Forensic Science International: Synergy 2 (2020) 608–669

Contents lists available at ScienceDirect

Forensic Science International: Synergy

journal homepage: https://www.journals.elsevier.com/forensic-science-international-synergy/

Interpol review of controlled substances 2016–2019☆

Nicole S. Jones [b, 1], Jeffrey H. Comparin [a, *]

[a] United States Drug Enforcement Administration, Special Testing and Research Laboratory, USA
[b] RTI International, Applied Justice Research Division, Center for Forensic Sciences, 3040 E. Cornwallis Road, Research Triangle Park, NC, 22709-2194, USA

ARTICLE INFO

Article history:
Received 6 January 2020
Accepted 23 January 2020
Available online 24 May 2020

Keywords:
Drugs
Controlled substances
DEA
Interpol

ABSTRACT

This review paper covers the forensic-relevant literature in controlled substances from 2016 to 2019 as a part of the 19th Interpol International Forensic Science Managers Symposium. The review papers are also available at the Interpol website at: https://www.interpol.int/content/download/14458/file/Interpol%20Review%20Papers%202019.pdf.

Prefacing remarks

- With the exception of synthetic cannabinoids and cannabimimetics, all references are subdivided by individual drug, drug group/class, or general topic, then chronologically (year only) within each subsection, then alphabetically by first author within each year. Synthetic cannabinoids and cannabimimetics are in a separate category (1.D), and are subdivided as individual compounds, groups of compounds, and finally as groups with other drugs.
- Many citations included in this report are dated prior to June of 2016, because they had not yet been abstracted prior to the 2016 report.
- All citations are formatted in accordance with Uniform Requirements for Manuscripts Submitted to Biomedical Journals.
- No restricted articles are cited in this report.

1. Routine and improved analyses of abused substances

Improved methods of analysis, i.e., faster, more discriminatory, more sensitive, less costly, etc., are needed for all abused substances. Additionally, standard analytical data are required for previously unknown or rarely encountered substances and/or new "designer drugs."

Drug seizures and clandestine laboratory operations are continuously monitored to provide a comprehensive overview of new developments. Ongoing research in the forensic community, as well as in the general fields of analytical chemistry and toxicology, provide new and/or improved methods of analysis for abused substances. Reports providing standard analytical data for new drugs of abuse and/or improved analytical protocols for known drugs of abuse are generated for the forensic and enforcement communities.

1.1. Individual compounds or substances (except individual synthetic cannabinoids and cannabimimetics, which are compiled under 1.D)

Alprazolam: 2016 adverse effects from counterfeit Alprazolam tablets [1]; Bromazepam and Alprazolam determination by CV and PV in pharmaceutical tablets Lexauring and Xanax [2]; **2017** microextraction method based on ultrasound-assisted surfactant-enhanced emulsification and solidification procedure with HPLC for quantification of alprazolam and chlordiazepoxide [3]; detection of alprazolam with a lab on paper economical device integrated with urchin like Ag@ Pd shell nano-hybrids [4], PLS-LS-SVM based modeling of ATR-IR for detection and qualification of alprazolam [5], stability of Alprazolam, Atropine Sulfate, Glutamine, Levofloxacin, Metoprolol Tartrate, Nitrofurantoin, Ondansetron Hydrochloride, Oxandrolone, Pregabaline, and Riboflavin in oral suspensions [6]; Triazolaminoquinoline, 5-chloro-(5-methyl-4H-

☆ Contains many citations published prior to June 1, 2016 – see Prefacing Remarks.

* Corresponding author.
E-mail address: Jeffrey.H.Comparin@usdoj.gov (J.H. Comparin).
[1] 70113th Street, N.W., Suite 750, Washington, DC 20005-3967.

https://doi.org/10.1016/j.fsisyn.2020.01.019

1,2,4-triazol-4-yl) benzophenone, triazolbenzophenone, and a-hydroxyalprazolam were identified as degradation products of Alprazolam by fluorescence spectroscopy and HPLC-MS [7].

2-Amino-1-(4-bromo-2, 5-dimethoxyphenyl)ethan-1-one (bk-2C–B): 2018 Identification of pyrolysis products of the new psychoactive substance 2-amino-1-(4-bromo-2,5-dimethoxyphenyl)ethanone hydrochloride (bk-2C–B) and its iodo analogue bk-2C–I [8].

Amphetamine: **2016** Determination of 1-phenyl-2-propanone (P2P) by HS-GC/MS in a material sold as "wet amphetamine" [9]; Amphetamine and derivatives in natural weight loss pills and dietary supplements by CE-MS/MS [10]; **2017** [11]; Accelerated quantification of amphetamine enantiomers using chiral liquid chromatography and on-line column-switching coupled with tandem mass spectrometry [12]; Identification of specific markers for amphetamine synthesized from the pre-precursor APAAN following the Leuckart route and retrospective search for APAAN markers in profiling databases from Germany and the Netherlands [13]; new approaches to gather information about the clandestine production of Amphetamine [14]; 'APAAN in the neck' - a reflection on some novel impurities found in seized materials containing amphetamine in Ireland during routine forensic analysis [15]; impurity profiling of the byproducts of the APAAN to P2P and AMS to P2P amphetamine synthesis to differentiate the synthesis route [16]; monitoring of the amphetamine-like substances in dietary supplements by LC-PDA and LC-MS/MS [17]; amphetamine and derivatives by DART- DMS [18]; investigation of the interaction of amphetamine with the pristine, B, Al, Ga (group IIIA), Si, and Ge (IIV group) doped C-60 fullerenes for use as sensors for amphetamine drug detection [19]; **2018** development of amphetamine-ion-selective microelectrodes using electrochemical polymerization and microfabrication technologies [20]; high-performance ion-selective microelectrode for the detection of amphetamine [21]; characterization of aqueous waste produced during the clandestine production of amphetamine by SPE GC-MS following the spectrometry and CE with contactless conductivity detection [22]; adsorption of amphetamine on BC3 nanosheet and nanotube for drug detection [23]; identification of specific markers for amphetamine synthesized from the pre-precursor APAAN following the Leuckart route and retrospective search for APAAN markers in profiling databases from Germany and the Netherlands using mass spectra, high resolution MS and NMR data [24]; impact of different storage conditions on the stability of amphetamine impurity profiles [25]; **2019** resin for enantio-selective extraction of R-amphetamine [26].

Butylone: 2018 Structure determination of butylone (NPS) using chiroptical and vibrational spectroscopies [27].

Carfentanil 2017 LC-MS/MS analytical method for the detection and quantification of carfentanil [28];

Cocaine: 2016 Thin layer chromatography coupled to paper spray ionization mass spectrometry for cocaine and its adulterants [29]; Electrochemical fingerprint of street samples for fast on-site screening of cocaine in seized drug powders [30]; Carbon nanotube beta-cyclodextrin-modified electrode for quantification of cocaine in seized street samples [31]; Analysis of Cocaine Using a Chemically Modified Electrode with Vanadium Hexacyanoferrate film by Cyclic Voltammetry [32]; Cocaine and benzoylecgonine on-site screening and confirmation [33]; A survey of adulterants used to cut cocaine in samples seized in the Espirito Santo State by GC-MS allied to chemometric tools [34]; automated fast screening method for Cocaine identification in seized drug samples using a portable Fourier transform infrared (FT-IR) [35]; analysis of cocaine/crack biomarkers by LC-MS [36]; Levamisole-adulterated cocaine (two fatal case reports) [37,38]; Cocaine classification using alkaloid and residual solvent profiling [39]; method development and validation for determination of Cocaine, its main metabolites and pyrolytic products by HPLC-UV-CAD [40]; voltammetric determination of cocaine using carbon screen printed electrodes chemically modified with Uranyl Schiff base films [41]; a label-free photoelectrochemical cocaine aptasensor based on an electropolymerized ruthenium-intercalator complex [42]; novel fluorescent aptasensor based on hairpin structure of complementary strand of aptamer and nanoparticles as a signal amplification approach for ultrasensitive detection of cocaine [43]; synthesis and characterization of novel molecularly imprinted polymer - coated Mn-doped ZnS quantum dots for specific fluorescent recognition of cocaine [44]; silica nanoparticle-based chemiluminescence biosensor for cocaine determination [45]; Selective determination of cocaine and benzoylecgonine in environmental samples by newly developed sorbent materials [46]; Cocaine and benzoylecgonine in drinking and source water [47]; Improvement of Electrochemical Response of Cocaine Sensors Based on DNA Aptamer by Heat Treatment [48]; novel electrochemical aptasensor for ultrasensitive detection of cocaine [49]; detection of Cocaine using Gravure Printed Silver Nanoparticle Based SERS Substrate [50]; electrochemical nanoaptasensor based on AuNPs for ultrasensitive determination of cocaine [51]; aptasensor for voltammetric and impedimetric determination of cocaine based on a glassy carbon electrode modified with platinum nanoparticles and using rutin as a redox probe [52]; removal of benzoylecgonine in water matrices by UV254/H2O2 process by using a flow microcapillary film array photoreactor [53]; specificity and ligand affinities of the Cocaine aptamer [54]; method for the determination of cocaine, cocaethylene and norcocaine using liquid phase microextraction and GC-MS [55]; direct quantitative analysis of cocaine by thin layer chromatography and quantification using a mobile phone application to process the multivariate calibration [56]; immunodetection of cocaine on banknotes [57]; combination of analysis of trace cocaine alkaloids, stable isotopes, and multivariate statistical analyses to classify illicit cocaine as originating from one of 19 growing regions within South America [58]; **2017** screening for cocaine on Euro banknotes by a highly sensitive enzyme immunoassay [59]; distribution of cocaine on banknotes in England and Wales [60]; double fluorescence assay via a beta-cyclodextrin containing conjugated polymer as a biomimetic material for cocaine sensing [61]; quantitative LC-MS/MS method for simultaneous determination of cocaine and its metabolites [62]; extraction method using magnetic carbon nanotubes to analyze cocaine and benzoylecgonine by GC-MS [63]; rapid classification and quantification of cocaine in seized powders with ATR-FTIR and chemometrics [64]; portable electrochemical method for cocaine quantification and rapid screening of common adulterants in seized samples [65]; competitive 'pseudo'-ELISA assay for measurement of cocaine and its metabolites using molecularly imprinted polymer nanoparticles [66]; aptamer folding-based sensory platform decorated with nanoparticles for simple cocaine testing [67]; lateral flow assay combined with a smartphone application for detection of cocaine [68]; diagnostic test for cocaine and benzoylecgonine using portable mass spectrometry [69]; review of adulterants identified in cocaine sold on the street [70]; ultra-high performance liquid chromatography-quadrupole-time of flight mass spectrometry for cocaine profiling [71]; profiling of illicit cocaine seized in China by ICP-MS for 26 inorganic elements [72]; direct fluorescence anisotropy assay for cocaine using tetramethylrhodamine-labeled aptamer [73]; isotopic fractionation of carbon, nitrogen, hydrogen, and oxygen during illicit production of cocaine base in South America [74]; analysis of cocaine and adulterating agents [75]; cocaine profiling by ATR-FTIR [76]; 2D gold nanoparticles film for cocaine detection using surface-enhanced Raman spectroscopy (SERS) [77]; chemometrics applied to chemical profiles of Cocaine

seizures [78]; LC-MS/MS dilute and shoot assay for benzoylecgonine with a LOQ of 5 ng/mL [79]; Cocaine classification method [80]; variation in chemical profiles within large seizures of cocaine bricks utilizing GC-MS and headspace GC-MS [81]; batch Variation within seizure Cocaine bricks (case study) [82]; quantification of cocaine in ternary mixtures using partial least squares regression applied to Raman and FTIR spectroscopy [83]; two methods to increase the signal/noise ratio for identification the cocaine and EBE by GC-MS [84]; aptamer-based nanopore biosensor method for cocaine detection [85]; electrochemically-reduced graphene oxide (ERGO) modified electrodes for the square-wave voltammetric detection of cocaine and adulterants paracetamol, caffeine and levamisole [86]; rapid analysis of cocaine and metabolites using microextraction in packed sorbent and GC-MS [87]; paper spray ionization mass spectrometry using the Dragendorff reagent for detection of cocaine, evamisole, lidocaine, caffeine, and phenacetin [88]; analysis of the interaction between the cocaine-binding aptamer using fluorescence spectroscopy [89]; potentiometric sensor based on molecularly imprinted nanoparticles for cocaine detection in concentrations between 1 nM and 1 mM [90]; Cocaine determination by IMS using molecular imprinting with LOD of 18mugL(-1) [91]; highly sensitive electrochemical aptasensor for detecting Cocaine [92]; presence of cocaine on circulating banknotes between 1974 and 2017 (a review) [93,94]; development of a new field-test procedure for cocaine [95]; profiling of cocaine seizures using GC-MS peak ratios [96]; magnetic lateral flow strip (MLFS) method for quantitative detection of cocaine in the linear detection range of 5–500 ng/mL [97]; magnetic dispersive solid-phase extraction for the detection of cocaine and cocaine metabolites by HPLC-MS with LOD of 0.09–1.10 ng/mL [98]; **2018** changes in illicit cocaine hydrochloride processing identified and revealed through multivariate analysis of cocaine signature data [99]; micro-HPLC-UV analysis of cocaine and adulterants in seized cocaine samples (2012 to 2017) [100]; external reference H-1 qNMR method for the determination of three major alkaloids -cocaine, cis-cinnamoylcocaine and trans-cinnamoylcocaine -in high purity cocaine seizures as applied to a set of 26 cocaine samples seized by the Brazilian Federal Police [101]; method for determination of the concentrations of cocaine, adulterants and diluents in cocaine samples employing Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR-FTIR) associated with Multivariate Curve Resolution with Alternating Least-Squares (MCR-ALS) [102]; analysis of 5 large cocaine seizures simultaneously with GC-MS, GC-FID and a portable FTIR spectrometer using ATR sampling combined with SVM models for sampling and fast analysis of large cocaine seizures [103]; comparison of portable IR spectrometers, portable Raman spectrometers, and color-based field tests for the on-scene analysis of cocaine [104]; sensor for cocaine detection in street samples [105]; multiple reactions monitoring to increase the signal/noise ratio in mass spectrometry analysis of cocaine and ethylbenzoylecgonine [106]; aptamer-based evanescent wave fibre (EWF) biosensor to rapidly detect cocaine in a wide working range [107]; ultrasensitive analyte detection by combining nanoparticle-based surface-enhanced Raman scattering (SERS) substrates with multivariate analysis for detection of cocaine in water [108]; method to quantify cocaine and adulterants (lidocaine, caffeine, phenacetin, procaine and benzocaine) using NMR spectroscopy without the use of deuterated solvents (No-D qNMR) [109]; MALDI-MS profiling and imaging for the analysis of fingermarks deposited on polymer banknotes (determination of ridge detail and detection of cocaine) [110]; HPTLC method for the simultaneous discrimination and quantification of cocaine and levamisole in seized samples [111]; micro-HPLC method for quantification of cocaine and its most common adulterants in seized samples [100]; Raman method for quantifying cocaine using atropine as the model analogue in various types of textiles [112]; characterization of cocaine in illicit drug samples by 1D and 2D NMR [113]; holographic sensor for the detection of cocaine [114]; **2019** determination of cutting agents in seized cocaine samples using GC-MS, GC-TMS and LC-MS/MS [115]; deconvolution procedure for levamisole determination in seized cocaine samples using screen-printed carbon electrodes and Square-wave voltammetry [116]; sensor for trace analysis of cocaine in water and body fluids [117]; analytical method for the separation and detection of cocaine and its adulterants, or cutting agents, using microchip electrophoresis devices [118].

Clobazam (7-chloro-1-methyl-5-phenyl-1,5-dihydro¬benzo [1,4]diazepine-2,4-dione): 2017 Potential impurities in clobazam: Identification, synthesis and characterization using HPLC, LC-ESI/MSn and NMR [119,120];

Codeine: 2016 Small study on spiking beer with preparations of codeine and acetaminophen to determine possible indications in drug-facilitated sexual assault [121] **2017** enantioselective synthesis of (−)-codeine [122]; **2018** synthesis of 1-Iodo-substituted Codeine derivatives [123]; synthesis of (−)-Codeine by application of temporary thio derivatization [124]; **2019** sensor for detection of codeine [125].

Cyclopropylfentanyl: 2018 analytical challenges of cyclopropylfentanyl and crotonylfentany (using HPLC-DAD, LC-MS/MS and LC-QToF-MS) [126]; **2019** synthesis, characterization and differentiation of cyclopropylfentanyl from E-crotonylfentanyl, Z-crotonylfentanyl, and 3-butenylfentanyl using NMR, GC-MS and FTIR [127].

Deschloroketamine (2-Methylamino2-phenylcyclohexanone): 2017 X-ray powder diffraction data, unit-cell parameters, and space group data for (S)-Deschloroketamine hydrochloride [128].

Desomorphine ("Krokodil"): 2016 identification of a complex mixture of opioids on krokodil street-like samples [129]; article presents the case of a user of krokodil and reviews the clinical symptoms of oral ingestion [130]; **2017** overview of krokodil's chemistry, pharmacology, metabolism, toxicology and analysis including dentification and quantification of desomorphine, contaminants and metabolites [131]; trace-Level Screening using DESI-MS and PSI-MS are implemented on a portable mass spectrometer for the direct analysis of desomorphine and precursor reagent codeine from multiple substrates of potential relevance to clandestine drug laboratory synthesis and paraphernalia seizure [132]; krokodil profiling conducted by RP-HPLC-DAD and LC-ESI-IT-Orbitrap-MS and desomorphine, codeine, and morphine, profiling with HRMS data [133]; cross-reactivity of desomorphine using six commercially available enzyme-linked immunosorbent assays [134];

Diazepam: 2016 Investigation of the solubility of diazepam in water plus tert-butyl alcohol solvent mixtures over temperature range [135]; voltammetric determination of diazepam using a bismuth modified pencil graphite electrode (BiPPGE) [136]; Direct-EI interface with LC-MS/MS in the fast determination of diazepam and flunitrazepam in alcoholic beverages [137]; determination of chlordiazepoxide and diazepam drugs using dispersive nanomaterial-ultrasound assisted microextraction followed by HPLC [138]; **2017** multivariate curve resolution - alternating least squares (MCR-ALS) analysis was used to quantify diazepam in thirty commercial liquid formulations reaching a relative error below of 1.66% against 2.56% [139]; rapid detection of Diazepam injection based on a droplet surface enhanced Raman spectroscopy (SERS) [140]; preferential solvation parameters of diazepam in binary solvent mixtures [141]; compatibility study between diazepam and tablet excipients investigated by thermal analysis (DSC and TG) and IR-spectroscopy [142]; Lab on paper chip integrated with silica coated gold nanorods (Si@GNRs) for electroanalysis of diazepam [143]; electrochemical determination of diazepam in real samples (commercial tablet, urine, and serum) based on fullerene-

functionalized carbon nanotubes/ionic liquid nanocomposite [144]; FIA-based TELISA biosensing strategy to rapidly detect diazepam in beverages [145]; **2018** flow injection system for differential pulse amperometry (DPA) for diazepam determination [146]; UV/Vis spectrophotometric method was developed and validated for estimation of diazepam in tablet dosage form [147]; differential pulse adsorptive cathodic stripping voltammetry using a hanging mercury drop electrode was used for the determination of diazepam and clonazepam [148]; development of a glassy carbon electrode for the voltammetric detection of diazepam [149]; **2019** determination of chlorinated byproducts of diazepam using SPE-LC-EI-MS/MS [150].

3,4-Dichloro-N-[2-(dimethylamino)cyclohexyl]-N-methylbenzamide (U-47700): 2016 analysis of powder for U-47700 performed using liquid-liquid extraction and UPLC-MS/MS in multiple reaction monitoring mode [151]; U-47700 obtained online [152]; **2017** review summarizing U-47700 chemistry, synthesis, pharmacology, toxicology and metabolism, as well as its international legal status [153]; review of U-47700 [154];

Diltiazem: 2016 A ternary hybrid matrix to prolong the release [155]; **2017** dissolution profiles of two diltiazem hydrochloride tablet formulations [156]; stability indicating HPLC method to determine diltiazem hydrochloride in tablets and compounded capsules [157]; **2019** voltammetric method for determination of diltiazem [158].

4,4′-Dimethylaminorex (4,4′-DMAR), "Serotoni"): 2017 website fora investigation documenting discussion of routes of administration and doses; desired effects; adverse effects; comparison with other drugs; association with other drugs; medications self-administered to reverse 4,4-DMAR action; overall impression; and provision of harm-reduction advice, etc. [159]; validated, sensitive HPLC-MS/MS method for quantification [160];

1,3-Dimethylamylamine (DMAA): 2017 review of available evidence on the harms of DMAA in relation to scheduling [161].

N,N-Dimethyltryptamine (DMT): 2018 review [162].

Eszopiclone: 2016 Determination and correlation of solubility and thermodynamic properties in pure and mixed solvents [163]; 2018 CPE-MABE extraction and analytical measurement using UV−Visible, HPLC and MS for detection of Eszopiclone [164];

Ethylone (3,4-Methylenedioxy-N-ethylcathinone): 2016 Identification, characterization and polymorphism of two conformational polymorphs of ethylone hydrochloride by FTIR, FT-Raman, powder XRD, GC-MS, ESI-MS/MS and NMR (C-13 CPMAS, H-1, 13C) [165]; **2018** Chemometric determination of ethylone in seized samples by DPV and SWV and validated by HPLC-DAD [166].

1-(4-ethylphenyl-)-N-[(2-methoxyphenyl)methyl] propane-2-amine (4-EA-NBOMe): 2018 LC-HR-MS/MS method for identification of the phase I and II metabolites of 4-EA-NBOMe [167].

Fenethylline (Captagon): 2016 Review of fenethylline including chemistry, synthesis, pharmacology and toxicology, legislation, prevalence and use as drug of abuse, analysis in biological or seized samples and reported Captagon-related cases and seizures [168]; **2017** technique to detect and quantify Captagon in waste water to aide in locating clandestine laboratories [169];

Fentanyl: 2016,160 distinct compounds were identified using GC/MS and LC-MS/MS-TOF in conjunction ICPMS to classify 87 route specific chemical attribution signatures (CAS) associated with the synthesis of fentanyl to determine origin [170]**;** counterfeit medications and Fentanyl [171]; **2017** Emergence of fentanyls on the Swedish NPS market [172]; establishing a surveillance study for early detection of fentanyl-laced heroin in Australia [173]; efforts to interrupt and suppress fentanyl supply result in evermore compact substitutes [174]; source attribution of fentanyl through impurity and stable isotope and trace element profiling [175]; signature profiling of illicit fentanyl and fentanyl-related seizures for tactical and strategic intelligence [176]; **2018** analysis of Fentanyl and 18 novel Fentanyl analogues and metabolites by LC-MS/MS [177]; overview of fentanyl [178]; fentanyls and the safety of first responders [179]; overview [180]; **2019** differentiation of 65 fentanyl and related substances, including various types of positional isomers, using low-field (62 MHz) H-1 NMR [181]; electrochemical sensor strip for analysis of Fentanyl [182]; validation of cross-reactivity of nine fentanyl analogues (2-fluorofentanyl, acetylfentanyl, acrylfentanyl, carfentanil, cyclopropylfentanyl, tetrahydrofuranylfentanyl, furanylfentanyl, ocfentanil, valerylfentanyl with the fentanyl ELISA kit [183];

Flubromazolam: 2016 Flubromazolam case report [184].

Flunitrazepam: 2016 magnetic graphene framework (MGF) as a magnetic solid-phase extraction adsorbent for the preconcentration of flunitrazepam from beverage samples prior to high resolution mass spectrometric [185]**; 2017** Portable Raman spectroscopy for the detection of the flunitrazepam in spiked beverages [186];

4-fluorobutyrfentanyl: 2017 identification and analytical characterization of a new fentanyl derivative, 4-fluorobutyrfentanyl (4-FBF), in seized powder and in the e-cigarette liquid [187];

Heroin: 2016 protocol for isolating B. anthracis and other bacteria applied to 82 samples of un-cut heroin [188]**; 2017** GC-FID method using nicotinamide as an internal standard for the quantitation of heroin in drug seizures [189]; **characterization of N,O(8)-diacetyl-O(14)-desmethyl-epi-porphyroxine (the C compound) and N-acetyl-O(14)-desmethyl-epi-porphyroxine (the B compound) to provide a forensic signature to determine region of origin** [190]; 87sr/86sr Isotopic analysis of Heroin-HCL to differentiate Mexican and South American Heroin [191]; determination of strontium isotope ratio (Sr-87/Sr-86) values by MC-ICP-MS [192]; **2018** a new way to consider fluctuations in heroin purity, mass and potential contribution to overdose [193]; method to extract opium poppy (Papaver somniferum L.) DNA from heroin samples for determining the source of an unknown heroin sample [194]; SPE-GC-MS method to identify heroin in adulterated beverage [195];

Human Growth Hormone (HGH) (and related substances): 2016 size-exclusion chromatographic method for the separation of the hGH somatropin from its high-molecular-weight aggregates [196]; **2017** cation exchange IEC-HPLC method to separate five position isomers of rhGH [197]; analysis of availability and quality of illegitimate somatropin products on the internet; somatropin content was determined using capillary electrophoresis with UV detection and ESI-MS [198]; **2018** review [199]; **2019** LC-HRMS/MS method for identification of a novel growth hormone releasing peptide (a glycine analogue of GHRP-2) in a seized injection vial [200].

Hydromorphone: 2018 Evaluation of the relative abuse of an OROS extended-release Hydromorphone HCI product [201];

Gamma-Hydroxybutyric Acid (GHB) (also gamma-Butyrolactone (GBL), 1,4- Butanediol (BD), and Tetrahydrofuran (THF)): 2016 Electro-oxidation of GHB using chronoamperometry and spectroelectrochemistry [202]; effect of temperature on the electro-oxidation of GHB analyzed by cyclic voltammetry, chronoamperometry, electrochemical impedance spectroscopy and SERS Spectroelectrochemistry [203]; **2017** study of endogenous GHB in a variety of drinks analyzed by GC-MS/MS [204]; method for simultaneous quantitative analysis of BHB and GHB by GC-MS [205]; real-time detection method for GHB using a iridium(III) chemosensor to produce luminescence signal that can be observed under UV illumination [206]; **2019** electrooxidation of GHB and ethanol by cyclic voltammetry and chronoamperometry [207]; detection of isomers of gamma-hydroxybutyrate using LC-ESI-MS/MS [208]; sensor for the detection of tetrahydrofuran in vapor form [209]; investigation of the formation, structure, and stability of Tetrahydrofuran [210].

Ibogaine: 2016 Quantification of Ibogaine and Voacangine in plants via GC-FID [211]; **2018** review [212].

2-(4-iodo-2,5-dimethoxyphenyl)-N-(2-methoxybenzyl) ethanamine (25I–NBOMe): 2017 Analytical confirmation of 25I–NBOMe using LC-ESI-MS/MS [213];

Ketamine: 2016 A review of the pattern of illegal use, regulations and analytical methods to detect ketamine [214]; review of ketamine abuse and diversion [215]; **2017** colorimetric sensor detection of ketamine in illicit drug samples with comparison to levels detected with FTIR-ATR and LC [216], a review of the nonmedical use and regulatory control of ketamine [217], Enantioseparation of (RS)-Ketamine using RP-HPLC [218]; false positive ketamine immunoassay caused by quetiapine [219]; history of ketamine and psychedelics [220]; **2018** electrochemical sensor for determination of ketamine [221]; review of chromatographic methods for ketamine and its metabolites norketamine and dehydronorketamine [222].

Lisdexamfetamine Dimesylate (LDX): 2016 Development, validation and comparison of two new stability-indicating liquid chromatographic methods using two detectors, an ultraviolet (UV) and a charged aerosol detector (CAD) simultaneously connected in series for the assessment of lisdexamfetamine dimesylate in capsules [223]; **2018** structurally characterized via LC-ESI-QTOF [224]; review including chemistry and pharmacology [225]; stability of LDX and identification of degradation product by NMR (1 H NMR, 13 C NMR, HSQC and HMBC) [226].

Lysergic Acid Diethylamide (LSD): 2016 characterization of 1P-LSD in comparison with LSD using various chromatographic and mass spectrometric methods, IR and NMR [227]; **2017** analytical characterization of powdered AL-LAD and LSZ tartrate samples and their semi-quantitative determination on blotter paper by NMR, GC-MS, low and high mass accuracy electrospray MS/MS, HPLC-DAD and GC solid-state IR analysis [228] development and validation of a microflow liquid chromatography (MFLC) tandem mass spectrometry method for the validated quantification of LSD, iso-LSD, 2-oxo 3-hydroxy-LSD (oxo-HO-LSD), and N-desmethyl-LSD (nor-LSD) [229]; self-reported patterns of use and effects of lysergic acid diethylamide (LSD) analogues (AL-LAD, 1P-LSD, and ETH-LAD) [230]; **2018** development and validation of a LC-MS/MS method for the quantification of LSD, iso-LSD, 2-oxo-3-hydroxy LSD (O–H-LSD), and nor-LSD [231].

Lysergic Acid Morpholide (LSM-775): 2018 analytical profile and pharmacological effects of LSM-775 [232].

Mephedrone (4-Methylmethcathinone): 2016 protocol to detect mephedrone via anthracene probe and NMR [233], **2017** GC-MS method for detection and quantification of mephedrone [234]; review of mephedrone including detection methods [235], comparison of different analytical methods (GC-MS, UHPLC-DAD, LC-MS/MS), to distinguish mephedrone and isomers (3-MMC, 2-MMC, buphedrone, metamfepramone and ethcathinone) [236]; **2018** sensor to detect mephedrone [237].

Metaphedrone (3-Methylmethcaathinone): 2019 review [238].

Methamphetamine: 2016 fluorescent film for detecting n-methamphetamine in vapor with a detection limit of 5.5 ppb [239], analysis of impurities in methamphetamine using a liquid-liquid extraction (LLE) method and analysis by GC-FID [240]; electrochemiluminescence for the direct detection of methylamphetamine and other amphetamine type stimulants in street samples and biological matrices without the need for pretreatment or extraction [241]; capillary microextraction for sampling of methamphetamine vapor at clandestine laboratories [242]; method to estimate the consumption and prevalence of methamphetamine based on wastewater analysis [243]; impurity characterization of seized methamphetamine crystals by GC-MS [244]; visual detection of methamphetamine and MDMA in the low micromolar range using gold nanoparticles as a colorimetric probe [245]; optimization of an electrochemical method to detect methamphetamine [246]; estimation of the synthetic routes of seized methamphetamines using GC-MS and multivariate analysis [247]; G-quadruplex-hemin DNAzyme molecular beacon probe for the detection of methamphetamine [248]; improved chiral separation of Methamphetamine enantiomers Using CSP-LC-MS/MS [249]; **2017** benchtop NMR for the analysis of samples from suspected clandestine laboratories [250]; impurity profiling of methamphetamine synthesized from clandestine methylamine [251]; remediating interior building surfaces contaminated by methamphetamine [252]; mobile application with evidence-based information on crystal methamphetamine [253]; airborne methamphetamine sampling using capillary microextraction [254]; chiral supercritical fluid chromatography method for differentiation of methamphetamine enantiomers in forensic samples [255]; mathematical separation instead of conventional chromatographic approaches to resolve trace impurities embedded in the methamphetamine peak [256]; isolation and characterization of trans-N-methyl-4-methyl-5-phenyl-4-penten-2-amine hydrochloride, trace processing impurity found in some methamphetamine samples [257]; fluorescence and chemiluminescence procedures for methamphetamine determination [258]; **2018** developed a simple and effective physical characteristic profiling method for Methamphetamine tablets with capital letter WY logos, which realized the discrimination between linked and unlinked tablet seizures from 2011 to 2015 in China, indicating the existence of a huge clandestine factory incessantly manufacturing methamphetamine tablets [259]; a dilute-and-shoot UHPLC-MS/MS method for the simultaneous identification and quantitation of 23 organic manufacturing impurities in illicit methamphetamine [260]; a complete synthesis of methamphetamine and analysis of the final product by both GC-MS and ESI-MS to identify impurities [261]; synthesis of a new extraction medium based on a deep eutectic solvent comprising choline chloride and phenylethanol followed by HPLC-UV analysis for the detection of methamphetamine in complex matrices [262]; fluorometric aptasensor for methamphetamine based on fluorescence resonance energy transfer using cobalt oxyhydroxide nanosheets and carbon dots [263]; pH assisted homogeneous liquid-liquid microextraction followed by GC-MS for determination of methamphetamine [264]; adsorption of methamphetamine on Ag nanoparticles dispersed in agarose gel for the detection of methamphetamine in fingerprints by SERS [265]; electrochemical detection method for screening of methamphetamine in the forensic samples using electrochemiluminescence and voltammetric techniques [266]; aptamer-modified carbon nanomaterial based sorption coupled to paper spray IMS for determination of methamphetamine [267]; C-13 and N-15 values of 30 nature ephedra plants, 12 synthetic ephedrine/pseudoephedrine (ephedrine), 14 natural ephedrine, and 987 seized methamphetamine samples were measured to determine the application for methamphetamine profiling [268]; isotope ratio-MS (IRMS) as a profiling tool for methylamphetamine [269]; UHPLC-MS/MS for the detection and quantitation of organic impurities in methamphetamine for profiling [260]; structure identification of a diphenhydramine-related impurity in methamphetamine using ESI-CID-MS and NMR [270]; C-13 and N-15 stable isotope analyses of the 30 nature ephedra plants, 12 synthetic ephedrine/pseudoephedrine (ephedrine), 14 natural ephedrine, and 987 seized methamphetamine for profiling [268]; **2019** impurity analysis of methamphetamine and its precursors by supercritical fluid chromatography-MS/MS [271];

Methaqualone: 2018 Palladium-catalyzed four-component carbonylative synthesis of 2,3-disubstituted quinazolin-4(3H)-ones: methaqualone preparation [272].

Methcathinone: 2018 Simultaneous enantioseparation of

methcathinone and two isomeric methylmethcathinones using CE [273]; diffusive gradients in thin films (DGT) to simultaneously measure methcathinone and ephedrine in surface water [274]; **2019** Ephedrone (methcathinone) hydrochloride and its fundamental derivatives N-acetylephedrine and N-acetylephedrone were analyzed by GC-MS, NMR, IR and Raman spectroscopy and X-ray crystallography [275].

Methoxetamine (MXE): 2016 salting-out-assisted liquid-liquid extraction and analysis by LC-MS [276]; report on the motivations for use, effect profile and prevalence of use of Methoxetamine [277]; review of methoxetamine case reports [278]; **2017** Synthesis of methoxetamine, its metabolites and deuterium labeled analog as analytical standards analyzed and separated using HPLC and chiral capillary electrophoresis [279]; X-ray powder diffraction data for MXE-HCL [280]; **2018** X-ray powder diffraction data for MXE-HCL [281];

2-Methoxydiphenidine (2-MXP): 2016 analytical characterization of three suspected 2-MXP powdered samples obtained from three Internet retailers in the United Kingdom and analyzed by GC and HPLC coupled to various forms of MS, NMR, IR and TLC to differentiate synthesis routes [282]; **2018** UHPLC-UV separation of the regioisomers of MXP [283].

3-Methoxy-2-(methylamino)-1-(4-methylphenyl)propan-1-one (Mexedrone): 2017 Synthesis and analytical characterization of mexedrone and the differentiation from its isomer, N-methoxymephedrone [284];

4-[1-(3-methoxyphenyl)cyclohexyl]morpholine (3-MeO-PCMo): 2018 Synthesis, analytical and characterizations of the "legal high' 3-MeO-PCMo and analogues [285];

3,4-Methylenedioxymethamphetamine (MDMA): 2016 High-resolution magic angle spinning NMR spectroscopy for enantiomer discrimination of MDMA [286]; MALDI-QqQ-MS/MS detection of MDMA [287]; library search-based screening system MDMA in ecstasy tablets using a portable near-infrared (NIR) spectrometer [288]; detection and quantification of MDMA and PMA simultaneously through an electrochemical voltammetric technique using screen-printed graphite electrodes (SPEs) [289]; synthesis and characterization of MDMA derived from a catalytic oxidation of material isolated from black pepper characterized by GC-MS to give a contaminant profile of the synthetic pathway and route specific impurities [290]; current aspects of MDMA use in France [291]; development of a library search-based screening system for MDMA in ecstasy tablets using a portable near-infrared (NIR) spectrometer [292]; overview of the history of MDMA in the United States, 1960–1979 [293]; assignment of batch membership of 3,4-methylenedioxy methylamphetamine hydrochloride by comparison of organic impurity profiles reported as similarity measures (Pearson correlation coefficient, reported as the modified Pearson distance, and its Fisher transform) between impurity content of pairs of samples manufactured using four common reductive amination routes [294]; **2017** Identification and characterization of N-tert-butoxycarbonyl-MDMA: a new MDMA precursor; using a combination of NMR, GC-MS, IR spectroscopy, and synthesis [295]; a new methodology that involves coupling HF-LPME and fiber-spray to improve the limit of detection after microextraction by 360-fold for MDMA achieving a limit of detection of 2 ng/mL [296]; Mesoporous silica nanoparticles used for the selective and sensitive fluorogenic detection of MDMA [297]; analysis of data collected from the colorimetric analysis of 529 Molly and Ecstasy pills for MDMA by the pill-testing organization, DanceSafe, from events across the United States from 2010 to 2015 [298]; **2018** review [299]; SERS detection of "difficult" aromatic targets such as 3,4-methylenedioxymethamphetamine with unmodified aggregated Au colloids [300];

Methylenedioxypyrovalerone (MDPV): 2016 GC-MS and GC-IRD studies on aminoketone designer drugs related to MDPV [301]; drug concentrations of MDPV in driver specimens [302]; **2017** combination of GC-MS, MS/MS and GC-IR techniques were used to characterize the ring substitution pattern, the alkyl side-chain and the cyclic tertiary amine portions of a series of six homologous and regioisomeric methylenedioxyphenyl-aminoketones related to MDPV [303];

β-Methylphenylethylamine (BMPEA): 2016 LC-QTOF analysis of Acacia rigidula dietary supplements run in triplicate for detection of the presence of BMPEA and confirmed by accurate mass, retention time and mass spectra match against a reference standard [304]; **2017** study to determine whether dietary supplements contained amphetamine and amphetamine-like substance, including beta-phenylethylamine (beta-PEA) and BMPEA using LC-PDA and LC-MS/MS [305];

Mianserin (a psychoactive tetracyclic antidepressant)**: 2016** selective micro-electromembrane extractions (mu-EMEs) of the colored indicators metanil yellow and congo red (visual proof-of-principle) and the small drug substances nortriptyline, papaverine, mianserin, and citalopram(model analytes) based on their acid-base strength [306]; MALDI- QTOF- MS method for the analysis of six tricyclic antidepressants (ADs) and their related drugs, such as amitriptyline, carbamazepine, clomipramine, imipramine, nortriptyline, quetiapine, and two tetracyclic ADs, mianserin and mirtazapine, because these eight drugs are commonly observed medicines in poisoning cases in Japan [307]; **2017** chemometric evaluation of the combined effect of temperature, pressure, and co-solvent fractions on the chiral separation of basic pharmaceuticals (alprenolol, atenolol, metoprolol, propranolol, clenbuterol, and mianserin) using SFC [308]; development of hydrophilic interaction liquid chromatography-ESI/MS/MS method for the determination of olopatadine in tear matrix using Mianserin hydrochloride as an internal standard [309]; synthesis and characterization of tetrabutylammonium and tetramethylammonium amino acid salts (chiral anions: 1-leucine, 1-proline, 1-histidine) to investigate their effect on chiral separations of ondansetron, mianserin, and ofloxacin using CE [310].

Midazolam: 2016 chemical characterization of the photodegradation products of midazolam complexes with randomly methylated-beta-cyclodextrin by HPLC and LC-MS/MS [311]; **2018** molecularly imprinted polymer (MIP) nanoparticles were used as recognition elements for development of a new electrochemical sensor for selective and sensitive determination of midazolam [312];

Morphine: 2016 A voltammetric sensor for determination of paracetamol in the presence of morphine [313]; a short cascade strategy for the stereoselective synthesis of morphine [314]; extraction of morphine from poppy seeds [315]; HPLC method for the simultaneous determination of morphine sulfate and naltrexone hydrochloride content in bulk, solid dosage forms [316]; life cycle assessment from opium poppy farming to the packaging of morphine [317]; LC-HRMS for the characterization of transformation products and comparison between irradiated samples and those that have not been irradiated [318]; determination of Morphine in pharmaceutical products by on-line SPE-HPLC [319]; **2017** solid state vibrational spectroscopic properties of morphine sulfate pentahydrate studied using FTIR-ATR [320]; review of the research progress on the synthesis of Morphine alkaloids [321]; Impurity profiling of morphine by LC-HESI-MS [322]; design and synthesis of carboxylic group functionalized hollow microporous organic capsules for encapsulation of morphine for prolonged release [323]; characterization of Morphine, Morphine Hydrochloride, and their Hydrates using 1-dimensional and 2-dimensional solid-state NMR and complemented with powder X-ray diffraction, FTIR, and Raman [324]; one-pot multicomponent

approach to synthesize a new series of morphine derivatives [325]; high-performance thin-layer chromatography-densitometry method for the quantitative analysis of morphine in the tablets of the Ayurvedic medicines [326]; tandem Brook rearrangement/silicon Polonovski reaction/fragmentation to give formamide derivatives in moderate yields [327]; asymmetric total synthesis of (−)-morphine [328]; stability studies of opioid analgesic, morphine-6-O-sulfate in various buffers and biological matrices and analyzed by HPLC-DAD analysis [329]; Quantum dots (QDs)-labeled antibody fluorescence immunoassays (FLISA) for the rapid detection of morphine for on-site screening of poppy shell added illegally in hot pot soup base [330]; rapid construction of the 6/6/5 tricyclic framework via a tandem radical cyclization reaction [331]; Arymo ER - a new abuse deterrent Morphine formulation [332]; ALERRT((R)) to quantitative measure the effort required to compromise prescription opioid abuse-deterrent tablets [333]; comparison of the abuse potential of intact and manipulated morphine abuse-deterrent, extended-release injection-molded tablets (morphine-ADER-IMT) with morphine sulfate ER tablets [334]; compare abuse potential after insufflation of manipulated morphine abuse-deterrent, extended-release injection-molded tablets (morphine-ADER-IMT) with that of marketed morphine ER tablets [335]; synthesis of morphinans using a programmed serial stereochemical relay [336] **2018** novel electrochemical sensor fabricated by embedding ZnO nano particles on MWCNT for morphine detection in the linear range of 0.1 to 700 mu mol L-1 and in the detection limit of 0.06 mu mol L-1 (3s) [337]; synthesis of morphine analogue using the Wagner-Jauregg reaction [338]; asymmetric synthesis of morphine and (nor)hasubanan alkaloids from (+)-Stephadiamine, an unusual alkaloid isolated from the vine Stephania japonica [339]; compatibility and stability of several mixtures of haloperidol and morphine in solution [340]; optical nanosensor for measurement and detection of morphine using CdS quantum dots (CdS-QDs) [341]; method for fluorometric determination of morphine via its effect on the quenching of fluorescein by gold nanoparticles through a surface energy transfer process [342]; characterization of the absorption profile of morphine after manipulation of morphine sulfate extended-release tablets with or without abuse-deterrent properties [343]; use of smartphones for quantitative chemiluminescence detection of morphine as a model analyte on a TLC plate [344]; magnetic carbon nanotubes were synthesized and applied as nanoadsorbent for the simultaneous solid phase extraction of codeine and morphine prior to analysis by HPLC [345]; effect of anodic treatment of titanium/tetrahedral amorphous carbon electrodes on the electrochemical detection of morphine and paracetamol [346]; synthesis, characterization and application of magnetic carbon nanotubes for the simultaneous SPE- HPLC determination of codeine and morphine in opium and tablet samples [345]; **2019** an optical nanosensor for the detection and measurement of morphine [347]; fluorescent nanosensor for morphine detection [348]; electrode modification to determine morphine [349];

Oxycodone: 2016 evaluation of the susceptibility to tampering of biphasic immediate-release oxycodone/acetaminophen tablets compared with IR OC/APAP tablets [350]; evaluation of trends of diversion, abuse and street price of OxyContin to assess the durability of the initial reduction in abuse of abuse deterrent formulations [351]; **2017** Long-term efficacy and safety of oxycodone-naloxone prolonged-release formulation (up to 180/90 mg daily) [352]; design and evaluation of an extended-release matrix tablet formulation (oxycodone); the combination of hypromellose acetate succinate and hydroxypropylcellulose [353]; abuse potential of Oxycodone DETERx (R) (Xtampza (R) ER) [354]; development and characterization of a mucoadhesive sublingual formulation (oxycodone film) [355]; evaluation of a newly-developed oxycodone prolonged-release tablet [356]; **2018** Roxybond - abuse-deterrent formulation of immediate-release Oxycodone [357]; study of the introduction of an abuse-deterrent version of OxyContin in 2010 [358]; trends and uptake of new formulations of controlled-release oxycodone in Canada [359]; abuse-deterrent formulations of Oxycodone hydrochloride immediate-release analgesic for managing severe pain [360]; evaluation of the impact of OxyContin reformulation [361]; effect of a potentially tamper-resistant oxycodone formulation on opioid use and harm [362]; evaluation of the safety, tolerability, and analgesic efficacy of Oxycodone DETERx extended-release (ER) and abuse-deterrent capsules (Xtampza (R) ER) [363]; total synthesis of the pharmacologically significant morphinan alkaloid, oxycodone [364]; abuse potential of the new opioid analgesic Molecule NKTR-181 compared with Oxycodone [365]; **2019** synthesis of (−)-Oxycodone via anodic aryl-aryl coupling [366].

Phenazepam: 2017 Detection of phenazepam in illicitly manufactured Erimin 5 tablets [367];

Phencyclidine (PCP): 2016 Synthesis of phencyclidine derivatives with modified aromatic or cycloalkyl rings and amino group [368]; 2017 Synthesis of novel derivatives of Phencyclidine with substituted aminobenzothiazoles [369]; **2018** review of the history, importance, synthesis (both legal and clandestine), pharmacology, drug metabolism, and folklore of PCP [370];

Phenobarbital: 2016 Phenobarbital loaded microemulsion for a transdermal drug delivery application [371]; energy contributions from competing hydrogen-bonded structures in six polymorphs of phenobarbital [372]; application of Ni:ZnS nanoparticles loaded on magnetic multi-walled carbon nanotubes as a sorbent for dispersive micro-solid phase extraction of phenobarbital and phenytoin prior to HPLC analysis of plasma, urine and water samples [373]; **2017** development of an electrochemical sensor based on the reduced graphene oxide/Pt nanopartides nanocomposite immobilized on modified glassy carbon electrode for the determination of phenobarbital and droxidopa [374]; preferential solvation parameters of phenobarbital in aqueous binary mixtures of 1,4-dioxane, t-butanol, n-propanol, ethanol, propylene glycol and glycerol were derived using the IKBI method [375]; application of a CaWO4 semiconductor to the phenobarbital electro-photocatalysis under UV/C irradiation [376]; **2018** SERS method for the quantitative detection of Phenobarbital in an injectable solution [377]; modified dispersive liquid phase microextraction for simultaneous separation/preconcentration of trace amounts of phenobarbital and phenytoin [378]; **2019** fluorescence sensor for the detection of phenobarbital [379].

Phenyl Acetyl Carbinol (L-PAC and R-PAC): 2016 catalytic asymmetric synthesis of chiral 2-hydroxy ketones using different thiamine diphosphate dependent enzymes including synthesis of (R)and (S)-phenylacetylcarbinol using Lactococcus lactis and Acetobacter pasteurianus [380]; biotransformation of benzaldehyde into L-PAC using yeast Saccharomyces cerevisiae [381]; **2017 i**mprovement of the yeast based (R)-phenylacetylcarbinol production process via reduction of by-product formation [382]; improved enzymatic method for the preparation of (R)-phenylacetyl carbinol [383]; asymmetric synthesis of (S)-phenylacetylcarbinol [384]; **2018** Biotransformation using halotolerant yeast in seawater to produce R-(−)-phenylacetylcarbinol [385]; effect of phosphate concentrations at 20, 250, 500, and 1,000 mM on phenylacetylcarbinol production [386]; Stereoselective synthesis of (1R, 2S)-norephedrine through the biosynthetic of L-phenylacetylcarbinol from benzaldehyde and pyruvate [387]; synthesis of novel beta-amino alcohols from phenylacetylcarbinol [388]; ethanol and phenylacetylcarbinol production processes of Candida tropicalis TISTR 5306 and Saccharomyces cerevisiae TISTR 5606 [389];

Phenyl-2-propanone (P2P, Phenylacetone): 2016 Wickerhamomyces subpelliculosus as whole-cell biocatalyst for stereoselective bioreduction of ketones including phenylacetone [390]; a covalent immobilization method of a flavoprotein monooxygenase via its flavin cofactor tested for phenylacetone monooxygenase [391]; **2017** catalytic mechanism of Phenylacetone monooxygenase for the native substrate phenylacetone as well as for a linear non-native substrate 2-octanone, using molecular dynamics simulations, quantum mechanics and quantum mechanics/molecular mechanics calculations [392]; **2018** conversion of a non-native linear substrate 2-octanone and the native substrate phenylacetone, catalyzed by the WT enzyme and a quadruple variant P253F/G254A/R258M/L443F [393];

Pregabalin: 2016 Direct Separation of Pregabalin enantiomers using a Zwitterionic chiral selector and analysis by two HPLC methods including detection by MS and UV [394]; results of a national study of Pregabalin abuse in France [395]; preparation and evaluation of floating tablets of pregabalin prepared in differing concentrations of xanthan and guar gum [396]; review article on the use of separation techniques including HP-TLC, HPLC, GC and electrophoresis in the determination of antiepileptic drugs including pregabalin (also includes eslicarbazepine acetate, levetiracetam, lacosamide, oxcarbazepine, and retigabine) [397]; study of the abuse potential of pregabalin [398,399]; validated fluorometric UHPLC method to measure pregabalin [400]; Thermomyces lanuginosus lipase for the efficient production of (S)-2-carboxyethyl-3-cyano-5-methylhexaoic acid used as chiral intermediate for pregabalin [401]; **2017** gabapentin diversion and misuse from 2002-2015 based on law enforcement-derived data [402]; abuse and misuse of Pregabalin and Gabapentin [403]; Pregabalin misuse and abuse reported to US Poison Centers [404]; synthesis of (+/−)-Pregabalin by using a three-step sequential-flow system with heterogeneous catalysts [405]; survey of the use of pregabalin among users of illicit drugs in Southern Germany [406]; systematic review of the effectiveness of policies restricting access to pregabalin [407]; Pregabalin abuse in Munich [408,409]; **2018** literature review of the abuse potential of pregabalin [410]; formulation of controlled-release tablets containing 150 mg pregabalin [411]; pregabalin immediate release tablets were prepared by direct compression method using central composite design with response surface methodology [412]; Preparation and evaluation of non-effervescent tablets containing pregabalin [413]; synthesis method of racemic Pregabalin, Baclofen and 3-Phenibut involving Lossen rearrangement [414]; Pregabalin misuse in methadone maintenance treatment patients in Israel [415]; **2019** validated GC/MS for the evaluation and quantification of pregabalin in pharmaceutical preparations [416];

Propofol: 2016 azo-coupling derivatization by sequential injection coupled with spectrophotometric detection for propofol analysis [417]; **2017** 1,2-Dimethylimidazole-4-sulfonyl chloride derivatization for the analysis of propofol by LC-ESI-MS/MS [418]; survey of 48 forensic medicine departments in Germany, Austria and Switzerland concerning autopsies carried out between 2002-2112 on medical personnel involving the suspected abuse of propofol [419]; **2018** Propofol-dependence potential and forensic relevance [420]; Propofol monitoring [421,422]; **2019** ESI-LC-MS/MS analysis with two multiple reaction monitoring analyte (without derivatization) for detection of propofol [423];

Alpha-Pyrrolidinopentiophenone (Flakka, alpha-PVP): 2016 review of the chemistry, synthesis, metabolism, pharmacology, and toxicology; any related cases and seizures, existing analytical methodologies for the determination of alpha-PVP and its current legal status [424]; quantitative analysis of NPS containing alpha-PVP by DART-TOF-MS [425]; **2017** seized products screened by GC-MS followed by quantification of alpha-PVP by UPLC-PDA [426]; **2018** case report and literature review [427]; **2019** review [428]; survey of use amount high school seniors [429]; review [430];

Scopolamine: 2016 scopolamine synthesized from over-the-counter butylscopolamine (Buscopan (R)) [431]; **2017** FRET-based optical nanobiosensor to detect scopolamine in natural and transgenic hairy roots extracts of Atropa belladonna [432]; detection of Scopolamine Hydrobromide via SERS [433]; determination of atropine and scopolamine in buckwheat and related products using modified QuEChERS and LC-MS/MS [434]; **2018** detection of scopolamine and atropine in organic buckwheat (Fagopyron esculentum L.) products by UHPLC-MS/MS [435]; improving detection window of scopolamine [436]; **2019** Structural, FT-IR, FT-Raman and ECD studies on the free base, cationic and hydrobromide species of scopolamine alkaloid [437]; isolation and structural elucidation of scopolamine as a secondary metabolite of Hyoscyamus albus using (UV, IR, NMR, and EI-MS) [438]; TLC-ESI/MS method for scanning and characterizing chemical compounds including scopolamine and norscopolamine on the TLC plates [439]; batch injection analysis with square wave voltammetric for screening and detection of Scopolamine in beverages (beer, coke, energy drink, sugarcane spirit, vodka, and whisky) [440]; modified QuEChERS method coupled with LC-ESI+/MS-MS for the simultaneous detection and quantification of three botanical alkaloids including scopolamine, L-hyoscyamine, and sparteine residues [441].

Sibutramine: 2016 spectrofluorometric method for analysis of sibutramine, indapamide and hydrochlorothiazide compounds in weight-reducing tonic samples [442]; enantiomeric separation of Sibutramine by capillary zone electrophoresis using cyclodextrins as chiral selectors [443]; determination of Sibutramine in slimming food supplements by a validated HPLC-ES-MS/MS method [444]; thermal behaviors of racemic sibutramine hydrochloride monohydrate as well as that of the anhydrous state were investigated by differential scanning calorimetry (DSC) [445]; a 'natural' weight loss product containing sibutramine [446]; simultaneous detection of sibutramine and phenolphthalein by CE [447]; **2017** ATR-FTIR spectroscopic method to detect sibutramine in dietetic herbal foods, teas and dietary supplements [448]; identification of sibutramine using a fully integrated GC/FT-IR/MS instrument [449]; SERS method for detection of Sibutramine HCL in seven types of commercial slimming capsules [450]; **2018** continuation of Lanzarotta's 2017 study using fully integrated GC-FT-IR-MS to identify and confirm the presence of sibutramine and AB-FUBINACA [451]; HPLC-PDA, LC-Q-TOF/MS, FT-IR, and NMR for isolation and structural characterization of a novel sibutramine analogue, chlorosipentramine, in a slimming dietary supplement [452]; LC-MS/MS (ESI) method for detecting sibutramine in herbal supplements [453]; **2019** identification of slimming agents apprehended in Brazil using FTIR, Differential Scanning Calorimetry and GC-MS including the comparison of the efficiency of solid-liquid extraction and microwave-assisted extraction [454]; portable square-wave voltammetric method for fast screening and quantification of sibutramine in herbal formulations and dietary supplements samples [455].

Tapentadol: 2016 Diversion and illicit sale of extended release tapentadol in the United States [456]**;** literature review on tramadol related scientific studies [457] **2017** Systematic review and meta-analysis of the efficacy and safety of tapentadol [458]; synthetic routes towards homochiral tapentadol [459]; **2018** efficacy and safety of tapentadol prolonged release formulation [460]; assessment of tapentadol API Abuse Liability [461]; review of tapentadol [462]; incorporation of tapentadol into validated screening and quantitative methods [463]; HPLC method (LC-MS compatible) developed and validated for identification and characterization of tapentadol and degradation products [464]; **2019** electrochemical sensor for determination of tapentadol in the presence of

paracetamol in pharmaceutical samples [465]; optical, thermal, spectroscopic and structural analyses of the phase transformation occurring in tapentadol hydrochloride was studied using single-crystal X-ray diffraction, differential scanning calorimetry and Raman scattering measurements [466].

Testosterone: 2016 high-resolution C-13 NMR spectroscopy compared to H-1 NMR for the detection of cation chelation and cation-induced signal shift effects for testosterone [467]; HPLC-DAD method for quantification of testosterone esters in an oil-based injectable dosage form [468]; availability and acquisition of illicit anabolic androgenic steroids and testosterone preparations on the internet [469]; **2017** UHPLC-ESI analysis of testosterone and other steroids in drinking water [470]; AB-ELISA method for the detection of testosterone and other anabolic androgenic steroids in dietary supplements [471]; electrochemical biosensor for determination of testosterone via electrochemical impedance spectroscopy measurements [472]; TLC method for quantification of synthetic testosterone derivative, methyltestosterone, in pharmaceutical formulations [473]; SPE-LC-MS/MS method for determination of testosterone and other endocrine disrupting compounds in tropical estuarine sediments [474]; biosensor system based on biolayer interferometry for quantitative determination of testosterone in the environment [475]; **2018** SPE/LC-(ESI) MS-MS method for simultaneous quantitative monitoring of testosterone and related pharmaceuticals and hormones in environmental water samples [476]; molecularly imprinted polymer photonic film for the detection of testosterone in water [477,478]; **2019** certification of a testosterone calibration standard and detection and quantification of impurities using GC-FID and NMR [479]; SPE-UHPLC-MS/MS method for detection of 13 hormones including testosterone in diverse water matrices [480];

Tianeptine: 2017 Case report of Tianeptine use purchased on the internet in the United States [481]; gold and silver nanoparticle electrodes combined with amperometric monoaminoxidase biosensors for the determination of tianeptine and other antidepressant drugs (moclobemide and amitriptyline) [482]; 2018 case reports of two known tianeptine fatalities in the United States [483]; characteristics of Tianeptine exposures reported to the National Poison Data System - United States, 2000–2017 [484,485]; New York State Poison Control Centers experience with calls related to tianeptine [486].

Tramadol: 2016 Potentiometric selective electrodes designed for the electrochemical determination of tramadol hydrochloride in bulk, Pharmaceutical formulations (also applied to plasma and urine) [487]; cyclic voltammetry for the determination of tramadol (also paracetamol and caffeine) [488]; RP-HPLC method for the simultaneous analysis of tramadol hydrochloride and dicyclomine in bulk and tablet dosage form [489]; all-solid-state ion selective electrode for the determination of Tramadol Hydrochloride [490]; electrochemical sensor fabricated based on a glassy carbon electrode for determination of tramadol in pharmaceutical and biological samples [491]; all solid state polymeric membrane electrode for analysis of tramadol hydrochloride in pharmaceutical formulations [492]; UV spectrophotometric method for simultaneous determination of paracetamol and tramadol in paracetamol-tramadol tablets [493]; formulation and dissolution kinetics study of hydrophilic matrix tablets with tramadol hydrochloride and different co-processed dry binders as possible controlled release formulations [494]; colorimetric method for estimation of tramadol hydrochloride in pure and tablet dosage forms [495]; predictive pharmacokinetics of tramadol hydrochloride floating tablets [496]; **2017** electrochemical imprinted sensor for determination of tramadol by combination of a functionalized multiwall carbon nanotubes and a thin molecularly imprinted film [497]; RP-HPLC method for simultaneous quantitation of tramadol and aceclofenac [498]; voltammetric determination of tramadol [499]; electrochemical determination of tramadol and paracetamol [500]; review article on tramadol [501]; electrochemical sensors for the determination of tramadol hydrochloride in pharmaceutical formulations [502]; glassy carbon electrode for determination of warfarin and tramadol in pharmaceutical compounds [503]; anisotropic (spherical/hexagon/cube) silver nanoparticle embedded magnetic carbon nanosphere as platform for designing of tramadol imprinted polymer [504]; synthesis of phosphorylated derivatives of cis-tramadol and analysis by IR, NMR (H-1, C-13, P-31), mass spectra, and C, H, N [505]; development of controlled release matrix tablets of tramadol [506]; enantiomeric separation of tramadol by LC with fluorescence detection [507]; **2018** LC-MS/MS Quantification of Tramadol and Gabapentin Utilizing Solid Phase Extraction [508]; liquid-liquid microextraction combined with GC-FID for the quantification of methadone and tramadol [509]; sensor for the determination of tramadol in pharmaceutical and biological samples [510]; 15-year overview of increasing tramadol utilization and the impact of tramadol classification in the United Kingdom [511]; sensor for tramadol determination [512]; controlled release subcutaneous formulation for tramadol hydrochloride [513]; CE method for simultaneous chiral separation of tramadol and methadone [514]; **2019** LC-MS/MS method for simultaneous determination of tramadol hydrochloride in the presence of some suspected mislabeled drugs such as alprazolam, diazepam, chlorpheniramine maleate, diphenylhydramine and paracetamol (application to counterfeit samples) [515]; FIA using an electrode to quantify tramadol hydrochloride in pure solutions and pharmaceuticals [516]; electrochemical sensor for determination of nalbuphine and tramadol [517]; glassy carbon electrode for simultaneous determination of tramadol and acetaminophen [518]; high performance chemiluminescence system for the detection of tramadol [519].

Zolpidem: 2016 electrochemical method was developed and validated for the voltammetric determination of zolpidem using a disposable pencil graphite electrode [520]; **2018** review of dosage forms of Zolpidem [521]; appearance, taste, and concentrations of zolpidem dissolved in still water and carbonated beverages determined by HPLC-MS/MS [522]; patterns of zolpidem use among Iraq and Afghanistan veterans [523]; **2019** electrochemical sensor for detection and determination of zolpidem [524]; HPLC method for evaluating the dissolution profile of commercially available zolpidem products [525];

Zopiclone (see also Eszopiclone)**: 2016** electrochemical oxidation of zopiclone [526]; HPLC methods with UV detection were developed and validated for the direct resolution of racemic mixtures of hyoscyamine sulfate and zopiclone [527]; **2017** spectrofluorimetric determination of zopiclone in pharmaceutical formulations [528]; **2018** RP-HPLC and TLC methods for determination of zopiclone in pharmaceutical formulation [529]; **2019** fluorescence spectroscopy and high-performance TLC methods for the separation of zopiclone enantiomers using L-(+)-tartaric acid as a chiral selector, followed by determination of the chiral-switching Eszopiclone [530]; evaluation of the ability of different beverages to mask the bitterness of zopiclone and Eszopiclone in tablet formulations [531].

1.2. Individual natural products containing abused substances (except natural products laced with synthetic cannabinoids and/or cannabimimetics)

Overviews and/or Reviews: 2016 tropane and quinolizidine alkaloid composition of Atropa acuminata, Lupinus polyphyllus and Hyoscyamus niger as determined by GC-MS [532]; **2017** review of anti-obesogenic effects of various medicinal plant extracts [533];

herbal medicine samples prepared and analyzed by GC-MS for identification of undeclared active pharmaceutical ingredients [534]; 2018 review of the current state of research into essential oils from native Mexican aromatic plants, identifies gaps in knowledge and suggests areas for further research [535]; medicinal uses for A. barbata and the peyote fern (Pellaea ternifolia) and new uses for damiana and cherry (Prunus serotina) are documented [536]; review of herbal highs [537]; review of medicinal plants in Uzunkopru and surrounding villages in the years 2013–2015 [538]; overview of the challenges in detection of magic mushroom, peyote cactus, khat, and solvent abuse [539]; 2019 review of tropane alkaloids in the Solanaceae and Erythroxylaceae families [540].

Aerva javanica: 2016 quantification of phenolic components of Achyranthes aspera and Aerva javanica leaves was made using LC-ESI-MS/MS [541]; **2017** analgesic and anti-inflammatory activity of aqueous-methanolic extract of Aerva javanica [542]; investigation of the chemical composition of Aerva javanica by HPLC and LC-MS [543]; compounds were isolated from ethyl acetate soluble fraction of methanolic extract of the flowers of Aerva javanica and the structures of isolates were elucidated by the combination of 1D (H-1 and C-13-NMR), 2D (HMQC, HMBC and COSY) NMR spectroscopy and mass spectrometry (FABMS, HRFABMS) [544]; **2018** determine of the bioactive components of the aerial parts of the Aerva javanica plant by GC-MS [545];

Atropa belladonna: 2016 Extraction method extract atropine from the stem and leaves of Atropa belladonna [546]; **2017** MALDI detection of major alkaloids from pulverized plant material of Atropa belladonna and Senecio vulgaris [547]; **2018** UHPLC-HRMS method for determination of tropane alkaloids from atropa belladonna seed extracts [548]; **2019** MALDI-MSI of Atropa belladonna berries [549].

Ayahuasca: 2016 drug policy of the EU member countries in relation to ayahuasca consumption [550]; DART-HRMS for determination of the individual components within Ayahuasca [551]; 2017 SPE and LC-UV-DAD determination of Tryptamines and beta-Carbolines in Ayahuasca [552]; **2019** development of an extraction method based on solid-phase extraction for determination of the major alkaloid components, N,N-dimethyltryptamine, harmine, harmaline, harmalol, and tetrahydroharmine, in ayahuasca using ultra-performance LC-MS/MS [553].

Betel (*Piper Betle Linn*): 2016 DART-HRMS for determination of the provenance of psychoactive pepper species, namely Piper methysticum (aka kava) and P. betle (aka betel) [554]; review article [555]; volatile constituents of Piper betle landraces were analyzed using GC FID and GC-MS [556]; GC-MS to identify the semi volatile and volatile compounds present in the leaf ethanol extracts [557]; **2018** isolation of two new chemical constituents on the basis of spectroscopic data 1D NMR (H-1 and C-13) and 2D NMR (H-1-H-1 COSY and HMBC) as well as ESI-MS, FT-IR and HR-ESI-MS analyses [558]; volatile profiling of Piper species by HS-SPME-GC-MS [559];

Coca (*Erythroxylum*): 2017 Non-extracted and extracted coca leaves, acidic extract and coca paste were analyzed by GC-MS and LC-MS/MS [560];

Damiana (*Turnera diffusa*): 2017 GC-MS analysis of essential oil and antioxidants in the medicinal plant Turnera diffusa [561]; **2019** UHPLC-DAD method for the quantification of the isolated components in the herb and in traditional preparations of T. diffusa [562].

***Datura stramonium* (Jimson weed, Angel Trumpet): 2016** Structural analysis and characterization of bio-oils from liquefaction of Datura stramonium L via elemental analysis, GC-MS and FT-IR [563]; fractionation of the MeOH extract of Datura stramonium leaves led to the isolation of three alkaloids - scopolamine (1), trigonelline (2), and tyramine (3) [564]; **2017** TLC and FTIR analysis to investigate the presence of alkaloids and other chemical constituents in Datura stramonium (Saikaran, Jimson weed) [565]; analysis of hyoscine in wild-type and in vitro-grown Datura by HPLC [566]; **2018** review of the genus Datura L. (Solanaceae) [567]; GC/MS analysis to identify tropane alkaloids found in the Hairy roots of Datura [568];

Ephedra: 2016 HPLC analysis of Ephedra major [569]; GC-MS analysis to determine chemical composition of the essential oil and various extracts of Ephedra alata alenda [570]; characterization of Ephedra sinica Stapf [571]; extraction of NDGA from Ephedra followed by HPLC analysis [572]; GC-MS-based plant metabolomics to investigate the chemical differences between Mahuang (the stems of Ephedra sinica) and Mahuanggen (the roots of Ephedra sinica) [573,574]; UHPLC-MS/MS method to measure ephedra in the herbal preparation Ma-Xing-Gan-Shi-Tang [575]; direct ionization-MS for identification of medicinal Ephedrae Herba (Ephedra sinica, Ephedra intermedia, and Ephedra equisetina) [576]; **2017** characterization of phenolic constituents from ephedra herb extract [577]; determination of ephedra alkaloids (ephedrine, pseudoephedrine, norephedrine, norpsuedoephedrine, methylephedrine, and synephrine) from dietary supplements using strong cation-exchange SPE cartridges for isolation of the compounds [578]; **2018** use of N-methyltransferase from Ephedra sinica to catalyze the formation of ephedrine and pseudoephedrine [579]; HPLC to determine ephedra alkaloids in powder products [580]; HPLC-UV method for the determination of Ephedra intermedia, Rheum palmatum, and Lithospermum erythrorhizon [581]; discrimination of three Ephedra species and their geographical origins based on multi-element fingerprinting by ICP-MS [582]; determination of the content of Ephedra alkaloids, namely ephedrine, methylephedrine, norpseudoephedrine, pseudoephedrine and norephedrine by HPLC [580]; determination of the Herbal Composition of Ephedra intermedia, Rheum palmatum, and Lithospermum erythrorhizon by HPLC-UV [581]; **2019** identification and phylogenetic analysis of three Ephedra herbs [583]; development of a set of microsatellite markers for genetic monitoring and surveying of Ephedra [584]; molecular analysis of genetic diversity and population genetic structure in Ephedra [585]; phytochemically characterization of Ephedra data Decne. by LC-DAD-ESI-MSn [586].

Hawaiian Baby Woodrose (*Argyreia nervosa*): 2017 review of cases involving Lysergic acid amide (LSA) [587];

Kanna (*Sceletium tortuosum*): 2016 DART-HRTOFMS for revealing the adulteration of commercially available Sceletium tortuosum (Kanna) [588].

Khat (*Catha edulis*): 2016 SPE of psychoactive phenylpropylamino alkaloids from Khat leaves [589]; rapid differentiation of Catha edulis using single point and imaging vibrational spectroscopy [590]; review of the chemical composition of Catha edulls (khat) [591]; use patterns [592]; **2017** HPLC-DAD determination of khat (Catha edulis Forsk) alkaloids [593]; evaluation of the consequences of criminalizing khat [594]; GC-MS to detect presence of cathine in Catha edulis and other Celastraceae species [595]; **2018** review [596]; **2019** review [597].

Kratom (*Mitragynine speciosa*): 2016 determination of the mitragynine composition of 13 commercial products of Kratom sold online and in “smartshops” by GC-MS [598]; analysis of products advertised as kratom [599]; overview of kratom products seized [600]; study of the addictive profile and abuse potential of Kratom [601]; **2017** determination of the purity of mitragynine in a Mitragyna speciosa alkaloid extract using UFLC [602]; ic-ELISA method for rapid quantification of the major kratom alkaloids including mitragynine, paynantheine, and speciogynine in kratom cocktails [603]; review of the known chemistry of plants of the genus Mitragyna that are sold as kratom [604]; detection and identification of kratom using chemical tests and qPCR-HRM [605]; HPLC method to quantify mitragynine in kratom raw materials and

finished products [606]; **2018** HPLC-DAD, HPLC-MS, HPLC-MS/MS and GC-MS for the identification and quantification of the principal alkaloids present in different Mitragyna speciose strains [607]; scheduling of kratom [608]; dangers of kratom [609]; survey of polydrug use among kratom users [610]; immunochromatographic strip to determine mitragynine in kratom cocktails and kratom leaf samples [611]; HPLC-UV determination of alkaloids in Kratom raw materials and dietary supplements [612]; **2019** case report [613]; SPE and GC and GC-MS analysis of the chemical constituents of M. speciosa leaves [614].

Marijuana and Hemp (*Cannabis sativa*) and associated Phytocannabinoids: 2016 review [615]; cyclic voltammetry technique to differentiate the electrochemical behavior of Delta(9)-THC to reduce false positive results in the analysis of marijuana plant matter [616]; voltammetric analysis of Delta(9)-THC in aqueous media [617]; review of industrial hemp [618]; analysis of the effects of gamma-irradiation through UPLC analysis of major cannabinoids and qualitative GC analysis of full cannabinoid and terpene profiles [619]; analysis of marijuana contamination on currency [620]; GC-MS of cannabigerol, cannabinol, cannabidiol, cannabichromene, delta 9-tetrahydrocannabinol (THC) and other terpenoids in seized cannabis seeds [621]; influence of cultivation on inflorescence lipid distributions, concentrations, and carbon isotope ratios of Cannabis [622]; immunoassay for herbal cannabis [623]; quantification of cannabinoids (Delta 9-tetrahydrocannabinol, cannabidiol, and cannabinol) in milk by alkaline saponification-SPE combined with isotope dilution UPLC-MS/MS [624]; chemical analysis of cannabinoids in seized cannabis using heated headspace solid-phase microextraction and GC-MS [625]; quantification of the main cannabinoids, cannabidiol, Delta(9)-tetrahydrocannabinol and cannabinol in seized hashish [626]; effect of supercritical CO2 extraction process parameters on recovery of oil from pressed hemp cake [627]; evaluation of biomass and seed yields and composition of cultivars in seven contrasting environments [628]; atomic absorption spectrometry, UV-VIS spectrophotometry, and biochemical methods for characterization of seed cakes including hemp cakes [629]; GC-FID analysis of foods made of hemp for determination of THC, cannabidiol and cannabinol [630]; phytochemical profiling by LC-MS [631]; characterization of cannabinoid composition in a diverse Cannabis sativa L. germplasm collection by LC-MS cannabinoid profiling coupled with dominant and co-dominant DNA marker assays [632]; **2017** LC-MS/MS analysis of cannabidiol, cannabigerol, cannflavin A, Delta(9)-THC in methanolic extracts [633]; HPLC-MS/MS coupled with chemometric analysis for determination of cannabinoids ((9)-tetrahydrocannabinol, cannabidiol, and cannabinol) in hemp nut products [634]; LC-MS/MS method for determining cannabinoids in hemp seeds, milk and liver [635]; isolation of compounds from hemp leaves by 1D and 2D NMR spectroscopy, LC-MS, and HRESIMS [636]; characterization of oil from hemp leaves by Raman spectroscopy [637]; evaluation of the hemp biomass and chemical composition of cannabis sativa [638]; NIR spectroscopy combined with chemometrics for growth stage classification of seized cannabis seeds [639]; ESI(+/−)-FT-ICR MS and ESI(±) MS/MS analysis of 68 samples of seized cannabis seeds for chemical characterization [640]; HPLC-UV/DAD and HPLC-ESI-MS method for analysis of the main non-psychoactive cannabinoids Cannabis sativa L [641]; microwave-assisted extraction method for cannabinoids in hemp nut [642]; LC-MS/MS method to identify pesticides in illicitly cannabis grown indoors [643]; analysis of the change in potency of cannabis samples in the five French forensic police laboratories over 25 years (1992–2016) [644]; confocal Raman imaging and quantitative image analysis to characterize biocomposite material microstructures in hemp [645]; analysis of blood samples and seizures in Norway [646]; U-HPLC-MS/MS method for quantification of cannabinoids [647]; chemical profiling of commercial strain of medical cannabis [648]; detection of marijuana varieties based on chemical signatures extracted from sample headspace [649]; HPLC-DAD method for analyzing cannabinoids in cannabis raw materials and finished products [650]; HPLC-DAD method for detection of cannabinoids in plant material [651]; LC-MS-IT-TOF technology, to detect and quantify cannabidiol (CBD), cannabidivarin (CBDV), Delta(9)-tetrahydrocannabivarin (Delta(9)-THCV), and cannabigerol (CBG) [652]; supercritical CO2 extraction of cannabinoids from cannabis sativa L. [653]; variations in potency and price in legal cannabis markets [654]; HPLC determination of delta-9-THC content in seized cannabis [655]; quantitation of 9-THC in perfume using HPLC-MS/MS in MRM mode [656]; isomeric separation of cannabinoids in hashish, marijuana, and parts of the Cannabis Sativa L plant (flower and leaf) by UPLC combined with twin wave ionic mobility mass spectrometry (TWIM-MS) [657]; MS estimation of Duquenois reaction chromophores for the four major Phytocannabinoids (a dagger(8)-tetrahydrocannabinol, a dagger(9)-tetrahydrocannabinol, cannabidiol, and cannabinol) [658]; method for the preparation and application of THC and CBD containing brownies used as quality control (QC) material for the analysis of marijuana or cannabinoid baked edibles [659]; analysis of Delta 9-THC, cannabidiol (CBD), and cannabinol (CBN) in confiscated cannabis using UPLC-MS/MS [660]; **2018** development of hydrophobic deep eutectic solvents (DESs) based on terpenes and natural organic acids as potential substitutes for the extraction of phytocannabinoids (tetrahydrocannabinol, cannabidiol, and their carboxylated homologues) from raw cannabis plant material [661]; extraction and isolation of cannabinoids from marijuana seizures followed by characterization using H-1 NMR and confirmed by GC-MS [662]; potency of Delta(9)-THC and other cannabinoids in cannabis in England in 2016 [663]; analytical applications of SFC for the cannabis industry [664]; chromatographic method validation for cannabis laboratories [665]; adoption of LC technology and its role in cannabis testing [666]; review [667]; Fast GC/MS method for determining cannabinoids in Cannabis sativa L [668]; GC-MS qualitative analysis of 11 target cannabinoids as their trimethylsilyl derivatives (CBD, CBDA, d9THC, THCA, CBN, d8THC, CBG, CBGA, CBDV, THCV, and CBC) in commercial cannabis products [669]; HPLC-DAD quantitative analysis of five cannabinoids of (CBD, Delta(9)-THC, CBDA, THCA, and CBN) in commercial cannabis products [670]; HPLC-ESI-HRMS/MS to evaluate the chemical composition of Cannabis medicinal extracts [671]; HPLC-UV method for determination of cannabidiolic acid (CBDA), tetrahydrocannabinolic acid (THCA), cannabidiol (CBD), tetrahydrocannabinol (THC), cannabinol (CBN), cannabigerol (CBG) and cannabidivarin (CBDV), present in 13 commercial hemp seed oils [672]; thermal desorption- IMS method for obtaining spectral fingerprints of single cannabinoids from Cannabis plant extracts [673]; review of chemical composition and nutraceutical properties of hempseed [674]; HPLC-MS/MS for determination of nine natural cannabinoids in beverages and food derived from Cannabis sativa [675]; LC-MS analysis of cannabinoids in milk, liver and hemp seed [676]; untargeted analysis by HRMS in negative ion mode for the identification of the main polyphenols (caffeoyltyramine, cannabisin A, B, C) in seeds and of omega-6 (linoleic acid) in sprouts [677]; HS-SPME-GC/MS analysis of buccal swabs for detection of Phytocannabinoids [678]; identification of stilbenoids and cannabinoids from the leaves of Cannabis sativa f. sativa by 1D and 2D NMR spectroscopy, LC-MS, and HRESIMS [679]; analysis of cannabis extracts by electrospray ionization IMS-MS [680]; GC-FID method for the qualitative and quantitative analysis of acid and neutral cannabinoids in C. sativa extracts [681]; determination of cannabinoids from a surrogate hops matrix using multiple reaction monitoring GC-MS/MS [682]; extraction of Delta(9)-tetrahydrocannabinol, cannabidiol, and cannabinol from

marijuana samples using a hard-cap espresso extraction with 2-propanol [683]; characterization of CBD oil by GC-MS and HPLC-Q-Exactive-Orbitrap-MS [684]; VOC emission profiles of 48 seized hashish samples were analyzed by headspace solid-phase micro-extraction GC-MS and evaluated with chemometric tools [685]; quantification of seven cannabinoids by HPLC-DAD and quantification of 42 terpenes by GC-MS [686]; RP-HPLC-UV method for the separation and quantification of eight different cannabinoids in cannabis sativa L. [687]; review [688]; chemical profiling of non-psychoactive cannabinoids by HPLC-UV/DAD, ESI-MS, and MS2; and analysis of Cannabis volatile compounds by HS-SPME coupled with GC-MS and GC-FID [689];

2019 UHPLC-DAD method for the qualification and quantification of the cannabinoids CBDA, CBD, CBN, THC, CBC and THCA, in medicinal cannabis biomass and resin obtained by SFE [690]; LC-HRMS for cannabinoid profiling of tetrahydrocannabinol, cannabidiol, other 30 cannabinoids in hemp seed oil [691]; LDI, MALDI MS, and IMS techniques were used to detect and determine the distribution of cannabinoid compounds on the surface of fresh and aged Cannabis leaves [692]; analysis of seven cannabinoid standards: five neutral and two acidic, as well as Cannabis products (hashish and marijuana) and parts of the Cannabis plant (flower and leaf) using GC-MS, GC x GC-QMS, UPLC-ESI-QTOF-MS and UPLC-ESI-(TWIM)-MS [693]; GC-MS method for the quantification of terpenes in cannabis plant material [694]; prevalence of Cannabis in relation to National Drug Policy in 27 Countries [695]; overview of analytical challenges in the cannabis industry faces and the role of mass spectrometry [696]; stability study of the effect of time and storage conditions on the composition of different varieties of cannabis products (hashish and marijuana) [697].

Marijuana (Genetic and/or Proteomic Analyses):2016 13-loci STR multiplex method to accurately genotype 199 Cannabis sativa samples from 11 U.S. Customs and Border Protection seizures [698]; loop-mediated isothermal amplification DNA -based assay for the identification of c. sativa [699]; rbcL gene for genetic discrimination of seized c. sativa [700]; comparison of three DNA markers for the detection of male genotype in industrial hemp and medicinal cannabis plants [701]; review of genetic and genomic tools for cannabis sativa [702]; RNA-Seq analysis for phenotypic differentiation of fiber-type and seed-type cannabis [703]; analysis of the nuclear genomic diversity among 340 Cannabis varieties, including fiber and seed oil hemp, high cannabinoid drug-types, and feral population [704]; analysis of DNA extracted from seed embryos used for individualization of four hemp and six marijuana varieties [705]; review of genetic resources available for phenotype tracking of cannabis [706]; **2017** high resolution melting SNP protocol for differentiation of drug and non-drug cannabis plants [707]; genotyping of 154 individual plants from 20 cultivars for identification of genetic clusters [708]; restriction fragment length polymorphism of the THCA synthase gene for differentiation of Cannabis subspecies [709]; 13 loci STR system for forensic DNA profiling of marijuana samples (validated according to relevant ISFG and SWGDAM guidelines) [710]; loop-mediated isothermal amplification assay for identifying the drug-type strains of C. sativa [711]; detection and partial characterization of a 16srix-c phytoplasma associated with hemp witches'-broom [712]; genetic determination of Cannabis sativa var. indica based on six genomic SSRs for genotyping 154 individual plants from 22 cultivars to determine intra-varietal diversity [708]; **2018** Phylogenetic analysis of samples from four different sites: 21 seizures at the US-Mexico border, Northeastern Brazil, hemp seeds purchased in the US, and the Araucania area of Chile, to determine population substructure using autosomal and lineage markers [713]; genetic characterization of hemp [714]; method for extracting DNA from cannabis resin based on the evaluation of relative PCR amplification ability [715];

2019 13-loci STR multiplex system for individualization and origin differentiation of Brazilian seized samples of marijuana [716]; determination of Cannabinoid concentrations in 531 confiscated cannabis samples [717]; optimization of protein extraction from cannabis [718];

Marijuana – Miscellaneous Topics:2016 food safety for marijuana-infused edibles [719]; oversight considerations for edible cannabis products [720]; cannabis consumption patterns among frequent consumers in Uruguay [721]; effect of legalization on the method of consumption [722]; refusal rates of sales to underage-appearing individuals without valid identification at retail outlets in Colorado [723]; characterization of edible marijuana exposures reported to US poison centers [724]; legalization issues [725]; legalization considerations [726]; dabbing-related content on Twitter [727]; citizen views toward marijuana regulation in Uruguay, the United States, and El Salvador [728]; regulation of agrochemical use on medical/recreational marijuana in Oregon [729]; recalls of marijuana contaminated by pesticides banned for use on marijuana in Colorado [730]; edible use among teens [731]; impacts of legalization [732]; modes of marijuana consumption among Colorado youth [733]; challenges of implementing a medical marijuana policy in Massachusetts [734]; Twitter data on cannabis edibles in the U.S [735]; prevalence and current patterns of vaping cannabis [736]; tobacco, legalized marijuana and electronic vaporizer use among young adults in Colorado [737]; regulation of agrochemicals use on medical marijuana in Nevada [738]; hair analysis for Delta(9)-tetrahydrocannabinolic acid A (THCA-A) and Delta(9)-tetrahydrocannabinol (THC) after handling cannabis plant material [739]; approach to identifying Twitter tweets that are related to personal and recreational use of marijuana [740]; analysis of Google search data to assess the scope and breadth of information seeking on dabbing [741]; profile of cannabis plantations, growers and production systems in Spain [742]; LC-MS/MS determination of 61 LC amenable pesticides in Marijuana [743]; review of industrial hemp production [618]; review of industrial hemp [744]; composition of a collection of hemp cultivars and accessions of different geographical origins grown under the same conditions for 1 year [745]; investigation of hemp plant morphological parameters [746]; fiber and seed productivity of 14 commercial cultivars were tested in four contrasting European environments [747]; isolation and structural elucidation of stereoisomers of diketopiperazine indole alkaloid (12S, 22R)-Dihydroxyisoechinulin A (1), (12S, 22S)-Dihydroxyisoechinulin A (2) and (12R/S)-Neoechinulin A (3) in hemp seed by UV, IR, NMR, MS, CD spectra, ECD and chiral HPLC analysis techniques [748]; **2017** product trial of new marijuana or hashish edible products [749]; implication of state regulation of marijuana contaminants [750]; instrumental neutron activation for isotopic ratio analysis of K-40 in marijuana [751]; 5 year study comparing exposures to marijuana and synthetic cannabinoids [752]; relationship of cannabis legalization to home cultivation and the use of edible products [753]; relationship of cannabis legalization and the use of edible products and vaping among youth [754]; model for predicting marijuana use based on twitter posts [755]; analysis of THC on hands and uniforms of officers during raids on cannabis growing houses and forest cannabis plantations and in the air [756]; use of marijuana edible by adolescents [757]; regulation of marijuana edibles [758]; impacts of marijuana legalization [759]; study on the labelling information on edible marijuana products sold for recreational use [760]; videos about marijuana edibles on YouTube [761]; orbitrap-MS analysis of THC and metabolites in wastewater to examine degradation kinetics [762]; review of the detection of marijuana and metabolites in waste and surface water [763]; regulation of pesticide use in commercial cannabis markets [764]; determination of carbonyls produced by thinning agents used when vaporizing

cannabis oil [765]; **2018** identification of non-cannabinoid compounds using HPLC [766]; review of cannabis-infused food in Canada [767]; occupational health and safety hazards in cannabis-related working environments [768]; bacteria and fungi encountered at an outdoor cannabis farm were elucidated by 16 S ribosomal RNA (rRNA) and Internal Transcribed Spacer (ITS) region sequencing [769]; cannabinoid content of legal cannabis products in Washington state [770]; analysis of post on an online cannabis community forum to identify trends in emerging forms of cannabis use [771]; impact of legalization in California's prime marijuana growing area [772]; overview of workplace safety in the Colorado cannabis industry [773]; characterization of hemp seed alpha-galactosidase using MALDI-TOF-MS [774]; review of the regulation of medical use of cannabis and cannabinoid containing products in North America and Europe [775]; Elemental analysis, X-ray fluorescence (XRF) and thermogravimetric analyzer coupled with Fourier transform infrared spectrometer (TG-FTIR) for comparison of the pyrolysis process of ancient hemp seeds and melon seeds [776]; review the current (as of November 2017) regulations of medical cannabis use in Europe and North America [775]; regulatory framework of marijuana in Colorado, Washington, Oregon and Alaska [777]; framework for assessing regulatory options for medicinal cannabis in Australia [778]; evaluation of the inflorescence yields and the content of Delta(9)-tetrahydrocannabinol (Delta(9)-THC) and cannabidiol (CBD) of seven traditional genotypes of cannabis - Conspiracy Kush, Nurse Jackie, Jilly Bean, Nordle, Jack Cleaner 2, Jack Skellington and National Health Services [779]; regulation of cannabis in Germany [780]; resolution of (+)- and (−)-sativamides A and B in the fruit of cannabis sativa by chiral HPLC [781]; **2019** impact of Marijuana legalization on law enforcement in states surrounding Colorado [782].

Marijuana ("Synthetic Marijuana") - See "Synthetic Cannabinoids and Cannabimimetics" (Subsection 1.D).

Mushrooms (including *Psilocybe* mushrooms): 2016 MC-ICPMS method for precise V-51/V-50 isotope ratio measurements as a useful tool for identifying the origin of Amanita muscaria - a widespread toxic and hallucinogenic mushroom [783]; identification of mushroom samples from nine clinically reported cases in Thailand during a 7-year period based on nuclear ITS sequence data and identification of lethal peptide toxins using a reversed phase LC-MS method [784]; DNA-based taxonomic identification of basidiospores in hallucinogenic mushrooms cultivated in "grow-kits" seized by the police: LC-UV quali-quantitative determination of psilocybin and psilocin [785]; **2017 i**dentification and quantitation of Psilocybe cubensis DNA using a quantitative qPCR-HRM assay [786]; review [787]; characterization of four psilocybin biosynthesis enzymes [788]; 1D and 2D NMR spectroscopy and high-resolution mass spectrometry for the identification of norpsilocin in Psilocybe cubensis [789]; isolation of 10 compounds from Psilocybe merdaria and structural determination from the analysis of 1D and 2D NMR and MS data [790]; characterization of four psilocybin biosynthesis enzymes [788]; **2018** Detection and identification of psilocybe cubensis DNA using a real-time PCR assay [791]; an enhanced enzymatic route of psilocybin production by adding the tryptophan synthase of the mushroom Psilocybe cubensis (TrpB) to the reaction [792]; review [793]; **2019** review [794]; morphological, chemical, and genetic analysis of mycelia of psychedelic fungi collected from a clandestine laboratory using SEM, MS, HRM and ITS sequencing [795];

Nymphea carulea (Blue Lotus): 2017 analysis of apomorphine and nuciferine in a confiscated brown resin material [796];

Opium/Opium Poppy/Poppy Seeds/Papaver Somniferum (see also Papaver below, and Opiates in Subsection 1.C**): 2016** opium profiling based on the relative content of five principal and 14 minor opium alkaloids using UPLC-Q-TOF to trace clandestine opium production and trafficking [797]; **2017** Forensic application of EST-derived STR markers in opium poppy to distinguish cultivars [798]; morphine content in the poppy straw of edible poppy (Papaver somniferum L.) [799]; novel fingerprint method applied to monitor the quality consistency of alkaloids in powdered poppy capsule extractive [800]; determination of the content of morphine, codeine, and papaverine in ornamental P. somniferum cultivars by HPLC and CE [801]; identification of illicit opium cultivation using SERS with microfluidics for the detection of papaverine at low concentrations [802]; isolation and characterization of a novel O-methyltransferase (OMT) involved in the biosynthesis of alkaloids in the California poppy [803]; SFE of papaverine and noscapine from poppy capsules [804]; **2018** study to examine relationships between capsule yield, some other yield and quality traits by means of correlation, path and principal components analysis in fifteen opium poppy (Papaver somniferum L.) cultivars registered in Turkey [805]; LC-MS/MS method to determine the content of six opium alkaloids (morphine, codeine, thebaine, noscapine, papaverine and narceine) in poppy seeds and bakery products with a limit of quantification (LOQ) of 0.1 mg/kg [806]; quantification of Morphine, codeine, and thebaine in home-brewed Poppy Seed tea extracts by LC-MS/MS [807]; examination of biosynthesis pathways and morphine content in opium poppy cultivars [808]; use of deep learning target detection to identify the location of poppy parcels and map their spatial distribution [809]; GC-MS method for the characterization of thebaol, a component of opium poppy [810]; bulk analysis of aged oil and juglet used for poppy distribution by GC-EI-MS and pyGC-EI-MS and analysis of the alkaloid extracts by HPLC-ESI-MS using both triple quadrupole and FTICR mass spectrometer [811]; **2019** review [812];

***Papaver* (other species): 2017** detection of papaverine and noscapine in Pericarpium papaveris in hot pot condiments using a QuEChERS- TLC-SER method [813]; **2018** identification and metabolite profiling of alkaloids in aerial parts of Papaver rhoeas by LC-QTOF-MS [814]; quantification of 22 different alkaloids in apaver spp. (Papaver rhoeas (Corn poppy) and Papaver nudicaule (Iceland poppy using LC-QTOF-MS/MS and comparison to genetic data for transcriptome profiling [815].

***Papaver* (Genetic and/or Proteomic Analyses): 2016** Identification of transcription factor gene families using transcriptome datasets of 10 cultivars of P. somniferum with distinct chemoprofile [816]; the morphological diversity and molecular diversity of 103 Turkish opium poppy landraces and 15 cultivars were analyzed for mapping genetic association [817]; cDNA sequences that belong to the Oxytona species (Papaver bracteatum, Papaver pseudo-orientale, and Papaver orientale) [818]; **2018** identification and expression analysis of a microRNA cluster derived from pre-ribosomal RNA in Papaver somniferum L. and Papaver bracteatum L. [819]; simultaneous over-expression and silencing of some benzylisoquinoline alkaloid biosynthetic genes in opium poppy [820]; phenotypic and genotypic characterization of two non-pathogenic strains R89−1 and R90(T) isolated from poppy seed (Papaver somniferum L.) [821]; report of the opium poppy genome [822]; 2019 use of gene expression to enhance Morphine biosynthesis in Papaver somniferum [823].

Peganum harmala 2017 Identification of quinazoline alkaloids in Peganum harmala by HPLC-DAD-MS and NMR [824]; CE-UV method for determination of psychoactive alkaloids in Peganum Harmala seed infusions [825]; C-18-SPE-CE-MS method for detection of harmala alkaloids [826]; **2018** HPLC-ESI-IMS analysis of alkaloid compounds from Peganum harmala L seeds [827]; **2019** FT-RAMAN and SERS for determination of harmala alkaloids in Peganum Harmala [828]; HPTLC method for simultaneous analysis of five antipsychotic and medicinally important -carboline alkaloids in Peganum Harmala [829]; determination of the morphological

characteristic and the anatomical structure of Peganum harmala L. [830]; genome of Peganum harmala [831].

Peyote (and other mescaline-containing cacti): 2016 DNA analysis of the chloroplast trnL/trnF region and chloroplast rbcL gene to identify the individuals of Lophophora to aid forensic analysis [832];

Plant Materials (Multiple Plants in Single Studies): 2016 review of the immunoassay challenges in detection of unusual substances such as Magic Mushroom, Peyote Cactus, Khat, and Solvent Abuse [539]; HPTLC -ESI-MS for profiling of alkaloid-rich herbal drugs [833]; DART-HRMS for spectral profiling of biological material including Mitragyna speciosa (Kratom) and Datura (Jimsonweed) [834]; GC-MS determination of the myristicin, psychoactive, hallucinogenic substance from plant material [835]; review of adulterants in herbal medications [836]; **2017** development and validation of a tetraplex multiplex real-time PCR assay used to simultaneously identify morning glory, jimson weed, Hawaiian woodrose, and marijuana [837]; spectrum-effect relationships between HPLC-DAD fingerprint and analgesic activity of Anisodus tanguticus (Maxim.) Pascher (Solanaceae) (AT) root [838]; supercritical fluid extraction of carbon dioxide extraction method to isolate bioactive components from variety of plant materials [839]; review of herbal highs [537]; identification of synthetic indazole-3-carboxamide cannabinoid (CUMYL-4CN-BINACA) in seized plant material using LC-HR/MS, GC-EI/MS, NMR spectroscopy and FTIR [840]; **2018** anti-nociceptive mechanisms of flavonoids-rich methanolic extract from Terminalia coriacea (Roxb.) Wight & Arn. leaves [841]; simultaneous determination of 13 tropane alkaloids in tea and herbal teas using HPLC coupled to an Exactive-Orbitrap analyzer [842]; **2019** mass-spectrometry-based imaging (MSI) of macroscopic plant samples [843]; GC-MS analysis of the physical and chemical properties of herbal medicines advertised as opioid withdrawal drugs [844]; LC-MS (Exactive-Orbitrap) to study degradation products in pasta and plant materials contaminated with Datura and Coca leaves [845]; laser desorption (LD)-LTP MSI platform for mapping mescaline in a San Pedro cactus (Echinopsis pachanoi) cross section, tropane alkaloids in jimsonweed (Datura stramonium) fruits and seeds, and nicotine in tobacco (Nicotiana tabacum) seedlings [843].

***Psychotria viridis* (and related species): 2017** spectroscopic (IR, H-1 and C-13 NMR, HSQC, HMBC and NOESY) and spectrometric (CG-MS and LCMS-ESI-ITTOF) analysis of extracts from leaves of Psychotria viridis [846].

***Salvia divinorum*: 2017** LC-MS/MS analysis of 40 Salvia species for screening their psychoactive constituents of salvinorin A and salvinorin B and genomic characterization [847]; **2019** review [848]; review of salvinorin A and some of its analogues [849].

***Scopolia tangutica:* 2019** LC-MS/MS method to characterize alkaloids from Scopolia tangutica [850]; SPE enrichment method to prevent co-elution of alkaloids from Scopolia tangutica (also applied to other plants) [851].

***Sinomenium acutum*: 2017** synthesis of (−)-sinoracutine [852]; **2018** review of modifications and bioactivities of sinomenine derivatives [853]; identification of 13 alkaloids by comprehensive analysis of 1D and 2D NMR, HRMS and single-crystal X-ray diffraction data [854]; structural characterization of 45 alkaloids, including morphinans, aporphines, benzylisoquinolines, and protoberberines by HRMS [855];

***Solanaceae*: 2016** microwave-assisted extraction of atropine and scopolamine from Solanaceae family plants (*Datura* and *Brugmansia genera*) followed by QuEChERS SPE and GC-MS [856]; H-1 NMR-based metabolite profiling and quantification via HPLC-MS with focus on the tropane alkaloids were applied to compare leaf and root extracts of three wild types and two hybrids of *Duboisia myoporoides* and *D. leichhardtii* [857]; **2017** determination of tropane alkaloids (tropane alkaloids as atropine, scopolamine, anisodamine, tropane, tropine, littorine, homatropine, apoatropine, aposcopolamine, scopoline, tropinone, physoperuvine, pseudotropine and cuscohygrine) in cereals and solanaceaes seeds by LC coupled to single stage Exactive-Orbitrap [858]; 2018 simultaneous quantification of atropine and scopolamine in herbal tea and Solanaceae plant material by MALDI-TOF-MS/MS [859]; **i**dentification of 18 tropane alkaloids, 8 phenolic acids and related compounds and 7 flavonoids in extracts of L. pubiflora (of the Solanaceae family) by UHPLC-PDA-MS [860]; **2019** Scanning Electron Microscopy (SEM) and Light Microscopy (LM) 10 genera and 23 species of the Solanaceae family (Atropa acuminata, Capsicum decoraticus, Capsicum frutescens, Cestrum aurantiacum, Cestrum diurnum, Cestrum nocturnum, Datura alba, Datura innoxia, Datura stramonium, Hyoscymus niger, Lycopersicon esculentum, Nicotiana rustica, Nicotiana tabacum, Petunia alba, Petunia hybrida, Solanum erianthum, Solanum melongena, Solanum miniatum, Solanum pseudocapsicum, Solanum surratense, Solanum tuberosum, Withania coagulans, Withania somnifera) [861].

***Stephania yunnanensis* 2018** HPLC-DAD method for the determination of five alkaloids (protoberberine, morphine, aporphine and protaporphine alkaloids) in Stephania yunnanensis Lo [862].

1.3. Common groups or classes of compounds or substances (except synthetic cannabinoids and cannabimimetics)

Amphetamine-Type Stimulants (ATSs) and Related Phenethylamines (PEAs): 2016 A solid colorimetric sensor for the analysis of amphetamine-like street samples with a LOD of 0.002–0.005 g mL(-1) [863]; differential mobility spectrometry (DMS-MS/MS) analysis of nine structurally similar amphetamine-type stimulants compared to LC-MS/MS [864]; 22 amphetamine-derived synthetic drugs, mostly cathinones, were examined by GC-MS using two different derivatization methods (i) heptafluorobutyric anhydride (HFBA) and (ii) pentafluorobenzoyl chloride (PFBCl) [865]; **2017** statistical comparison of mass spectra for identification of amphetamine-type stimulants [866]; Indirect chiral separation of 8 novel amphetamine derivatives as potential new psychoactive compounds by GC-MS and HPLC [867]**;** Destruction of ATS in aqueous solution using gamma irradiation [868]; point-of-use detection of ATS with host-molecule-functionalized organic transistors (sensor) [869]; Statistical comparison of mass spectra for identification of amphetamine-type stimulants including amphetamine, methamphetamine, MDA, MDMA, phentermine, and psilocin [870]; chromatographic differentiation of the ring-substituted regioisomers of amphetamine and methamphetamine by supercritical fluid chromatography [871]; Identification of five substituted phenethylamine derivatives 5-MAPDB, 5-AEDB, MDMA methylene homolog, 6-Br-MDMA, and 5-APB-NBOMe, seized from clandestine laboratories and analyzed by LC-QTOF-MS, GC-MS and NMR [872]; analysis of synthetic phenethylamine street drugs using direct sample analysis coupled to accurate mass TOF-MS [873]; wearable sensor device for the rapid and sensitive detection of amphetamine-type stimulants [874]; quantum chemical investigation of neutral and cationic phenylethylamine, amphetamine and methamphetamine [875]; enantioresolution of 12 drugs (including phenethylamines) by CE [876]; investigation of characteristic mass fragmentation of 20 phenethylamine/tryptamine standards by MALDI/TOFM, GC-EI/MS and LC-ESI/MS [877]; LC-QTOF-MS, GC-MS and NMR for identification of phenethylamine derivatives seized from a clandestine laboratory, including 5-(2-methylaminopropyl)-2,3-dihydrobenzofuran (5-MAPDB, 1), 5-(2-aminoethyl)-2,3-dihydrobenzofuran (5-AEDB, 2), N,2-dimethyl-3-(3,4-methylenedioxyphenyl)propan-1-amine (MDMA methylene homolog, 3), 6-bromo-3,4-methylenedioxymethamphetamine (6-Br-MDMA, 4), and 1-(benzofuran-5-yl)-N-(2-methoxybenzyl)propan-2-

amine (5-APB-NBOMe, 5) [872]; **2018** SUPRAS extraction approach for matrix-independent determination of amphetamine-type stimulants by LC-MS/MS [878]; use of CE coupled to TOF-MS for simultaneous chiral separation of amphetamine-type stimulants and ephedrine for the identification of chiral characteristics of methamphetamine seizures in Shanghai for inferring the synthetic pathways of drugs [879]; detection of t-Boc-methamphetamine (t-Boc-MP) by DART-TOF-MS and evaluation of the method in comparison with GC-MS and LC-TOF-MS [880]; effects of substituted benzaldehydes on the reaction to synthesize amphetamine type stimulants and identifies several new Akabori-Momotani by-products [881]; quantitative NMR method for detection and quantification of phenethylamines in supplements [882]; **2019** sensor for detection of amphetamine-type stimulants [883];

Barbiturates: 2016 Rotaxanes comprising a macrocylic Hamilton receptor obtained using active template synthesis; synthesis, spectroscopic and structural characterization of barbiturate anions using Raman spectral analysis [884]; FT-IR, multinuclear NMR (1H, 13C) and MS characterization of Barbiturate bearing aroylhydrazine derivatives [885]; **2017** LC-MS/MS method developed for the simultaneous determination of four barbiturates (phenobarbital, pentobarbital, amobarbital and secobarbital) in raw milk [886]; synthesis and characterization by H-1 and C-13 NMR spectroscopy [887]; **2018** GC-MS/MS method for quantification of phenobarbital [888]; **2019** evaluation of chromatographic and computational lipophilicity of barbiturate derivatives [889]; quantitative determination of the barbiturate [890]; synthesis of spirodihydrofuryl barbiturates and spirocyclopropyl barbiturates [891].

Benzodiazepines: 2016 Direct-EI-LC-MS/MS determination and quantification of benzodiazepines (diazepam, flunitrazepam, Valium®, Rohypnol®) in small residues of beverages collected at the crime scene [137]; Dispersive liquid-liquid microextraction (DLLME) coupled with a back extraction step based on using an immiscible organic solvent applied to benzodiazepines for analysis by GC-mu ECD [892]; HPLC-UV method for simultaneous analysis of six benzodiazepines (chlordiazepoxide, diazepam, clonazepam, midazolam, flurazepam, and lorazepam) was developed for forensic screening of adulterated non-alcoholic drinks [893]; Six benzodiazepine samples (diazepam, chlordiazepoxide, midazolam, oxazepam, clonazepam, and nitrazepam) were separated and detected with LC-DART-MS [894]; **2017** voltammetric method was applied to analysis of benzodiazepines (BDZs) in the pharmaceutical preparations Lexaurin and Xanax [895]; Mercury-free and modification-free electroanalytical approach using boron-doped diamond electrodes for quantification of benzodiazepines, bromazepam and alprazolam [896]; Simultaneous quantification method for Escitalopram and Etizolam using LC-ESI-MS/MS [897]; UHPLC-ESI-TOF/MS method for the selective and sensitive separation, identification, and determination of selected designer benzodiazepines (pyrazolam, phenazepam, etizolam, flubromazepam, diclazepam, deschloroetizolam, bentazepam, nimetazepam, and flubromazolam) [898]; analytical cross-reactivity of 13 designer benzodiazepines in the CEDIA, EMIT II Plus, HEIA, and KIMS II immunoassays [899]; **2018** availability from Internet suppliers and motivations for use of three benzodiazepines (diclazepam, flubromazepam, and pyrazolam) [900]; fabrication of magnetic zinc adeninate metal-organic frameworks for the extraction of benzodiazepines from urine and wastewater [901]; **2018** LLE-LTP and PS-MS method to identify and quantify benzodiazepines in beverages [902]; determination of benzodiazepines in beverages using green extraction methods and capillary HPLC-UV detection [903]; spectroscopic properties of 4-(2-chlorophenyl)-2-ethyl-9-methyl-6H-thieno [3,2-f] [1,2,4] triazolo [4,3-a] [1,4] diazepine were investigated using FT-IR and FT-Raman techniques [904]; **2019** biosensor for determination of alprazolam, chlordiazepoxide bis, diazepam, oxazepam and clonazepam [905]; voltammetric sensor for determination of clonazepam, diazepam, alprazolam, chiordiazepoxide, oxazepam [906]; HPLC method for the simultaneous determination of three benzodiazepines [907];

Benzofurans: 2017 Differentiation of 6-MAPB and its positional isomer, 2-MAPB by GC-MS and GC-MS/MS [908]; **2018** experimental and theoretical FT-IR, FT-Raman, H-1 NMR, C-13 NMR and UV–Vis spectral studies on 2-DBAA [909]; 5MBOT characterization by FT-IR, FT-Raman, H-1 NMR, C-13 NMR and UV spectral studies [910]; synthesis and characterization of HBFAA by FT-IR, FT-Raman and NMR [911]; **2019** synthesis of a range of polycyclic benzofurans [912]; synthesis of 2,3-disubstituted benzofurans [913]; synthesis of substituted 2-methylbenzofuran [914]; one-pot synthesis of benzofurans and naphtho [2,3-b]furans [915].

Bromo-, Chloro-, and Fluoro- Amphetamines and Methamphetamines: 2016 discrimination of fluoroamphetamine regioisomers using a portable Raman spectrometer [916]; GC-MS-MS to differentiate ring-substituted bromoamphetamine analogues [917]; **2018** identification and characterization of 4-chloromethamphetamine (4-CMA) in seized ecstasy using HPLC-PDA and GC-MS; region-isomeric form was confirmed by H-1 NMR [918]; identification and characterization of 3-fluoroethamphetamine in seized material using FTIR, GC-EI-MS, HRMS, NMR and IMS [919]; **2019** computerized analysis of drug users' forum posts for monitoring and early detection of trends specifically for 4-FA/4-FMP [920].

Cathinones: 2016 Analysis of 22 amphetamine-derived synthetic drugs (mostly cathinones) by GC-MS with LOD less than 2 ng/mL for each [865]; GC-MS Method for Detection and Quantification of Cathine, Cathinone, Methcathinone and Ephedrine [921]; wastewater analysis of 17 synthetic cathinones in four European countries using solid-phase extraction LC-MS/MS [922]; identification of thermal degradation products for 18 cathinones during GC-MS [923]; structure-related derivatization followed by GC-MS analysis of cathinone type synthetic drugs focusing on the most common pentedrone (PENT), 4-fluoromethcathinone (4-FMC), methcathinone (MCTN), 4-methylethcathinone (4-MEC), 3,4-dimethylmethcathinone (3,4-DMMC), and 4-ethylmethcathinone (4-EMC) [924]; analysis and quantification of mephedrone, methylone, butylone, ethylone, pentylone and MDPV by GC-MS [925]; chiral LC method was developed to separate and determine the enantiomeric ratio of synthetic cathinones present in "legal highs" acquired in old smart shops or over the Internet [926]; product ion MS/MS differentiation of regioisomeric side-chain groups in cathinone derivatives including propyl and isopropyl side-chain groups related to Flakka and MDPV [927]; review of synthetic cathinones including analytical methods [928]; characterization of cathinone derivatives, 4-fluoro-PV9 and alpha-PHP in seized materials by HPLC-MS and HPLC-DAD [929]; identification and characterization of a novel cathinone derivative 1-(2,3-dihydro-1H-inden-5-yl)-2-phenyl-2-(pyrrolidin-1-yl)-ethanone seized by customs in Jersey using GC-MS, LC coupled with high-resolution MS, NMR, and X-ray crystallography [930]; differentiation of the isomers of N-Alkylated Cathinones by GC-EI-MS-MS and LC-PDA [931]; **2017** Six acylation reagents compared for their derivatization potential towards nine synthetic cathinones followed with analysis by GC-MS [932]; identification and characterization of four synthetic cathinone derivatives via LC-QTOF-MS, GC-MS and NMR [933]; Identification and analytical characterization of nine synthetic cathinone derivatives N-ethylhexedrone, 4-Cl-pentedrone, 4-Cl-alpha-EAPP, propylone, N-ethylnorpentylone, 6-MeO-bk-MDMA, alpha-PiHP, 4-Cl-alpha-PHP, and 4-F-alpha-PHP by UHPLC-QTOF-MS, GC-MS and NMR spectroscopy [934]; LC-MS/MS method to separate the ortho, meta and para isomers of methylmethcathinone (MMC) and methylethcathinone (MEC) using a core-shell biphenyl analytical column [935]; comparison of six acylation reagents for their derivatization

potential towards nine synthetic cathinones analyzed by GC-MS [932]; identification and structural characterization of four novel synthetic cathinones including alpha-methylaminohexanophenone (hexedrone, HEX), 4-bromoethcathinone (4-BEC), 4-chloro-alpha-pyrrolidinopropiophenone (4-Cl-PPP), and 4-bromo-alpha-pyrrolidinopentiophenone (4-Br-PVP) in seized compounds [936]; review of alpha-Pyrrolidinophenones as a new wave of designer cathinones [937]; analytical properties of five pyrrolidinyl substituted cathinones: alpha-pyrrolidinononaphenone (alpha-PNP, 1), 4-chloro-alpha-pyrrolidinopropiophenone (4-Cl-alpha-PPP, 2), 4-chloro-alpha-pyrrolidinovalerophenone (4-Cl-alpha-PVP, 3), 5-dihydrobenzofuranpyrovalerone (5-DBFPV, 4), and 2-(pyrrolidin-1-yl)-1-(5,6,7,8-tetrahydronaphthalen-2-yl)hexan-1-one (beta-THNPH, 5) identified by LC-QTOF-MS, GC-MS and NMR [938]; GC-MS, GC-MS/MS and GC-IR differentiation of desoxy cathinone derivatives [939]; differentiation of six dimethoxypyrrovalerone (DMPV) regioisomers using GC-MS, GC-MS/MS and GC-IR [940]; overview of Chiral and isotope ratio mass spectrometric analysis as applied to the synthetic cathinones [941]; **2018** Spectroscopic and crystallographic characterization of two cathinone derivatives: 4-FPD and 4-MEAP by electrospray ionization ion trap mass spectrometry (MS) in MS(2) and MS(3) modes, gas chromatography-MS, infrared, Raman and ultraviolet–visible spectroscopies, X-ray crystallography, differential scanning calorimetry and nuclear magnetic resonance spectroscopy [942]; determination and long-term stability of twenty-nine cathinones and amphetamine-type stimulants (ATS) using GC-MS [943]; review of new synthetic cathinones that have appeared on the illegal drug market during the period 2014–2017 - characterization by GC-MS and LC-MS/MS [944]; the synthesis and structural characterization by NMR and MS of a library encompassing 21 cathinones, 4 of which are not yet reported in the literature (N,N-dimethylbuphedrone(DMB) and N,N-dimethylpentedrone (DMP) [945]; review of analytical chiral resolution and biological differences between enantiomers of cathinone derivatives [946]; reviewed cases of analytically confirmed synthetic cathinones-related fatalities [947] NMR, FT-IR, GC-MS, HRMS and HPLC-UV detection, identification and full characterization of three cathinone derivatives, 4-MPD, 4F-PHP and bk-EPDP, purchased as bulk powder from online vendors [948]; enantioresolution of pentedrone and methylone at a multi-milligram scale by LC [949]; acid-base dissociation of six cathinones (2-methylmethcathinone, 3-methylmethcathinone, 4-methylmethcathinone, alpha-pyrrolidinovalerophenone, methylenedioxypyrovalerone, and ephedrone); and structurally similar 1-phenylethylamine by CE [950]; acidity of substituted cathinones (2-methylmethcathinone, 3-methylmethcathinone, 4-methylmethcathinone, alpha-pyrrolidinovalerophenone, methylenedioxypyrovalerone and ephedrone) studied by capillary electrophoresis [951]; synthesis and spectroscopic analysis (GC-MS, GC-FTIR, NMR and LC-QTOF-MS) of synthetic cathinone analogues [952]; review of analytical challenges in determination of cathinones [953]; comparison of single quadruple MS and PDA-UV detection interfaced to UHPSFC for the quantitative analysis of synthetic cathinones [954]; characterization of synthetic cathinone 5-PPDI using GC-MS, FTIR, HRMS and NMR spectroscopy [955]; review [956]; **2019** LC-LRMS/MS method for identification of synthetic cathinones in seized products [957]; SERS for the evaluation of 4-bromomethcathinone [958].

"Ecstasy Tablets" (that is, Tablets or Powders specified in their Titles or Abstracts as Ecstasy – these may in fact contain MDMA, a mixture of MDMA with one or more other Drugs, or only one or more non-MDMA Drugs): 2016 Chemical profiling of ecstasy tablets seized in the State of Sao Paulo (Brazil) by FT-Raman spectroscopy analysis and confirmed by GC-MS [959]; development of GC-MS for identification of 3, 4-MDMA impurities in ecstasy tablets [960]; **2017** identification of the need for more research on powder MDMA (Molly) use and purity [961] **2018** identification and quantification of MDMA and other psychoactive substances in ecstasy tablets seized by the Brazilian Federal Police by GC and quantitative H-1 NMR based on an internal standard approach (IS–H-1-qNMR) [962]; emergence of super strength ecstasy pills (MDMA) [963]; physical profiling combined with ATR-FTIR spectral matching, multi-component/deconvolution analysis and correlation were used prove that in five cases of tablets seized by local law enforcement forces in the state of Minas Gerais, Brazil were genuine sildenafil tablets from a specific manufacturer, painted in a colorful way so that they could be marketed as MDMA tablets [964]; presumptive method for identification of drugs in seized ecstasy tablets (n = 92) using ATR-FTIR (attenuated total reflectance - Fourier transform infrared spectroscopy) and partial least squares discriminant analysis [965]; seized ecstasy samples were analyzed to obtain their chemical profiles to determine origin of the seizures [966]; review of the most relevant analytical methodologies (sample preparation and instrumental techniques) used to determine the ecstasy components in complex matrices [967]; Chemical profiling of seized ecstasy tablets by determination of 25 elements by ICP-MS [968]; **2019** GC-MS and UV characterization of seized ecstasy tablets after screening using NIR and Mid-IR spectroscopy in combination with partial least squares-discriminant analysis (PLS-DA) and-regression (PLS) to differentiate MDMA positive and negative tablets [969].

Ephedrines: 2016 fluorescence resonance energy transfer (FRET) assay for detection of ephedrine [970]; a novel sensor for the determination of ephedrine [971]; evaluation of a molecularly imprinted polymer liquid chromatography column for the separation of ephedrine enantiomers [972]; determination of five alkaloids including ephedrine, norephedrine, and methylephedrine by HPLTC-ESI-MS [833]; fluorescence-detected circular dichroism spectroscopy of ephedrine [973]; differential mobility spectrometry for the differentiation of ephedrine and pseudoephedrine [974]; detection of ephedrine by HPLC, CE and GC-MS [970]; LC-MS/MS method for quantification of five ephedrines in supplements [975]; **2017** a new portable quantum cascade laser spectrometer to perform the automated recognition of ephedrines based on their vibrational absorptions [976]; detection of controlled amphetamines and ephedrines based on Laser Infrared Spectra [977]; Two-dimensional correlation spectroscopy for the identification of ephedrine and pseudoephedrine present in illegally adulterated slimming herbal products [978]; hydrophilic interaction LC-MS/MS for the analysis of ephedrine in a pharmaceutical solid dosage form available on the internet [979]; **2018** HPLC method for the simultaneous analysis of ephedrine HCl, guaifenesin and synthetic additives in syrup samples [980]; GC-MS method for quantification of ephedrine [981]; chiral and stable isotope ratios of ephedrine synthesized via the Akabori-Momotani reaction [982]; molecularly imprinted polymer for the detection of ephedrine [983]; **2019** sensor for detection of ephedrine in liquid and solid samples [984]; identification and characterization of three compounds obtained from ephedrine (Ephedrone (methcathinone) hydrochloride, N-acetylephedrine and N-acetylephedrone) using GC-MS, NMR, IR, RAMAN and X-ray Crystallography [275].

Ergot Alkaloids: 2016 detection of 25 ergot alkaloids in cereal samples by LC-MS/MS [985]; comparison of ESI and APPI coupled with LC-MS for the analysis of ergot alkaloids [986]; HPLC-FLD method for detection of five ergot alkaloids (ergometrine, ergotamine, ergocornine, ergocrypine and ergocristine) in animal feed [987]; UHPLC-HRMS for screening of ergot alkaloids in animal feed [988]; determination of the bioactive alkaloids tabersonine, serpentine, vindoline, catharanthine, tryptamine, and vincamine in Apocynaceae plants (C. roseus and V. minor) by LC-MS/MS [989]; **2017** review [990]; MALDI-MSI for imaging distribution of alkaloids

[991]; review [992]; determination of three new ergot alkaloids by HRMS [993]; determination of the total ergot alkaloids in rye using HPTLC-FLD [994]; response surface methodology for the identification, screening and optimization of fermentation factors to produce ergot alkaloids [995]; identification of a new species by molecular and ergot alkaloid profile analysis [996]; identification of alpha-CPA by UHPLC Triple-TOF HRMS [997]; NIR hyperspectral imaging for the detection of ergot bodies in cereal flour [998]; **2018** LAESI-MS for detection of ergot alkaloids [999]; testing of 122 samples of rye grains harvested in three different regions of Poland in 2016 and 2017 for ergot and its alkaloids [1000]; a total ergot alkaloid EIA compared with HPLC-FLD for the determination of total ergot alkaloids [1001]; multi-laboratory study to determine applicability of HPLC-FLD and HPLC-MS/MS for the determination of ergot alkaloids in rye-containing breads [1002]; review [1003]; UHPLC-FLD method for the quantification of the six major ergot alkaloids and their corresponding epimers [1004]; ergot alkaloids determination using spectrophotometry and TLC [1005]; review of IR spectroscopy for the detection of ergot alkaloids [1006]; **2019** protocol introducing lysergic acid diethylamide (LSD) for internal standardization of the analysis of ergot alkaloids by LC-FLD [1007]; 2D LC-MS/MS method for the simultaneous determination of 350 pesticides, 16 mycotoxins, 6 ergot alkaloids as well as the growth regulators Chlormequat and Mepiqua [1008]; NIR and ATR-FT/MIR spectroscopy for the determination of major ergot alkaloids [1009].

Fentanyl Derivatives: 2016 Conformation of fentanyl and its five derivatives using the IEF-PCM and SMD [1010]; **2017** GC-MS, QTOF-MS, MALDI-Orbitrap-MS, NMR and IR for confirmation of the presence of acrylfentanyl in seized material [1011]; identification of acrylfentanyl in powder from a seized capsule, analyses by QTOF-MS, MALDI-Orbitrap-MS, NMR and IR [1011]; discussion of the characteristics of the Swedish drug market for fentanyl-analogues in general and acrylfentanyl in particular and acrylfentanyl related deaths between April and October 2016 [1012]; review of chemical properties and the synthetic routes, analytical methodologies for the identification of acrylfentanyl, as well as the limited information on the biological properties [1013]; characterization of b cis and trans isomers of 3-methylfentanyl and its three analogues by GC/MS, LC/MS and NMR [1014]; GC/MS and LC/MS/MS detection of ocfentanil in heroin purchased off the dark web [1015]; **2018** review of Ocfentanil and Carfentanil [1016]; identification and characterization of fentanyl derivative N-(1-(2-fluorophenethyl)-4-piperidinyl)-N-(2-fluorophenyl)propionamide (2,2-difluorofentanyl) by HPLC-QTOF-MS, GC-MS, FTIR and NMR [1017]; review of various formulations of fentanyl, properties of fentanyl and its derivatives, and toxicity [1018]; review of fentanyl derivatives and uses [1019];

2-, 3-, and 4-Fluorophenmetrazines: 2017 synthesis and extensive analytical characterization of five powdered samples advertised as 3-FPM that were purchased from 5 difference internet vendors and differentiation from synthesized ortho- and para-substituted isomers, 2-FPM and 4-FPM [1020];

NBOMe Compounds: 2016 The detection of NBOMe designer drugs on blotter paper by high resolution time-of-flight mass spectrometry (TOFMS) with and without chromatography [1021]; case series: toxicity from 25B–NBOMe–a cluster of N-bomb cases [1022]; HPTLC and GC-MS analysis of 25 C NBOMe in Seized Blotters [1023]; Detection of 25C–NBOMe using LC-QTOF designer drug screen and quantitated by LC-MS-MS [1024]; identification of 2,4,6-TMPEA-NBOMe by GC-MS, GC-HRMS, GC-HRMS/MS, UHPLC/HRMS, UHPLC/HRMS/MS, and (1) H and (13) C NMR [1025]; analytical characterization of 3,4-DMA-NBOMe (1), 4-EA-NBOMe (2), 4-MMA-NBOMe (3), and 5-APB-NBOMe (4) by MS, IR spectroscopic, and NMR spectroscopic data [1026]; chemical profiling of 25I–NBOMe TLC, UV–Vis, ATR-FTIR, GC-MS and ESI-FT-ICR MS [1027]; identification of 25X-NBOMe and analogues by GC-MS [1028]; **2017** Rapid screening and analytical determination of 25B–NBOMe and 25I–NBOMe via Cyclic and Differential Pulse Voltammetry [1029]; 25B–NBOMe and 25C–NBOMe by GC-MS, LC-MS(n), and LC-HR-MS/MS [1030]; Identification and quantification of 5 different 25-NBOMes (25B–NBOMe, 25C–NBOMe, 25D-NBOMe, 25H–NBOMe, 25I–NBOMe) via LC-MS-MS [1031]; synthesis of potential metabolites of 25C–NBOMe and 25I–NBOMe [1032]; UPLC-QTOF-MS analysis of twelve 2C-X, six 2,5-dimethoxyamphetamines (DOX), and fourteen 25X-NBOMe derivatives, including two deuterated derivatives (2C–B-d(6) and 25I–NBOMe-d(9) [1033]; identification of NBOMes and the analogous 2,5-dimethoxy phenethylamine structures by voltammetric methods in blotting paper seized from the drug market [1034]; modification of solvent delay window to prevent misidentification of 25I–NBOH as 2C–I with GC-MS [1035]; 25c-nbome: Case report and literature review [1036]; comparison of nano-LC-HRMS/MS to UHPLC for detection of 3,4-DMA-NBOMe and 4-MMA-NBOMe and metabolites [1037]; **2018** square-wave voltammetry for the quantification of NBOMes and their correlates, 2,5-dimethoxy phenethylamine structures in seized blotting paper [1038]; the analysis of illicit 25X-NBOMe from over 100 seizures in Western Australia [1039]**;** LC-HR-MS/MS identification of the phase I and II metabolites of 4-EA-NBOMe [1040]; LC-MS-MS confirmation of 251-NBOMe [1041]; **2019** handheld NIR spectrometer for discrimination of NBOMe and NBOH drugs absorbed in blotter papers using PLS-DA and SIMCA [1042]; **2019** SPCE electrochemical method for the detection of 25I–NBOH and full differentiation between 25I–NBOH, 2C–I and 25I–NBOMe [1043]; review [1044]; review of the main methods for the analysis of NBOMe compounds for detection in seized and biological materials for forensic and clinical purposes [1045]; the fragmentation patterns of NBOMe derivatives were analyzed using LC-QTOF/MS and the spectral data was used to establish a molecular networking map for NBOMe derivatives [1046].

Opiates: 2016 syntheses of new N-demethyl-N-substituted analogues (propyl, allyl) of 1-fluorocodeine and their 7,8-dihydro derivatives [1047]; Collison nebulizer as an ionization source for the MS analysis of opiates [1048]; comparison opiate recovery from acid hydrolysis and enzymatic hydrolysis followed by LC-MS/MS (toxicology focus) [1049]; synthesis of noroxymorphone from thebaine [1050]; synthesis of nororipavine and noroxymorphone via N- and O-demethylation of iron tricarbonyl complex of thebaine [1051]; **2017** investigation of the acid/base behavior of the opium alkaloid thebaine in LC-ESI-MS mobile phase by NMR spectroscopy [1052]; review of Piritramide [1053]; model studies toward the total synthesis of Thebaine by an intramolecular [4+2] cycloaddition [1054]; physico-chemical profiling of semisynthetic opioids characterized by combining pH-potentiometry and deductive methods [1055]; integrated continuous-flow synthesis of a key oxazolidine intermediate to noroxymorphone from naturally occurring Opioids (oripavine and thebaine) [1056]; a colorimetric sensor array based on unmodified gold nanoparticles (AuNPs) was developed for the detection and identification of multiple structurally similar opioids including morphine, codeine, oxycodone, noroxycodone, thebaine, tramadol and methadone in aqueous media [1057]; **2018** Opioids in expensive formulations are being favored over IR morphine both at the dispensing level and in their inclusion in national list of essential medications [1058]; isolation and determination of Opium Alkaloids by dispersive liquid-liquid microextraction based on solidification of floating organic drop and HPLC-UV detection [1059]; novel retro-ene reaction via a [4.4.3]propellane intermediate containing a quaternary ammonium linkage [1060]; review of drug interactions with new synthetic opioids [1061]; crystal structures of Thebaine 6-O-demethylase in

complexes with 2-oxoglutarate and succinate [1062]; abuse-deterrent Opioids [1063]; effects of ketamine and norketamine on the attenuation of morphine and oxycodone tolerance [1064]; review of abuse-deterrent Opioid formulations [1065]; identification of novel Opioid interferences using High-Resolution Mass Spectrometry [1066]; changes in consumption of opioid analgesics in Israel 2009 to 2016 focusing on oxycodone and fentanyl formulations [1067]; trends and characteristics of oxycodone exposures reported to the US Poison Centers, 2011–2017 [1068]; spatial pattern analysis of 3,396 locations of oxycodone positivity in drivers involved in fatal traffic crashes from the Fatality Analysis Reporting System (FARS) [1069]; impact of the introduction of tamper-resistant controlled-release (CR) oxycodone in April 2014 in Australia [1070]; review of the opioid class of NPS [1071]; review of novel synthetic opioids including N-(1-(2-phenylethyl)-4-piperidinyl)-N-phenylbutyramide (butyrylfentanyl), 3,4-dichloro-N-[(1R,2R)-2-(dimethylamino)cyclohexyl]-N-methylbenzamide (U-47700) and l-cyclohexyl-4-(1,2-diphenylethyl)piperazine (MT-45) [1072]; synthesis of MT-45, 2F-, 3F- and 4F-MT-45 as reference samples to confirm presence of 2F-MT-45, a fluorinated analogue of the synthetic opioid MT-45 in a single seized tablet [1073]; SERS for detection of trace quantities of fentanyl alone and as an adulterant in heroin [1074]; **2019** LC/TOF-MS for identification of opioids in surface and wastewater [1075]; review [1076].

Opiates (Bio-Engineered): 2016 review of the engineered biosynthesis of ditryptophenaline (dimeric diketopiperazine alkaloid), saframycin (tetrahydroisoquinoline alkaloid), strictosidine (monoterpene indole alkaloid), ergotamine (ergot alkaloid) and opiates (benzylisoquinoline and morphinan alkaloid) [1077]; review of microbial Benzylisoquinoline alkaloid synthesis and derivatization [1078]; yeast-based production of Benzylisoquinoline alkaloids [1079]; **2018** commercial production of opiate alkaloids in engineered microorganisms [1080]; development of fermentation-based opiate production using thebaine synthase to improve thebaine yield in engineered yeast [1081]; Inclusion of neopinone isomerase in yeast strains engineered to convert thebaine to natural or semisynthetic opiates [1082].

1-(1-Phenylcyclohexyl)piperidine (PCP), 1-(1-phenylcyclohexyl)pyrrolidine(PCPy) and Arylcyclohexylamine analogues: 2016 Synthesis and analytical characterizations of N-alkyl-arylcyclohexylamines (3-MeO-PCP, 3-MeO-PCE and 3-MeO-PCPr) by GC and HPLC coupled to multiple forms of MS as well as NMR, UV-DAD and IR spectroscopy [1083]; **2017** Arylcyclohexylamines powders analyzed by LC-TOF-MS with detection of Methoxetamine and 3-methoxy-phencyclidine in all samples [1084]; synthesis of Methoxy and methyl-aminobenzothiazole derivatives of phencyclidine [369]; LC-TOF and LC-MS/MS for identification and quantification of MeO-PCP [1085]; **2018** analytical and pharmacological characterization of 3-MeO-PCMo along with five additional analogues, namely the 2- and 4-MeO-PCMo isomers, 3,4-methylenedioxy-PCMo (3,4-MD-PCMo), 3-Me-PCMo and PCMo using chromatographic, mass spectrometric and spectroscopic techniques [285];

Phenothiazines: 2016 LC-MS/MS method for the screening and confirmation of 28 veterinary drug and metabolite residues (nitroimidazoles, benzimidazoles, sulfones, quinolones, macrolides, phenothiazines, pyrethroids and others) [1086]; heterologous competitive indirect ELISA for the determination of five phenothiazines (chlorpromazine, promethazine and perphenazine, acepromazine and fluphenazine) [1087]; synthesis and characterization by H-1 NMR, C-13 NMR and ESI-MS [1088]; UPLC MS/MS method for 210 drugs (including phenothiazines) [1089]; **2017** simultaneous electroanalytical detection of Chlorpromazine and Thioridazine [1090]; ELISA method for determination of 5 phenothiazine drugs [1091]; SPE method for phenothiazines [1092]; ELISA for the detection of phenothiazines in animal feed [1093]; LC-MS/MS method for quantification of phenothiazines [1094]; **2018** SPE UHPLC-DAD method for detection of promethazine (PMZ) and chlorpromazine (CPZ) [1095]; CE coupled with ultraviolet absorption for the simultaneous separation of chiral phenothiazine drugs at nanomolar concentration levels [1096]; SPE method for phenothiazines and benzodiazepines [1097]; imprinted polymer based chemiluminescence array capable of simultaneous determining phenothiazines and benzodiazepines [1098]; chemiluminescence array sensor for the simultaneous determination of four phenothiazines and five benzodiazepines [1099]; **2019** continuous flow synthesis of a model phenothiazine antipsychotic [1100]; review [1101].

Phosphodiestrase-5 Inhibitors (PDE—5) – Cialis (tadalafil), Levitra (vardenafil), Viagra(sildenafil), and similar drugs: 2016 spectrofluorimetric method for determination of both tadalafil (TAD) and vardenafil (VAR) in pure and tablet dosage forms [1102]; HPLC-DAD method for the simultaneous determination of seven drugs including the phosphodiesterase-5 inhibitors: sildenafil, tadalafil, and vardenafil, and selective serotonin reuptake inhibitors: dapoxetine, duloxetine, fluoxetine, and paroxetine [1103]; HPLC-PDA and HPLC-MS methods for the analysis of genuine ViagraA (R), generic products of ViagraA (R), and counterfeit samples [1104]; immunochromatographic (IC) assay was developed based on polyclonal antibodies for determination of sildenafil and major analogues in herbal samples [1105]; LC-ESI-MS/MS method to identify phosphodiesterase-5 (PDE-5) inhibitors and their analogues in dietary supplements and food [1106]; HPLC-UV, GC/FT-IR/MS and HRMS for the isolation and structural characterization of a tadalafil analog (chloropropanoylpretadalafil) in dietary supplements [1107]; HPLC, QTOF- MS and NMR spectroscopy for identification and structural elucidation of three new tadalafil analogues found in a dietary supplements [1108]; GC-MS/MS mass for identification, confirmation and quantification of 6 phosphodiesterase-5 (PDE-5) inhibitors (sildenafil, dimethylsildenafil, homosildenafil, thiosildenafil, thiodimethylsildenafil and thiohomosildenafil) in dietary supplements [1109]; disposable potentiometric sensor for determination of sildenafil [1110]; UPLC-MS/UV method for simultaneous determination of sildenafil citrate and dapoxetine hydrochloride [1111]; **2017** colorimetry in identifying imitator products by comparing the color signatures of Viagra tablets with imitator sildenafil tablet [1112]; ultrasound-assisted (UA) dispersive nanocomposite solid-phase micro-extraction (UA-DNSPME) to determine trace levels of Sildenafil Citrate in water [1113]; pencil graphite electrode (PGE) system for the trace-level determination of vardenafil hydrochloride [1114]; two amperometric methods to determine Sildenafil Citrate in Viagra (R) and Generics, using Batch Injection Analysis (BIA) and Flow Injection Analysis (FIA) systems with a cell for Screen Printed Electrodes [1115]; LC-ESI-MS/MS for determining the synthetic phosphodiesterase-5 inhibitors, sildenafil, tadalafil and vardenafil, and the active metabolite N-desmethyl sildenafil in water matrices [1116]; batch injection analysis with multiple pulse amperometric detection (BIA-MPA) used as a screening method on tablets containing sildenafil [1117]; analysis of Voriconazole and Tadalafil by HPLC [1118]; immunochromatographic strip for screening of tadalafil and its analogues in herbal samples [1119]; TLC and Raman for detection of PDE-5 inhibitors [1120]; SPE assisted reversed-phase dispersive liquid-liquid microextraction followed by LC-UV to simultaneously determine the concentration of sildenafil and its five analogues in dietary supplements [1121]; cyclic voltammetry method for determination of tadalafil [1122]; UHPLC-DAD and/or MS for the separation and determination of tadalafil and its impurities in pharmaceutical samples [1123]; SERS for screening of PDE-5 adulterants in health products [1124]; ESI-MS for the differentiation of enantiomeric

tadalafil isomers without using chiral chromatographic separation [1125]; SERS to detect sildenafil drugs illegal added to water and liquid nutraceuticals [1126]; electrochemical sensing platform to determine tadalafil in herbal health products [1127]; **2018** review of PDE-5 inhibitors found as adulterants in dietary supplements and analytical methods for detection [1128]; SERS detection of PDE-5 in botanical dietary supplements after TLC separation [1129]; electrochemical sensor for determination of Tadalafil [1130]; PDE-5 linked Fe3O4@SiO2 nanoparticles as a new adsorbent for magnetic dispersive SPE of ligands from medicinal plant samples before the analysis by UHPLC-Q-TOF/MS [1131]; SERS method for determining vardenafil and rosiglitazone maleate [1132]; magnetic nanodiamond/graphene oxide hybrid material for preconcentration and sensitive determination of sildenafil in alleged herbal aphrodisiacs by HPLC-DAD [1133]; magnetic solid phase micro-extraction followed by SERS for determination of sildenafil [1134]; **2019** LC-QTOF-MS/MS for determination of sildenafil, tadalafil, vardenafil, and avanafil in illicit erectile dysfunction medications [1135]; U-HPLC-HRMS/MS method has been developed to simultaneously determine 59 PDE-5 inhibitors and their analogues [1136]; electrochemical sensor for determination of tadalafil [1137]; differential scanning calorimetry for chemical profiling of counterfeit medicines of Cialis and Viagra [1138]; sensor for simultaneous detection of various tadalafil adulterants in health food [1139]; LC-MS/MS method for screening for the presence of 80 PDE-5 inhibitors and analogues illegal sexual enhancement products available on the internet [1140].

Piperazines: 2016 HPLC-MS method to determine the trace residues of piperazine [1141]; HPLC method for characterizing of impurities (1-[4-[(2,4-dimethylphenyl)thio]phenyl]-piperazine) in vortioxetine confirmed by LC-MS, IR and NMR [1142]; HPLC-FLD method for determination of piperazine residues [1143]; synthesis of Sodium4-benzyl piperazine-1-carbodithioate and sodium4-benzhydryl piperazine-l-carbodithioate and characterization by FT-IR and multinuclear NMR (H-1, C-13) spectroscopy [1144]; **2017** GC-EI/MS/MS for determination of piperazine [1145]; UPLC-ESI/MS/MS) method for the detection of piperazine [1146]; **2019** spectral analysis of novel N-thioamide analogues of pyrazolylpyrimidine based piperazine using Mass, H-1 NMR and C-13 NMR spectral techniques [1147];

Steroids: 2016 LC-ESI-MS/MS method for determination of progesterone, testosterone, trenbolone acetate and zeranol [1148]; LC-MS/MS screening method for multi-class steroid hormone detection [1149]; detection of Detection and metabolic investigations of a novel designer steroid: 3-chloro-17 alpha-methyl-5 alpha-androstan-17 beta-ol in seized capsules using NMR, GC-MS and GC-MS/MS [1150]; HPLC-UV method for identification of corticosteroids in illegal cosmetics [1151]; LC-ESI-MS/MS for the simultaneous determination of six estrogens and six glucocorticoids in water [1152]; FPSE-UHPLC-MS/MS for the determination of four progestogens and six androgens [1153]; uHPLC-MS/MS for the analysis of sex hormones and corticosteroids [1154]; Stable isotope labeling - LC-ESI-MS/MS for quantitative analysis of androgenic and progestagenic steroids [1155]; LC-MS/MS method for selective and sensitive determination of estrogens [1156]; DLLME- HPLC/UV–vis for determination of estrogens [1157]; GC/EI-MS/MS and GC/CI -MS/MS analysis of anabolic steroids [1158]; MALDI-TOF-MS for the detection of steroids [1159]; PF-MEKC-UV for detection of steroids [1160]; **2017** CE and UHPLC to identify steroids [470]; LC-ESI-MS/MS for quantitative analysis of oestrogens (oestrone, oestradiol and oestriol) and androgens (testosterone and 15 alpha-testosterone) [1161]; LC-ESI-MS/MS for the determination of several corticosteroids illegally added to cosmetic products [1162]; LC-APCI-MS for determination of sterols and steroids [1163]; review of methods for isolation and characterization of brassinosteroids in plants [1164] analysis of anabolic steroids by LPPI-MS [1165]; identification of steroids in drug products using RP-HPLC-UV-detection and GC-MS [1166]; HPLC method for determination of steroids [1167]; **2018** GC-MS method to detect anabolic androgenic steroids (androsterone, nandrolene, dehydroepiandrosterone, 5a-androstane-3 beta, 17 beta-diol, dihydrotestosterone, testosterone, methenolone acetate, methandienone, boldenone and fluoxymesterone) in food supplements [1168]; differential pulse voltammetry and amperometry for steroids in commercial pharmaceutical formulations [1169]; considerations for validation of chromatographic mass spectrometric methods for the quantification of endogenous substances in forensics [1170]; availability and ease of purchase of illicit anabolic androgenic steroids and testosterone preparations on the Internet [1171]; UHPLC-MS/MS method for simultaneous determination of 12 hair-growth compounds (including steroids) in adulterated products [1172]; authenticity assessment of anabolic androgenic steroids in counterfeit drugs by H-1 NMR [1173]; SPE-HPLC-MS/MS method for analysis of two progestin metabolites, 17 alpha-hydroxypregnanolone (17OH-Delta 5P) and pregnanediol (PD), and 31 other natural and synthetic steroids and related metabolites (estrogens, androgens, corticosteroids, progestins) in river water and wastewater [1174]; **2019** characterization of apprehended formulations of anabolic androgenic steroids in either tablet, capsule or injectable forms using FTIR, GC-MS and differential scanning calorimetry [1175]; HPTLC-densitomeric method for the determination of nandrolone decanoate in a commercially available injection formulation [1176]; determination of designer steroids by HPLC-UV [1177]; TD-APPI for direct analysis of steroids at trace levels [1178]; LC-MS/MS for the detection and quantification of naproxen, methyltestosterone and 17 alpha-hydroxyprogesterone caproate residues [1179]; ciELISA and lateral flow immunochromatography for the determination of DHEA in slimming products [1180]; HPLC-UV for semi-quantitative determination of designer steroids [1177].

Tryptamines (see also Mushrooms): 2016 square wave adsorptive stripping voltammetry for determination of tryptamine [1181]; synthesis of synthesis of 3-(2-(1H-indol-3-yl)ethyl)-4-hydroxy-4-arylthiazolidine-2-thione and 3-(2-(1H-indol-3-yl) ethyl)-4-arylthiazole-2(3H)-thione [1182]; synthesis of functionalized 3-{1-[2-(1H-indol-3-yl) ethyl]-4,5,6,7-tetra-hydro-1H-indol-3-yl} indolin-2-ones [1183]; HPLC-DAD method for detecting terpenoid indole alkaloids in different parts and different developmental stages of Catharanthus roseus plants [1184]; Solid Surface-Room Temperature Phosphorescence (SS-RTP) for direct determination of the concentration of tryptamine in beers [1185]; RP-HPLC-DAD for determination of the biogenic amines tryptamine, putrescine, histamine, phenylethylamine, tyramine, cadaverine, spermidine and spermine in red and white wines [1186]; **2017** analytical characterization of 17 DALTs using NMR, GC quadrupole and ion trap (EI/CI) MS, low and high mass accuracy MS/MS, photodiode array detection, and GC solid-state infrared analysis [1187]; LC-MS method for quantification of Tryptophan [1188]; characterization of omega-N-methyl-4-hydroxytrypt-amine (norpsilocin, 1) using 1D and 2D NMR spectroscopy and high-resolution mass spectrometry [789]; detection of 5-fluoro-DALT (5-F-DALT), 7-methyl-DALT (7-Me-DALT), and 5,6-methylenedioxy-DALT (5,6-MD-DALT) using GC-MS, LC-MS/MS and LC-HR-MS/MS [1189]; GC-MS analysis of 25,296 samples of which 436 were tryptamines; from these 232 (53.21%) were non-regulated (the most delivered non-regulated tryptamine was 4-AcO-DMT) [1190]; SPE-LC-UV-DAD for determination of tryptamines Ayahuasca, a potent hallucinogenic beverage [552]; use of tryptamine as a reactive matrix for the analysis of non-polar carbonyl compounds by MALDI-MS [1191]; UPLC-TQ/MS method for direct

determination of biogenic amines tryptamine, putrescine, histamine, phenylethylamine, tyramine, cadaverine, spermine, and spermidine in wine [1192]; **2018** detection of 5-MeO-2-Me-DALT, 5-MeO-2-Me-ALCHT, 5-MeO-2-Me-DIPT using GC-MS, LC-MSn and LC-HR-MS/MS [1193]; investigation and comparison of mass fragmentation of 20 phenethylamine/tryptamine standards by means of MALDI/TOFM, GC-EI/MS and LC-ESI/MS [877]; trends in use of tryptamines-specifically DMT, alpha-methyltryptamine (AMT), and 5-MeO-DIPT ("Foxy") [1194];

1.4. Synthetic cannabinoids and cannabimimetics [Notes: Compounds are listed either by their acronym or full name as was specified in their respective abstract – no effort was made to transcribe acronyms to full chemical names or vice versa. Articles that include both synthetic cannabinoids and/or cannabimimetics with other drugs are detailed separately.]

Individual Synthetic Cannabinoids and Cannabimimetics: **2016** identification and structure elucidation of a new synthetic cannabinoid, [1-(cyclohexylmethyl)-1H-indol-3-yl](naphthalen-1-yl) methanone using flash chromatography, GC-MS, IR and NMR spectroscopy [1195]; identify of a new designer drug thiothinone, [2-(methylamino)-1-(2-thienyl)-1-propanone] using GC/MS, LC/MS, accurate mass spectrometry, NMR and X-ray powder diffraction [1196]; synthesis and characterization of tN-(1-amino-3-methyl-1oxobutan-2-yl)-1-(cyclohexylmethyl)-3-(4-fluorophenyl)-1H-pyrazole-5-carboxamide(3,5-AB-CHMFUPPYCA) and differentiation from its 5,3-regioisomer using chromatographic, spectroscopic, mass spectrometric platforms as well as crystal structure analysis [1197]; LC separation method for the analysis of JWH-122 and its methyl isomers [1198]; identification of 3-benzyl-5-[1-(2-pyrrolidin-1-ylethyl)-1H-indol-3-yl]-1,2,4-oxadiazole (BzODZ-EPyr) by means of GC/MS, GC/HRMS, UHPLC/HRMS2, FT-IR and NMR (H-1 and C-13) [1199]; characterization of MDMB-CHMCZCA by various spectroscopic techniques including NMR spectroscopy and tandem mass spectrometry [1200]; **2017** selective SPE of four JWH synthetic cannabinoids (JWH-018, JWH-073, AM-1220, WIN-55) using computationally designed peptides and analysis by UHPLC-MS/MS [1201]; case review (39 cases) of the effects of synthetic cannabinoid UR-144 [1202]; separation and identification the 5F-PB-22 and its isomers using GC-MS, solid deposition GC-IR spectroscopy and H-1 and C-13 NMR spectroscopy [1203]; identification and characterization of 2-(2-(4-chlorophenyl)acetamido)-3-methylbutanamide [1204]; Identification of (1H-indol-3-yl)(2,2,3,3-tetramethylcyclopropyl)methanone (DP-UR-144) in a herbal drug product using LC-MS, GC-MS and NMR [1205]; integration of NIR spectroscopy with chemometrics for the determination of AKB48 (N-1-Adamantyl-1-pentyl-1H-indazole-3-carboxamide) [1206]; **2018** GC-MS and GC-IR analyses of the methoxy-1-n-pentyl-3-(1-naphthoyl)-indoles: regioisomeric designer cannabinoids [1207]; Structural characterization and pharmacological evaluation of the new synthetic cannabinoid CUMYL-PEGACLONE using GC-MS. GC-sIR, LC-ESI-qToF-MS and NMR [1208]; chemistry and pharmacology of synthetic cannabinoid SDB-006 and its regioisomeric fluorinated and methoxylated analogues using LC-QTOF-MS [1209]; identification and characterization of an indazole-3-carboxamide class synthetic cannabinoid: 2-[1-(cyclohexylmethyl)-1H-indazole-3-carboxamido]-3,3-dimethylbutanoic acid (DMBA-CHMINACA) using GC-MS, LC-HRMS, IR and NMR [1210]; detection of 5F-MDMB-PICA in "legal high' products and human urine samples using GC-MS, LC-MS/MS and LC-QToF-MS [1211]; LC-MS/MS analytical method for 11 Phytocannabinoids in cannabis [1212]; electrochemical biosensor for the detection of JWH-073 [1213]; **2019** identification of 5F-Cumyl-PINACA (1-(5-fluoropentyl)-N-(2-phenylpropan-2-yl)-1H-indazole-3-carboxamide in herbal mixtures by NMR [1214]; synthesis and characterization of 5F-CUMYL-PICA, 5F-CUMYL-PINACA, and 5F-CUMYL-P7AICA by NMR, GC-MS and LC-QTOF-MS [1215]; characterization of 5F-Cumyl-PINACA in "e-liquids' using NMR [1214].

Multiple Synthetic Cannabinoids and Cannabimimetics: [Note: Each year in this subsection is separated by a line space.]

2016 A flash chromatography separation followed by structural elucidation using GC-MS, GC-sIR and NMR analysis of an herbal mixture containing [1-(cyclohexylmethyl)-1H-indol-3-yl](naphthalen-1-yl) methanone and 5F-ADB [1195]; UHPSFC for the analysis of seized drugs and application for analysis of a mixture of 22 controlled synthetic cannabinoids, and the second group included JWH018 and nine of its non-controlled positional isomers [1216]; synthesis and spectroscopic analysis of synthetic cannabinoid analogues of 1H-indol-3-yl(2,2,3,3-tetramethylcyclopropyl) methanone and 1H-indol-3-yl(adamantan-1-yl)methanone using GC-FTIR and GC-MS [1217]; enantioseparation of the carboxamide-type synthetic cannabinoids N-(1-amino-3-methyl-1-oxobutan-2-yl)-1-(5-fluoropentyl)-1H-indazole-3-carboxamide and methyl [1-(5-fluoropentyl)-1H-indazole-3-carbonyl]-valinate in illicit herbal products using LC-HRMS [1218]; identification and characterization of alpha-PVT, alpha-PBT, and their bromothienyl analogues found in illicit drug products [1219]; 5F-AMBICA, 5F-AMB, 5F-ADB, AMB-FUBINACA, MDMB-FUBINACA, MDMB-CHMICA, and their analogues were synthesized and assessed for cannabimimetic activity [1220]; analysis of spice like products procured from German internet shops and analyzed by GC-MS for identification of THJ-018, THJ-2201, MAB-CHMINACA, 5F-ADB, 5Cl-AKB48 (syn.: 5C-AKB48), 4-pentenyl-AKB48, MDMB-CHMICA and 5F-AB-PINACA [1221]; synthetic cannabinoid use in a Norwegian Internet drug forum [1222]; synthetic cannabimimetics detected in smoking blends on the Bulgarian territory [1223]; structure elucidation of cannabimimetic designer drug, N-(1-amino-3,3-dimethyl-1-oxobutan-2-yl)-1-(5fluoropentyl)-3-(4-fluorophenyl)-pyrazole-5-carboxamide using NMR and MS [1224]; ESI-FT-ICR MS analysis of nine samples of herbal extract blends, where UR-144, JWH-073, XLR-11, JWH-250, JWH-122, AM-2201, AKB48, JWH-210, JWH-081, MAM-2201 and/or 5F-AKB48 were identified in the positive ionization mode [1225]; analysis of the Canadian synthetic drugs market using multiple sources of data and three methods (georeferencing, economic modeling, and chemical composition analysis) to establish the scope, scale, and structure of synthetic drugs produced in Canada [1226]; GC-MS differentiation of six regioisomeric 1-n-pentyl-3-(dimethoxybenzoyl)-indoles representing potential designer modifications in the synthetic cannabinoid drug category [1227]; simultaneous determination of major Phytocannabinoids (THC, CBD, CBN), their main metabolites (11-OH-THC, THC-COOH, THC-COOH-glucuronide) and common synthetic cannabinoids (HU-210, JWH-018, JWH-073, JWH-250) using LC-MS/MS; electrooxidative transformations of 11 new indole and indazole synthetic cannabinoids in seized street samples and artificial saliva using cyclic and differential pulse voltammetry [1228]; identification and quantification of the nine cannabinoids by UPLC-UV and ion spray UPLC-MS-MS using multiple reaction monitoring [1229]; ESI-FT-ICR MS was applied to nine samples of herbal extract blends, where a total of 11 SCs (UR-144, JWH-073, XLR-11, JWH-250, JWH-122, AM-2201, AKB48, JWH-210, JWH-081, MAM-2201 and 5F-AKB48) were identified [1225]; identification and quantification of eight different synthetic cannabinoids (5-fluoro-AB-PINACA, AB-CHMINACA, AB-FUBINACA, 5-fluoro-PB-22, 5-fluoro-AMB, MDMB-CHMICA, EAM-2201 and STS-135 synthetic cannabinoids) in "spice-like" herbal mixtures using GC-MS and NMR, ESI-MS/MS, IR and UV spectroscopy was conducted for eight compounds [1230]; synthesis, pharmacological evaluation and analytical

characterization of commonly encountered indazole synthetic cannabinoids AB-CHMINACA, AB-FUBINACA, AB-PINACA, 5F-AB-PINACA and their corresponding 2-alkyl-2H-indazole regioisomers using H-1 and C-13 NMR, GC-MS and UV–visible spectroscopy [1231]; DART-MS and NMR spectroscopy for screening and detection of synthetic cannabinoids in herbs and powders [1232]; micellar electrokinetic chromatography-tandem mass spectrometry separation and determination of 15 selected naphthoyl- and phenylacetylindole-synthetic cannabinoids and main metabolites derived from JWH-018, JWH-019, JWH-073, JWH-200 and JWH-250 [1233]; characterized of seized white powders for identification of 5F-AMB and PX-3 using H-1 and C-13 NMR, HR-MS/MS and Raman spectroscopy [1234];

2017 role of derivatization techniques in the analysis of plant cannabinoids by GC-MS [1235]; LC-MS/MS method for the analysis of 32 synthetic cannabinoids [1236]; identification of ten synthetic cannabinoids found in sixty-three different herbal blends seized by the Swedish police between October 2012 and April 2015 by NMR [1237]; review article [1238]; identification of eight synthetic cannabinoids (JWH-018, JWH-019, AM2201, JWH-122, 5F-AKB48, AKB48-N-(4-pentenyl) analog, UR144, and XLR11) in seized herbal products using DART-TOF-MS and LC-QTOF-MS [1239]; isomeric discrimination of synthetic cannabinoids by GC-EI-MS including carboxamide-type synthetic cannabinoids (APINACA 2-adamantyl isomer, APICA 2-adamantyl isomer, 5F-APINACA 2-adamantyl isomer, 5F-APICA 2-adamantyl isomer, 5Cl-APINACA, 5Cl-APINACA 2-adamantyl isomer, adamantyl-THPINACA, 2-adamantyl-THPINACA) and four 1-adamantyl derivatives (APINACA, APICA, 5F-APINACA, 5F-APICA) [1240]; determination of nine synthetic cannabinoids (MAM-2201, JWH-073, JWH-210, JWH-122, JWH-081, JWH-250, UR-144, XLR-11 and AKB-48-5F) in seized herbal materials using high-field to low-field proton NMR [1241]; mass spectrometric identification and structural analysis of the third-generation synthetic cannabinoids using LC-HR-MS(/MS) [1242]; structure identification and spectral characterization of four novel substituted cathinones: hexedrone [2-methylamino-1-(phenyl)hexan-1-one], 4-BEC [1-(4-bromophenyl)-2-(ethylamino)propan-1-one], 4-Cl-PPP [1-(4-chlorophenyl)-2-(pyrrolidin-1-yl)propan-1-one], and 4-Br-PVP [1-(4-bromophenyl)-2-(pyrrolidin-1-yl)pentan-1-one] in seized material using LC-HRMS, GC-MS and NMR [936]; analysis of 32 synthetic cannabinoids using LC-MS-MS [1236]; characterization of the synthetic cannabinoids CUMYL-PINACA, 5F-CUMYL-PINACA, CUMYL-4CN-BINACA, 5F-CUMYL-P7AICA and CUMYL-4CN–B7AICA using GC-EI-MS, LC-HRMS, IR and NMR [1243]; identification and quantification of synthetic cannabinoids in 'spice like' herbal mixtures using GC-MS, followed by in-depth characterization of 5F-Cumyl-P7AICA and CumylPeGACLONE by NMR, EI-MS, ESI-MS/MS, IR and UV/Vis [1244]; detection of 93 synthetic cannabinoids by LC-MS/MS [1245]; identification of synthetic cannabinoids including N-(1-adamantyl)-2-pentyl-2H-indazole-3-carboxamide (APINACA 2H-indazole analogue, 1), N-(1-adamantyl)-4-methyl-1-pentyl-5-phenyl-1H-pyrazole-3-carboxamide (AMPPPCA, 2), and N-(1-adamantyl)-1-(5-fluoropentyl)-4-methyl-5-phenyl-1H-pyrazole-3-carboxamide (5F-AMPPPCA, 3) by LC-QTOF-MS, GC-TOF-MS and NMR [1246]; cross-reactivity of poly- and monoclonal antibodies for synthetic cannabinoids by direct SPR and ELISA [1247]; determination of MDMB(N)-Bz-F and adamantan-1-yl 1-pentyl-1H-indazole-3-carboxylate (APINAC) in illegal products by HPLC, LC-HRMS, IR and NMR [1248]; identification of six synthetic cannabinoid derivatives including 1H-benzo[d] [1–3]triazol-1-yl 1-(5-fluoropentyl)-1H-pyrrolo [2,3-b]pyridine-3-carboxylate (NNL-3, 1), quinolin-8-yl 1-(5-fluoropentyl)-1H-pyrrolo [2,3-b] pyridine-3-carboxylate (5F-NPB-22-7N, 2), N-((1 s, 3 s)-adamantan-1-yl)-1-(5-fluoropentyl)-1H-pyrrolo [2,3-b] pyridine-3-carboxamide (5F-AKB-48-7N, 3), ethyl 2-(1-(5-fluoropentyl)-1H-indazole-3-carboxamido)-3,3dimethylbutanoate (5F-EDMB-PINACA, 4), ethyl 2-(1-(4-fluorobenzyl)-1H-indazole-3-carboxamido)-3-methylbutanoate (EMB-FUBINACA, 5), and naphthalen-1-yl(9-pentyl-9H-carbazol-3-yl)methanone (EG-018, 6) using UHPLC-QTOF-MS, GC-MS and NMR [1249]; review [1250]; identification of JWH-018, JWH-019, AM2201, JWH-122, 5F-AKB48, AKB48-N-(4-pentenyl) analog, UR144, and XLR11 in herbal products using DART-TOF-MS and LC-QTOF-MS [1239]; identification and analytical characterization of four synthetic cannabinoids including ADB-BICA, NNL-1, NNL-2, and PPA(N)-2201using LC-QTOF-MS, GC-MS, FT-IR and NMR [1251];

2018 Correlation of vapor phase infrared spectra and regioisomeric structure in synthetic cannabinoids (twelve 1-n-pentyl-2-, 3-, 4-, 5-, 6- and 7-(1- and 2-naphthoyl)-indoles) [1252]; synthesis impurity profiling using the combination of flash chromatography coupled with LC-MS, and multivariate data analysis for synthetic cannabinoids [1253]; detection of AMB-FUBINACA and alpha-PVP by Raman SERS [1254]; synthesis and characterization of seven cumyl carboxamide-type synthetic cannabinoids (CUMYL-PINACA, CUMYL-5F-PINACA, CUMYL-PICA, CUMYL-5F-PICA, CUMYL-THPINACA, CUMYL-BICA, and CUMYL-5F–P7AICA) using GC-EI-MS [1255]; colorimetric assay for (aminoalkyl)indole group-containing drugs was developed, based on the silica/sulfuric acid-catalyzed Ehrlich reaction of (aminoalkyl)indoles with p-dimethylaminobenzaldehyde [1256]; LC-CAD method for unified quantification of synthetic cannabinoids in herbal blends and comparison with quantitative NMR results [1257];

2019 detection of 5F-ADB, Cumyl-PeGaClone and 5F-Cumyl-PeGaClone in herbal products by GC-MS and in-depth characterization of 5F-Cumyl-PeGaClone using NMR, EI-MS, ESI-MS/MS, R and UV/Vis [1258]; analytical differentiation of the indole ring regioisomeric chloro-1-n-pentyl-3-(1-naphthoyl)-indoles using GC-MS and GC-IR [1259]; synthesis and characterization of 5F-CUMYL-PICA, 5F-CUMYL-PINACA, and 5F-CUMYL-P7AICA by NMR, GC-MS and LC-QTOF-MS [1215]; determination of 4-chloro-N,N-dimethylcathinone (4-CDC) and its differentiation from 4-chloroethcathinone (4-CEC) and regioisomers of CDC (i.e., 2-CDC, 3-CDC and 4-CDC) and CEC (i.e., 2-CEC, 3-CEC and 4-CEC) were analyzed using GC-EI-MS, LC-DAD and FTIR and GC-CI-MS using methane as the reagent gas operated in positive mode [1260]; analysis of FUB-JWH-018 and five positional isomers having structures of 1- or 2-naphthoyl-substituted 1H-indole-3-carboxylates with N-substituted positional isomeric fluorobenzyl groups (2-fluorobenzyl, 3-fluorobenzyl, and 4-fluorobenzyl) using HPLC-QqQ-MS-IT-TOF-MS with electrospray ionization (ESI) in positive ion mode [1261]; on-line 2D-LC method that employed a Bonus-RP column in the first dimension (D-1) coupled with UV detection and a biphenyl column in the second dimension (D-2) coupled with QTOF-MS detection in full scan positive mode for separation and identification of isomeric and structurally related Synthetic Cannabinoids [1262]; identification of 5F-ADB and Cumyl-PeGaClon in "spice-like" herbal products using GC-MS and identification and characterization of 5F-Cumyl-PeGaClone using NMR, EI-MS, ESI-MS/MS, IR and UV/Vis [1258]; characterization of the thermal stability of six carboxamide-type synthetic cannabinoids (CUMYL-PICA, 5F-CUMYL-PICA, AMB-FUBINACA, MDMB-FUBINACA, NNEI, and MN-18) to identify thermolysis products [1263]; overview of cannabinoids including chemical structure and toxicity [1264];

Synthetic Cannabinoids and Cannabimimetics with Other Drugs (except when a minor part of a larger study)**: 2016** DART-MS method for the analysis of 11 NPSs including four cathinones, one phenylethylamine, and six synthetic cannabinoids [1265]; GC-PCI-MS/MS and LC-ESI-MS/MS databases of 104 psychotropic

compounds, including 32 cannabinoid derivatives, 29 cathinone derivatives, 34 phenethylamine derivatives, and several other designer compounds [1266]; **2018** UHPSFC-PDA-UV-MS, and GC-vacuum UV as analytical approaches to synthetic cannabinoids and cathinones [1267]; **2019** identification of 5F-ADB and dextromethorphan in commercially available cannabidiol e-liquids by DART-MS and GC/MS [1268];

1.5. Polydrug A: mixed or unrelated individually named compounds or substances

[Note: Each year in this subsection is separated by a line space.]

2016 Investigation of a mixture containing Alprazolam, Codeine and Paracetamol using TLC and HPLC [1269]; Chiral separations of cathinone and amphetamine-derivatives: comparative study between CEC, supercritical fluid chromatography and three liquid chromatographic modes [1270]; detected cutting agents and the analytical methodology implemented by forensic laboratories (focused on cocaine and heroin) [1271]; chemiluminescence for simultaneous determination of paracetamol and codeine in pharmaceuticals [1272]; simultaneous determination of ascorbic acid, acetaminophen and codeine based on multi-walled carbon nanotubes modified with magnetic nanoparticles paste electrode [1273]; Profiling of 8 years of seizures in Switzerland (5875 cocaine specimens and 2728 heroin specimens) [1274]; SPME GC-MS method validated for 15 residual solvents in seized cocaine and heroin [1275]; GC-MS method for the detection and quantification of cathine, cathinone, methcathinone and ephedrine [1276]; Identification of 17 commonly encountered drugs (fentanyl, hydromorphone and morphine; anesthetic: baclofen, bupivacaine, ketamine, midazolam, ropivacaine and succinylcholine; and a mixture of other drug classes: caffeine, clonidine, dexamethasone, ephedrine, heparin, methadone, oxytocin and phenylephriner) in parenteral pharmaceutical preparations from a quality assurance and a diversion program by AccuTOF(TM)- DART-MS [1277]; LC-MS-MS method for the simultaneous determination of morphine, codeine, tuberostemonine, thebaine, papaverine, scopoletin, liquiritin, narcotine, gynaroside, hyperoside, hesperidin, isoliquiritin, liquiritigenin, luteolin, isoliquiritigenin, apigenin, formononetin and glycyrrhizic acid in traditional Chinese antitussive medication [1278]; colorimetric assay for the sensitive and visual detection of morphine and codeine using melamine modified gold nanoparticles (MA-AuNPs) [1279]; screen-printed electrodes for quantification of cocaine and Delta(9)-THC: adaptions to portable systems for forensic purposes [1280]; identification of unknown NBOMe drugs (25H−NBOMe, 25D-NBOMe, and 25E-NBOMe) three other phenethylamine-type drugs (25I-NBMD, RH34, and escaline), eight cathinone derivatives (5-DBFPV, 3,4-MDPHP, 3,4-dimethyl-NEB, 3,4-dimethyl-alpha-ethylaminopentiophenone, 3,4-dimethyl-alpha-PVP, 4F-alpha-ethylaminopentiophenone, bk-IVP, and bk-IBP), and a phencyclidine derivative (MMXE) as well as known compounds, 25I−NBOMe, ADB-CHIMINACA, 5F-ADB, and butane-1,4-diol analyzed by GC-MS, HRMS, and NMR [1281];

2017 Identification of five substituted phenethylamine derivatives 5-MAPDB, 5-AEDB, MDMA methylene homolog, 6-Br-MDMA, and 5-APB-NBOMe by LC-QTOF-MS, GC-MS and NMR [1282]; analysis of cutting agents in Australian seizures of cocaine and heroin over six years [1283]; HPLC with dual UV detection for the simultaneous quantification of methadone and cocaine [1284]; fast determination of codeine, orphenadrine, promethazine, scopolamine, tramadol, and paracetamol in pharmaceutical formulations by CE [1285]; fentanyl and U-47700 in Norco pills bearing a Watson imprint [1286]; identification and analytical characterization of U-47700-Et and 4-F-Pentedrone [1287]; SERS, Raman, and DFT analyses of fentanyl and carfentanil [1288,1289]; cold EI based fast GC-MS analysis of cocaine and heroin (focus on the optimization of flow programming) [1290]; analysis of cutting agents in cocaine and heroin drug seizures in Australian [1283], determination of LSD and 25h-NBOMe by Square Wave Voltammetry [1291]; SERS methods detect trace levels of Cocaine, Heroin, Methamphetamine, and THC [1292]; colorimetric biosensor to detect methamphetamine and cocaine in biological and environmental matrices [1293] electrochemical oxidation of morphine and codeine by the application of a novel glassy carbon electrode modified with a hydroxyapatite-Fe3O4 nanoparticles/multiwalled carbon nanotubes composite (HA-FeNPs-MWCNTs/GCE) [1294]; stability of morphine and methadone in syringes analyzed by HPLC [1295]; synthetic agents off the darknet: a case of U-47700 and phenazepam abuse [1296]; method for determining synthetic sedative-hypnotics and sleep inducers, including barbital, benzodiazepam, zolpidem, and first-generation antihistamines, in adulterated products using Quadrupole-Orbitrap MS and UHPLC-MS/MS [1297];

2018 review of data regarding the use and effects of MDPV and alpha-PVP to highlight their impact on public health [1298]; separation of (R)-and (S)-enantiomers of methamphetamine and amphetamine by a fast LC-MS/MS-method using a Lux (R) 3 mm AMP 150 × 3.0 mm analytical column [1299]; dichloromethane doping-assisted photoionization for the detection of aniline, benzylamine, phenethylamine, amphetamine, and their structural isomers by vacuum ultraviolet photoionization mass spectrometer (VUV-PIMS) [1300]; HPLC method for the simultaneous determination of GHB (gamma-hydroxybutyrate), GBL (gamma-butyrolactone), norketamine, ketamine, phenobarbital, fenitoin and thiopental [1301]; detection of ethylphenidate, methiopropamine and methoxiphenidaine, the sedative etizolam and the third generation synthetic cannabinoids 5F-AKB-48, AB-FUBINACA, MDMB-CHMICA on letters impregnated with NPS [1302]; evaluation of detection efficiency of methamphetamine, heroin and cocaine in nanostructure-assisted laser desorption-ionization (NALDI) and desorption electrospray ionization in comparison to standard MALDI-MS [1303];

2019 HPLC-DAD for simultaneous detection and quantification of heroin, fentanyl and ten fentalogues [1304]; separation of R-(−)/S-(+)-enantiomers of amphetamine and methamphetamine using LC-MS/MS [1305]; fluorescence based lateral flow competition assay for the screening of four classes of drugs, THC, cocaine, opiates and amphetamine present in the sweat of a fingerprint [1306]; fluorescent probes for detection of Ketamine and Amphetamine in Latent Fingermarks [1307]; qualitative and quantitative analysis of methamphetamine, ketamine, heroin, and cocaine by near-IR spectroscopy [1308]; quantitation of low concentrations of three analytes (methamphetamine, cocaine, and papaverine) by SERS analysis [1309]; sensor to detect methamphetamine and ketamine [1310]; nanosensor for differentiation and determination of morphine and methamphetamine [1311];

2. Instrument Focus

Forensic Chemists must maintain familiarity with updates in current instrumental techniques and become versant in new, improved methods of analysis.

Improved/existing and new technologies are reviewed and applied to both routine and specialized analyses of drugs. In cases where improved performance is observed, case reports are generated for the forensic community.

2.1. Polydrug B: mixed or unrelated groups of compounds or substances

Named Groups of Compounds: 2017 Simulated IR Spectra of NPS, Amphetamines and Cathinones [1312]; GC-MS Identification of Designer Stimulants Including 2C Amines, NBOMe Compounds, and Cathinones [1313]; The detection and prevention of unintentional consumption of DOx and 25x-NBOMe at Portugal's Boom Festival [1314]; theoretical Study of FITC and Cb [6] to detect Amphetamine and Cathinone [1315]; synthesis of novel beta-phenylethylamines and NBOMe derivatives and confirmation by H-1 and C-13 NMR [1316]; **2018** screening errors of the presence of cocaine heroin samples & pharmaceuticals [1317], **2019** LC-MS-MS method that combines synthetic cannabinoids and synthetic cathinones, etizolam, a designer benzodiazepine and mitragynine (kratom) [1318];

Abused Substances Illegally Added to Licit Pharmaceuticals, Herbal Medications, Health Supplements, and Foodstuffs (Notes: A) Specific, named compounds are compiled in their individual categories above; B) There are many dozens/hundreds of (highly repetitive) articles pertaining to adulteration of Chinese foods, food seasonings, health care supplements, sexual enhancement aids, Chinese Traditional Medicines, etc.; only a subset of these are included below)**: 2016** Amphetamine and derivatives in natural weight loss pills and dietary supplements with a modified QuEChERS extraction procedure by followed by CE-MS/MS analysis [1319]; review to discuss the current literature on food-derived opioid peptides focusing on their production, methods of detection, isolation and purification [1320]; H1-NMR detection, identification and quantification of adulterants (active pharmaceutical ingredients) in 160 herbal food supplements marketed for weight loss [1321]; development and validation of UPLC and LC-MS/MS methods for the simultaneous determination of anti-obesity drugs in foods and dietary supplements [1322]; analysis of trace amounts of adulterants found in powders/supplements RAMAN coupled to direct analyte-probed nanoextraction-nanospray IMS [1323]; LC-ESI-MS/MS method for the simultaneous detection of common synthetic drugs as adulterants in natural and herbal slimming products [1324]; LC-MS/MS analysis of 40 wt loss compounds adulterated in health supplements including bisacodyl, phenolphthalein, and sibutramine and its metabolites [1325]; banned and discouraged-use ingredients found in weight loss supplements [1326]; detection of adulterants in botanical dietary supplements by TLC combined with SERS [1327]; identification of chemical compounds in Mahuang-Fuzi-Xixin Decoction by HPLC-QQQ/MS/MS and HPLC-QQQ/MS/MS [1328]; comparison of HPLC-UV and CE analysis of weight loss supplements [1329]; HPLC method for determination of the ingredients in cough syrup [1330]; desktop ion trap MS coupled with PSI, ESI and slug-flow microextraction for direct analysis of illegal substances in various types of cosmetic and foodstuff samples [1331]; review of adulteration of dietary supplements by the illegal addition of synthetic drugs [1332]; **2017** Four experimental stimulants identified by UHPLC-MS in sports and weight loss supplements: 2-amino-6-methylheptane (octodrine), 1,4-dimethylamylamine (1,4-DMAA), 1,3-dimethylamylamine (1,3-DMAA) and 1,3-dimethylbutylamine (1,3-DMBA) [1333]; biosensor-based two-phase pharmacological profiling for discovery, monitor and control of natural products [1334]; simultaneous determination of eight alkaloids and oleandrin in herbal cosmetics by dispersive SPE coupled with UHPLC-MS/MS [1335]; validated UHPLC-LTQ-Orbitrap HRMS method for identification, confirmation and quantitation of illegal adulterated weight-loss drugs in plant dietary supplements [1336]; UPLC-PDA and an UPLC-MS method were developed to analyze 92 slimming aids (confiscated by customs) [1337]; a graphene tip solid-phase extraction UPLC-MS/MS method for determining fenfluramine, phenolphthalein, bumetanide, and sibutramine in slimming supplements [1338]; GC-MS method for the quantitation of caffeine and identification of other substances (including sibutramine, phenolphthalein, amphepramone and femproporex) in supplement products seized by the Brazilian Federal Police [1339]; review of the regulation of dietary supplements in the USA and issues of adulteration with phenethylamines [1340]; HPLC-DAD and LC-MS/MS for simultaneous determination of eight adulterants in weight management supplements and herbs [1341]; QuEChERS method coupled to LC-HRMS to determine pyrrolizidine and tropane alkaloids in honey [1342]; review of regulation of dietary supplements in the USA and issues of adulteration with phenethylamines (PEAs) [1340]; UHPLC-QJTOF-MS method to screen dietary supplements (liquid, capsule, powder, pill and tablet) for detection of 156 illegal drugs (58 erectile dysfunction drugs, 49 synthetic steroids, 26 anabolic steroids, and 23 anti-histamine drugs) [1343]; novel screening approaches utilized in the detection of adulterants in botanical dietary supplements (includes IR, near-IR, NMR, Raman, LC-circular dichroism, LC-MS, TLC-SERS, TLC-MS) [1344]; UHPLC-QJTOF-MS method for screening and confirmation of 156 illegal drugs (58 erectile dysfunction drugs, 49 synthetic steroids, 26 anabolic steroids, and 23 anti-histamine drugs) in dietary supplements [1343]; **2018** development of a new method for the screening of six drug classes (stimulants, anorexics, anxiolytics, antidepressants, diuretics and laxatives) as possible adulterants in dietary supplements by HPLC-PAD [1345]; GC/MS analysis of synthetic adulterants (adulterated with tramadol, caffeine, fluoxetine, rizatriptan, venlafaxine and methadone) in herbal supplements advertised as weight loss drugs [1346]; IR spectroscopy combined with ATR and partial least squares-discriminant analysis (PLS-DA) detection and identification of multiple adulterants in plant food supplements [1347]; HPLC-UV for detection and quantification of undeclared withdrawn synthetic medications in counterfeit herbal medicines with confirmation by HPLC-PDA and MS [1348]; GC-MS method using hydrogen as a substitutive carrier gas for the detection of adulterants in traditional Chinese medicine and food supplements [1349]; LC-MS/MS method to detect and quantitate 14 anti-diabetic, 2 anti-obesity, and 3 cholesterol-lowering drugs in botanical dietary supplements [1350]; LC-QTOF-MS coupled to LC-MS/MS for confirmation and quantitation of active pharmaceutical ingredient in "natural" herbal supplements [1351]; GC-MS fingerprinting of nine herbal slimming pills assisted by deconvolution of two-way chromatographic signals into pure chromatographic and spectral patterns where peak clusters were resolved using multivariate curve resolution-alternating least squares [1352]; UHPLC and GC/MS analysis of synthetic pharmaceutical adulterants in herbal weight gain supplements [1353]; review of the toxicity of compounds found in herbal dietary supplements [1354]; overview of the electromigration and miniaturized chromatographic methods for the analysis of dietary supplements including the determination of phenethylamines, contaminants and pharmaceutical drugs [1355]; HPLC-EIS-MS/MS method for simultaneous analysis of 15 key chemicals in slimming foods and herbal products [1356]; HPLC-UV method for detection and quantification of adulterants in herbal medicines with confirmation by HPLC-PDA and MS [1348]; HPLC-PAD method for screening of dietary supplements to identify of adulterants from six drug classes (stimulants, anorexics, anxiolytics, antidepressants, diuretics and laxatives) [1345]; HPLC-Q-TOF HRMS for analysis of 23 illegal adulterated aphrodisiac type chemical ingredients in health foods and Chinese Traditional Patent Medicines [1357]; **2019** detection of protoalkaloids in Chinese fruit by HPLC-UV [1358]; SPE directly coupled to mass spectrometry analyzers including Orbitrap and triple quadrupole to detect Solanaceae and other plants containing

tropane alkaloids in contaminated baby cereals [1359]; LC-MS/MS for the simultaneous determination of pesticides, mycotoxins, tropane alkaloids, growth regulators, and pyrrolizidine alkaloids in oats and whole wheat grains [1360]; HPLC method for detection of illegal adulterants in ginseng pills [1361]; HPLC determination of adulterants(sibutramine, sildenafil, phenolphthalein, and orlistat) in herbal slimming products [1362]; review of Phenibut in dietary supplement purchased online as a potent psychoactive substance with GABA(B) agonist properties [1363].

Abused Drugs and Pharmaceuticals in Surface Waters and Municipal Wastewater Streams: [Note: Each year in this subsection is separated by a line space.]

2016 Analysis of amphetamine and methamphetamine in municipal wastewater influent and effluent using weak cation-exchange SPE and LC-MS/MS [1364]; Cross-reactivity of selected old and novel psychoactive substances (NPS) in an amphetamine and ecstasy immunoassay [1365]; analysis of Cocaine and cannabinoids in wastewater [1366]; cocaine and cannabinoids in the atmosphere of Northern Europe cities, comparison with Southern Europe and wastewater analysis [1367]; Cocaine, MDMA and methamphetamine residues in wastewater [1368]; occurrence of pharmaceuticals and cocaine in a Brazilian coastal zone [1369]; detection of Cocaine in Wastewater with DNA-Directed Immobilization Aptamer Sensors [1370]; refining the current excretion factors used for estimating methadone and codeine in wastewater by analyzing published data from the literature on the excretion of methadone, 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine (EDDP), and codeine [1371]; diazepam stability in wastewater and removal by advanced membrane technology, activated carbon, and micelle-clay complex [1372]; investigating drug consumption by comparing epidemiological, crime and wastewater data in Germany and Switzerland [1373]; Use of wastewater analysis to provide investigative intelligence to law enforcement (study focused on cocaine, heroin and methamphetamine in Switzerland) [1374]; wastewater analysis used to estimate illicit drug use in Colombia [1375]; study to rationalize sampling methods for minimizing the number of samples required while maximizing information about temporal trends focusing on MDMA, methamphetamine, cocaine and methadone [1376]; direct injection and analysis of cocaine, 3,4-methylenedioxymethamphetamine (MDMA) and methamphetamine in wastewater by LC-MS [1368]; analysis of municipal wastewater for 4 stimulants: cocaine, methamphetamine, 3.4-methylenedioxymethamphetamine (MDMA) and amphetamine; 6 opioids: codeine, morphine, heroin, fentanyl, oxycodone and methadone; 11 new psychoactive substances (NPS); benzylpiperazine (BZP), trifluoro-methylphenylpiperazine (TFMPP), methcathinone, methylone, mephedrone, methylenedioxypyrovalerone (MDPV), alpha Pyrrolidinopentiophenone (alpha-PVP), para-methoxyamphetamine (PMA), 25C–NBOMe, 25B–NBOMe, 25I–NBOMe; and cannabis between December 2011 and December 2015 [1377]; influence of sewer biofilms on transformation rates of drugs, 30 illicit drug and pharmaceutical residues were quantified [1378]; identification and quantification of Methamphetamine, benzoylecgonine (cocaine metabolite), 3,4-methylenedioxymethamphetamine (MDMA), methadone, oxycodone and hydrocodone in wastewater samples and estimation using four statistical approaches (reporting censoring, Maximum Likelihood Estimation, Kaplan-Meier estimates, or complete data calculations) [1379]; Comparison of pharmaceutical, illicit drug, alcohol, nicotine and caffeine levels in wastewater with sale, seizure and consumption data for 8 European cities [1380]; wastewater-based epidemiology to detect spatio-temporal changes in the relative amounts of stimulants (amphetamine, methamphetamine, methylenedioxymethamphetamine (MDMA), cocaine) used in seven locations in Belgium over 2011–2015 [1381]; development and validation of an isotope dilution-SPE-LC-MS/MS based method for the quantitative determination and characterization of a broad range of analytes belonging to different classes of psychotropic drugs such as benzodiazepines, antidepressants, stimulants, opiates and opioids, anticonvulsants, anti-dementia drugs, analgesics as well as the anti-inflammatory drug diclofenac with quantification limits between 0.14 and 3.54 ng L-1 [1382]; enantiomeric profiling of 56 chiral drug biomarkers in wastewater with the usage of chiral liquid chromatography coupled with tandem mass spectrometry, including enantiomeric separation for 18 pairs of enantiomers [1383]; sewage-based epidemiology investigating consumption of cocaine, benzoylecgonine, MDMA, marijuana and alcohol [1384]; refining current correction factors for back-calculation of the illicit drugs: amphetamine, methamphetamine, MDMA and THC in wastewater based epidemiology [1385]; analysis of amphetamines and cocaine in wastewater samples using LC-MS/MS [1386]; a method was developed for the analysis of opiates in wastewater samples using LC-MS-MS [1387]; LC-MS/MS analysis of 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrolidine (EDDP), fentanyl, norfentanyl, meperidine, normeperidine, methadone, phencyclidine and tramadol in wastewater [1388]; Wastewater based epidemiology using UHPLC-MS/MS to identify current trends in Finnish drug abuse [1389]; spatial and temporal consumption patterns of illicit drugs (heroin, cocaine, amphetamine, MDMA, methamphetamine, cannabis) and therapeutic opioids (codeine, methadone) in six Croatian cities by applying wastewater-based epidemiology [1390]; Australia-wide WBE monitoring to examine spatial patterns in the use of three illicit stimulants (cocaine, methamphetamine; and MDMA) by analysis of 112 daily composite wastewater samples by LC-MS/MS [1391]; 2011SPE-LC-ESI-MS/MS analysis of samples collected from 77 sites to determine the occurrence of 22 drugs of abuse and metabolites in surface water from four Spanish River basins [1392]; review on the stability of illicit drugs in sewers and wastewater samples [1393]; extraction of main temporal features of ecstasy (MDMA) using FPCA and both Fourier and B-spline basis functions with three different smoothing parameters, along with PCA and WPCA with different mother wavelets and shrinkage rules [1394]; LC-QTOFMS method was applied for identification and quantification of popular stimulants: MDMA, mephedrone, 4-MEC, MDPV and mCPP in wastewater [1395]; LC-MS/MS to measure mephedrone and methylone (analog of MDMA) in wastewater sample using direct injection mode [1396]; quantification of the change of use for various classes of licit and illicit drugs by monitoring Athens' wastewater from 2010 to 2014 [1397]; evaluation of using wastewater-based epidemiology (WBE) for assessing illicit drug use by comparing wastewater data analyzed by LC-MS/MS with that from a population survey [1398]; fully automated SPE-LC-MS/MS method developed and optimized for the quantification of 10 illicit drugs and metabolites in environmentally aqueous samples [1399]; population surveys measuring prevalence of use coupled with consumption data by wastewater analysis for cocaine, opioids, cannabis, methamphetamine and MDMA (ecstasy) from 2010 to 2014 in Italy [1400]; analysis of 23 substances in the wastewaters of Slovakia by LC-MS/MS including stimulants, opioid and morphine derivatives, benzodiazepines, antidepressants, drug precursors and their metabolites [1401]; identification and measurement of morphine in wastewater by SPE and LC-MS and determination of the morphine structure in solution be NMR and RDC [1402]; concentrations of 17 drugs of abuse, including cocaine, several amphetamines, opioid drugs, benzoylecgonine, and 2-ethylidene-1,5-dimethyl-3,3-diphenylpyrolidine were investigated in an urban watershed [1403]; wastewater analysis to measure the use of 12 licit and illicit substances in a small prison facility [1404]; review of neuropsychiatric pharmaceuticals and illicit drugs in wastewater

treatment plants [1405]; Zerovalent iron and iron(VI for the removal of psychoactive pharmaceuticals and illicit drugs from wastewaters [1406]; analysis of drugs of abuse, cytostatic drugs and iodinated contrast media in the tap water by SPE-LC-MS/MS [1407]; surface water samples analyzed for amphetamine-like compounds, ketamines, cocainics, and opioids [1408]; comparison of contamination patterns of psychoactive compounds in sewage-affected groundwater [1409]; SPE followed by partial-filling micellar electrokinetic capillary chromatography with UV detection for determination of human-based steroids in water samples [1160]; determination of hormones in wastewater by GC-MS [1410]; MAE-

2017 Persistence of alprazolam in river water according to forced and non-forced degradation assays: adsorption to sediment and long-term degradation products [1411]; Removal of alprazolam from aqueous solutions [1412]; tracing methamphetamine and amphetamine sources in wastewater and receiving waters via concentration and enantiomeric profiling [1413]; cocaine, MDMA, and MDEA in wastewater by hyphenated mass spectrometry techniques [1414]; cocaine and metabolites in hospital effluent using Dispersive Liquid-Liquid Micro Extraction (DLLME) and analysis by HPLC [1415]; reaction of four benzodiazepines (diazepam, oxazepam, nordazepam and temazepam) during water chlorination analyzed by LC-QTOF-MS [1416]; investigation of occurrence of diazepam and its metabolites, nordiazepam, temazepam, and oxazepam in samples collected from four rivers flowing through Beijing and all thirteen sewage treatment plants [1417]; influent and effluent wastewater samples from 24 major cities in China were analyzed for morphine, codeine and 6-AM [1418]; statistical approach to identify chemical transformation pathways of heroin and codeine in wastewater [1419]; tracing methamphetamine and amphetamine sources in wastewater via concentration and enantiomeric profiling [1420]; enantiomeric profiling of a chemically diverse mixture of chiral pharmaceuticals in urban water [1421]; a new analytical method was developed and validated for the extraction and analysis of MDMA and three of its main metabolites in wastewater [1422]; investigation of MDMA in Minnesota's natural waters by HS-SPME-GC-MS [1423]; LC-MS/MS analysis of wastewater samples for 17 drug residues [1424]; Analysis of 19 selected drugs of abuse and metabolites, the by means of two methodologies based LC-MS/MS, to monitor the inlet at a wastewater treatment plant in Barcelona between 2011 and 2015 [1425]; wastewater analysis of drugs and psychoactive substances in the Tiber River in samples collected in May and June 2012, at six points of the river and analyzed by GC-MS [1426]; functional data analysis and wavelet principal component analysis on ecstasy (MDMA) wastewater data [1427]; bioaccumulation of 11 selected psychoactive pharmaceuticals (citalopram, clomipramine, haloperidol, hydroxyzine, levomepromazine, mianserin, mirtazapine, paroxetine, sertraline, tramadol and venlafaxine) was examined in Zivny Stream (tributary of the Blanice River, the Czech Republic) [1428]; removal of illicit drugs and morphine in two waste water treatment plants under tropical conditions [1429]; morphine, 6-acetylmorphine, and codeine were measured to estimate heroin abuse in major Chinese cities through wastewater-based epidemiology [1430]; investigation of the in-sewer stability of selected illicit drugs and pharmaceutical biomarkers [1431]; Illicit drug consumption in school populations measured by wastewater analysis [1432]; SPE-LC-HRMS was developed, validated and applied to detect twelve cathinones and one metabolites in different environmental samples including influent and effluent sewage and river water [1433]; determination of 89 drugs and other micropollutants in wastewater and freshwater by LC-MS/MS [1434]; LC-MS/MS determination of synthetic cathinones and phenethylamines, including N-ethylcathinone, methylenedioxypyrovalerone (MDPV), methylone, butylone, methedrone, mephedrone, naphyrone, 25-C-NBOMe, 25-I-NBOMe and 25-B-NBOMe in influent wastewater [1435]; NPSs in wastewater of major Chinese cities [1436]; 32 samples of wastewater were analyzed by LC-MS/MS [1437]; illicit drugs in water and wastewater and their removal during wastewater treatment [1438]; occurrence and distribution of five drugs of abuse and their metabolites, namely, methamphetamine, amphetamine, ketamine, ephedrine, and hydroxylamine in surface water [1439]; trace analysis of 14 anthropogenic organic compounds in river water, tributary water, and raw and treated wastewater [1440]; LC-HRMS identification of identified eight NPS belonging to the classes of synthetic cathinones, phenethylamines and opioids in wastewater [1441];

2018 diffusive gradients in thin films (DGT) to simultaneously measure methcathinone and ephedrine in surface water [1442]; wastewater-based epidemiology and enantiomeric profiling for drugs of abuse in South African wastewaters [1443]; correlation of wastewater analysis (using UHPLC-MS/MS) and positive roadside drug testing results for MDMA and cannabis from December 2011–December 2016 in South Australia [1444]; LC-QTOF equipped with **S**equential **W**indow **A**cquisition of all **TH**eoretical (SWATH) fragment-ion spectra was used to qualitatively screen 346 compounds in influent wastewater from two wastewater treatment plants in South Australia over a 14-month period [1445]; examination of the associations between the annual average purity of seized illicit drugs and their corresponding load measured in waste water in a South East Queensland catchment over a six year period [1446]; wastewater-based epidemiology (WBE) and enantioselective analysis were combined to evaluate trends in illicit drug use in the context of their consumption vs direct disposal as well as their synthetic production routes in eight European cities [1447]; study of the occurrence and behavior of illicit drugs and their metabolites at two wastewater treatment plants located in Sicily, Italy [1448]; study of wastewater collected from two wastewater treatment plants in Barbados, with the detection of caffeine and ibuprofen at A mu g/L concentrations, two steroid hormones (i.e. androstenedione, estrone) and several prescription pharmaceuticals were detected at ng/L concentrations and benzoylecgonine, MDMA and MDA were present at the highest concentrations in untreated wastewater [1449]; analysis of wastewater samples from five Nordic capital cities by SPE-UHPLC-MS/MS and comparison with data published by the European Monitoring Centre for Drugs and Drug Addiction based on illicit drugs in wastewater from over 50 European cities [1450]; Synthetic cathinones (methylenedioxypyrovalerone, methylone, mephedrone) and phenethylamines (4-methoxy-methamphetamine and 4-methoxyamphetamine) were incubated in individual reactors over a 24 h period and analyzed by LC-QToF-MS [1451]; simultaneous analysis of 27 opioid analgesics and their metabolites in municipal wastewaters and river water by LC-MS/MS [1452]; the impact of temperature on the transformation of illicit drug biomarkers in wastewater [1453]; tracking narcotics consumption at a Southwestern US university campus by wastewater-based epidemiology analyzed by LC-MS/MS [1454]; SPE followed by LC-MS/MS analysis of 37 legal and illicit psychoactive substances in wastewater, including the illicit drugs (cocaine-related compounds, amphetamine-type stimulants, hallucinogens, opiates/opioids, and cannabinoids), new psychoactive substances (two synthetic cathinones, the synthetic opioid AH-7921, and the arylcyclohexylamine methoxetamine), and legal but controlled psychoactive substances (stimulants, benzodiazepines, antidepressants, sedatives, antipsychotics, and hypnotics) [1455]; nineteen neuropsychiatric drugs, eight illicit drugs, and three metabolites of illicit drugs were detected and quantitated in the water samples using HPLC-MS/MS [1456]; pharmaceuticals, hormones, pesticides, and other bioactive contaminants in water, sediment, and tissue from Rocky Mountain National Park, 2012–2013 [1457];

bias in consumption monitoring of illicit drugs using wastewater-based epidemiology [1458]; simultaneous determination of 38 psychoactive drugs (including benzodiazepines, antidepressants and drugs of abuse) and related metabolites in raw wastewater using UHPLC-MS/MS [1459]; diffusive gradients in thin films technique for simultaneous measurement of methcathinone and ephedrine in surface river water [1460];

2019 method for the analysis of 44 selected pharmaceuticals in wastewater [1461]; LC-HRMS method to screen the wastewater samples for NPS [1462]; LC-HRMS method to screen the wastewater samples for NPS in order to determine spatial patterns [1463].

"Novel Psychoactive Substances" (NPSs): 2016 Overview of NPSs: chemistry, pharmacology, metabolism, and detectability of amphetamine derivatives with modified ring systems [1464]; overview of emerging and NPSs in the United Kingdom [1465]; qualitative distribution of drugs of abuse in 162 seized materials confiscated in the Italy after internet purchase between 2013 and 2015 [1466]; TLC screening method and GC-MS quantification of the active components for seized solid NPS samples, both in their pure form and in the presence of common adulterants [1467]; an overview of synthetic drugs and newly emerging substances [1468]; review of NPS in Italy and the distribution of drugs in seized materials analyzed in an Italian forensic laboratory in the period 2013–2015 [1466]; 22 recreational drug samples analyzed by GC-MS, HRMS, and NMR resulted in the detection of three NBOMe drugs 25H–NBOMe, 25D-NBOMe, and 25E-NBOMe, three other phenethylamine-type drugs 25I-NBMD, RH34, and escaline, eight cathinone derivatives 5-DBFPV, 3,4-MDPHP, 3,4-dimethyl-NEB, 3,4-dimethyl-alpha-ethylaminopentiophenone, 3,4-dimethyl-alpha-PVP, 4F-alpha-ethylaminopentiophenone, bk-IVP, and bk-IBP, and a phencyclidine derivative MMXE; 25I–NBOMe, ADB-CHIMINACA, 5F-ADB, and butane-1,4-diol were also detected in some samples [1281]; review of recent publications on NPSs [1469]; LC-MS/MS screening method for 143 NPS 143 compounds from different groups (number of compounds): cathinones (36), phenethylamines (26), tryptamines (18), piperazines (9), piperidines (2), synthetic cannabinoids (34), arylalkylamines (7), arylcyclohexylamines (3), aminoindanes (2), and other drugs (6) [1470]; GC-MS identification of NPS found in seized blotter papers [1471]; identification of two NPSs, a phenethylamine derivative 2-(4-iodo-2,5-dimethoxyphenyl)-N-[(3,4-methylenedioxyphenyl)methyl] ethanamine (25I-NB 34MD, 1) and a piperazine derivative 1-(3,4-difluoromethylenedioxybenzyl)piperazine (DF-MDBP, 2), were identified in illicit products using LC-MS, GC-MS and NMR [1472]; **2017** Forensic in Silico Study of NPS: Amphetamines and Cathinones [1473]; NPSs by UPLC-TOF-MS [1474]; NPSs: types, mechanisms of action, and effects [1475]; Parallel artificial liquid membrane extraction (PALME) paired with UHPLC-MS for screening NPSs [1476]; multidisciplinary approach comprising LC-MS/MS, GC-MS and NMR analysis for the identification of three NPS including 1-(benzofuran-5-yl)-N-methylpropan2- amine, 2-amino-1-(4-bromo-2,5-dimethoxyphenyl) ethan-1-one (bk-2C–B), and 3-(2-aminopropyl) indole (a-methyltryptamine) in seized materials [1477]; enantioseparation method for chiral separation of NPS compounds including cathinones, amphetamines, benzofurans, thiophenes, phenidine and phenidate derivatives [1478]; study of chemical composition and price of NPS compounds purchased online in 5 different European countries [1479]; PLS-DA and ATR-FTIR was developed to identify NPS drugs in blotter papers [1480]; review [1481,1482]; analytical methods including LC/MS or GC/MS and several immunochemical methods were developed in connection with the analysis of synthetic cannabinoids, cathinones and phenethylamines, and other NPS compounds [1483]; EASI-IMS and ambient ionization MS method screening of 25I–NBOH in blotter papers [1484]; NPS purchasing and supply patterns in Australia [1485]; **2018** review of historical accounts of the main classes of psychoactive drugs, several foundational total syntheses that provide the groundwork for producing these molecules in academic, industrial, and clandestine settings [1486]; separation of enantiomers of new psychoactive substances by HPLC [1487]; systematic review of the abuse of prescription drugs in the context of NPS [1488]; identification of NPSs by LC-HRMS/MS and GC-MS [1489]; review [1481]; review of NPS of natural origin [1482]; review of NPS [1490]; NPS used at music festivals [1491]; separation of structural isomers of NPS including 2-, 3-, and 4- structural isomers of fluoroamphetamine, fluoromethamphetamine, and methylmethcathinone, isomeric pairs of the synthetic cannabinoids UR-144/UR-144 degradant, XLR-11/XLR-11 degradant, JWH-015/JWH-073, and JWH-019/JWH-122, as well as amphetamine and several stable isotope-labeled amphetamine internal standards with UHPSFC-MS/MS and compared with UHPLC-MS/MS [1492]; syntheses, analytical characterization, and pharmacological evaluation of the positional isomers of new psychoactive substance 4-methylphenmetrazine (4-MPM) [1493]; identification of NPS by means of Raman spectroscopy coupled with Principal Components Analysis (PCA) [1494]; IMS and HRMS for the rapid identification of the last generation of NPS in seizures [1495]; review of Aminorex (5-phenyl-4,5-dihydro-1,3-oxazol-2-amine) and 4-methylaminorex (4-methyl-5-phenyl-4,5-dihydro-1,3-oxazol-2-amine) [1496]; examination of 251 drug products that were submitted for analysis in 173 cases of suspected NPS-related intoxications [1497]; **2019** Raman spectroscopy for the identification and classification of seized Customs samples into three NPS families [1498]; review of screening methods for NPS compounds [1499]; X-Ray powder diffraction (XRPD) for the identification of NPS [1500]; IMS-MS combined with gas-phase hydrogen-deuterium exchange for characterization of NPS [1501];

"Hallucinogens", "Hypnotics" (and similar generic terms): 2019 Raman for detection of hypnotics [1502];

"Illicit Drugs" (including "Controlled Substances," "Drugs of Abuse," "Illicit Drugs," "Narcotics," "Seized Drugs," "Street Drugs" and similar generic terms):

2016 Sorption of structurally different ionized pharmaceutical and illicit drugs to a mixed-mode (C18/strong cation exchange-SCX) SPME microsampler [1503]; Chemical characterization and quantitative estimation of narcotic drugs in the seized illicit samples by GC-MS and GC-FTIR, identification of source and possibility of isotopic substitution [1504]; direct detection of trace amounts of illegal street drugs, namely p-chloroamphetamine, p-fluoromethamphetamine, gamma-hydroxybutyrate, ketamine, methamphetamine, 3,4-methylenedioxypyrovalerone, p-methylethcathinone, methylone, and nimetazepam, in solution and also in real drug samples by DART coupled to Q-orbitrap MS/MS [1505]; determination of inorganic ionic profiles of three pharmaceutical samples and precursors of two illicit drugs (contemporary samples of methylone and paramethoxymethamphetamine) by CE [1506]; HR-MAS NMR for rapid identification of Illicit substances (3,4-methylenedioxy-N-methylcathinone (methylone), 4-methylmethcathinone (mephedrone), 2,5-dimethoxy-4-bromoamphetamine (DOB) and 2-(4-bromo-2,5-dimethoxyphenyl)-N-[(2-methoxyphenyl) methyl] ethanamine (25B–NBOMe)) in sized tablets and blotter papers [1507]; near infrared (NIR) spectroscopy coupled to chemometrics calibration to detect new psychoactive substances in street sample [1508]; results of analysis by a portable ultrafast CE for the separation of controlled substances are compared with the results obtained from a benchtop CE system with both a nominal mass ion trap mass spectrometer and an accurate mass orbitrap mass spectrometer [1509]; review of the clinical correlations and laboratory assessment of narcotic analgesics and common drugs of abuse [1510]; barriers to research on controlled drugs [1511]; simultaneous characterization of over twenty Illicit psychotropic substances in the air by GC-MS or HPLC-MS [1512]; **2017** Trans European Drug Information (TEDI)

project analysis of illicit drugs and purity trends in Spain, Switzerland, Belgium, Austria, Portugal, and the Netherlands [1513]; expansion of the Australian Illicit Drug Intelligence Program (AIDIP) to include a range of chemical signatures aimed at investigating the clandestine manufacturing methods and precursor chemicals used for synthesis of synthetic drugs [1514]; paper spray ionization in the positive ionization mode (PS(+)-MS) method to quantify eight illicit drugs MDA, MDMA, MDEA, meta-chlorophenylpiperazine (m-CPP), methamphetamine, cocaine, LSD and dimethoxybromoamphetamine (DOB); as well as the relative intensity of methylene blue dye to chemically profile commercially available blue pens to date question documents [1515]; GC-MS method to identify illicit drugs in vape products [1516]; surfaces in 10 police stations were swabbed and analyzed by LC-MS/MS for illicit drugs and drug residues [1517]; mass spectral library search algorithm that identifies compounds that differ from library compounds by a single "inert" structural component for identification of illicit drugs [1518]; **2018** targeted and untargeted analyses of illicit drugs in 10,451 samples seized in the Province of Florence from 2006 to 2016 using GC-FID, GC-MS, LC-MS/MS [1519]; a comparative study of used syringes in Switzerland analyzed by GC-MS to detect drugs (licit or illicit) contained in the residual content [1520]; absorption factors (total mass attenuation coefficients, total molecular, atomic and electronic cross sections, effective atomic numbers and electron density) were computed in the wide energy region from 1 keV to 100 GeV for select narcotic drugs [1521]; rapid identification and quantification of illicit drugs on nanodendritic surface-enhanced Raman scattering substrates [1522]; differentiation of illicit drugs including methamphetamine, ecstasy, magu, caffeine, phenobarbital, and ketamine in vapor phase using fluorescent films [1523]; study of adulteration of psychoactive illicit drugs with lead and other active pharmaceuticals [1524]; review of chromogenic and fluorogenic probes for the detection of Illicit Drugs [1525]; identification of illicit drugs (cocaine, opioids, amphetamines and cannabis derivatives), some of their metabolites and 48 pharmaceuticals in indoor swimming pools using SPE-HPLC-MS/MS [1526]; LC-MS/MS to measure illicit, behavioral and antihistamine drugs in edible seaweeds [1527]; SERS-active platform for detection of illicit drugs (heroin, methamphetamine, and cocaine) [1528]; **2019** field detection of Illicit substances in 304 samples using RAMAN during drug-checking service in electronic music events [1529]; CME-MS analysis of Illicit Drugs [1530]; ambient mass spectrometry and LC-MS/MS for the rapid detection and identification of multiple illicit street drugs [1531]; SPE-LC-MS method for the simultaneous detection of 20 drugs of abuse and pharmaceuticals in drinking water, including 15 NPS, three traditional illicit drugs and two antidepressants [1532]; thermal desorption acetone-assisted photoionization miniature ion trap mass spectrometer for on-site identification of illegal drugs at checkpoints [1533].

Pharmaceuticals/Counterfeits (with a focus on differentiation of legitimate versus counterfeit products, or for monitoring quality control for legitimate pharmaceutics; see also a significant number of citations concerning counterfeits under Phosphodiestrase-5 Inhibitors, above)**:**

2016 JEOL DART-AccuTOF - MS method was developed to screen parenteral pharmaceutical formulations [1277]; **2017** a review of pharmacognosy through the centuries including identification, quality and purity [1534]; series of benzimidazole-piperidine derivatives were synthesized and structures of the compounds were elucidated by FT-IR, H-1 NMR, C-13 NMR, and HRMS spectral data [1535];

2.2. Instrument Focus

General Overviews and Reviews, and articles covering multiple techniques: **2018** overview of the application of chiral analysis in biological and environmental samples and their relevance in the forensic field [1536]; review of chemical "spot' tests as presumptive illicit drug identification technique [1537]; **2019** review of the state-of-the-art technologies in forensic chemistry [1538].

Color Testing: 2018 presumptive identification of BZP, cocaine, PCP, fentanyl, opiates, piperazine-based designer drugs, and other heterocyclic amines of forensic interest using photoluminescent copper(I) iodide cluster compounds [1539]; **2019** centrifugal microfluidic devices using low-volume reagent storage and inward fluid displacement for presumptive drug detection of methamphetamine, codeine, heroin, cocaine, 3,4-methylenedioxymethamphetamine (MDMA) and 3,4-methylenedioxyamphetamine (MDA) [1540]; **2019** color assay for the screening of unknown drugs for drugs in street samples using a polydimethylsiloxane composite [1541].

Direct Analysis in Real Time (DART-MS): 2018 review of use in forensic and security applications [1542].

Electrophoresis (and Related Techniques): 2017 review of the capabilities of electrochemical methods for the separation (capillary electrophoresis) and determination (amperometry, the versions of voltammetry, and potentiometry) of narcotic and psychotropic drugs and their metabolites [1543]; chiral CE method development for chiral purity profiling of the four stereoisomers of tadalafil, tapentadol, and dapoxetine [1544]; **2018** Cyclodextrin-induced acidity modification of substituted cathinones studied by capillary electrophoresis supported by density functional theory calculations [1545];

Gas Chromatography: 2016 Vaporization enthalpy and vapor pressure of Fenpropidin and Phencyclidine (PCP) by correlation gas chromatography [1546]; **2017** Resolution of forty-three isomeric new designer drugs using GC - Vacuum ultraviolet spectroscopy and theoretical computations [1547];

Infrared Spectroscopy: 2017 assessing the effect of spectra preprocessing on the efficiency of a Principal Component Analysis (PCA) application designed to screen for stimulant and hallucinogenic amphetamines, as well as for ephedrines, [1548]; **2018** Near infrared (NIR) spectroscopy using a portable instrument (microNIR) associated with chemometrics models (partial least squares regression (PLS), principal component analysis (PCA) and hierarchical cluster analysis (HCA)) was applied to quantify cocaine, and to classify synthetic drugs by their functional chemical composition in 19 ecstasy tablets, 22 seals of designer drugs and 23 medicine samples [1549].

Ion Mobility Spectroscopy: 2016 IMS analysis of over 20,000 samples for trace detection of illicit narcotics (cocaine, heroin, methamphetamine, MDMA and THC) relative to environmental background was investigated [1550]; new approach to reduce the false-positive responses commonly encountered in the field when drugs and explosives are detected for ESI-HPIMS [1551], low-pressure air dielectric-barrier discharge ion source for explosives, caffeine, cocaine and morphine [1552]; surface-assisted laser desorption/ionization mass spectroscopy (SALDI-MS) of low-molecular-weight compounds including aspirin and barbital [1553]; PSI-MS to analyze designer drugs directly on the surface of blotters [1554]; **2018** ambient pressure laser desorption-chemical ionization mass spectrometry for fast and reliable detection of Explosives, Drugs, and precursors [1555]; development of a plug-type IMS-MS instrument for detection of illicit drugs and explosives [1556]; Integration of paper spray ionization high-field asymmetric waveform ion mobility spectrometry for forensic applications [1557];

"Lab-on-a-Chip" (Microfluidics): 2018 microfluidic analytical devices for illicit drug sensing [1558]; proof of concept microfluidic devices for the detection of methamphetamine, codeine, heroin, cocaine, MDMA and MDA [1540].

Liquid Chromatography: 2016 method for simultaneous analysis of GHB, ketamine, norketamine, phenobarbital, thiopental, zolpidem, zopiclone and phenytoin (an anticonvulsant and antiepileptic drug) with LC-MS/MS [1559]; Enantiomeric separation of citalopram was developed using a reversed phase HPLC with sulfobutylether-beta-cyclodextrin as a chiral mobile phase additive [1560]; multivariate curve resolution-alternating least squares analysis of HRLC-MS data [1561]; beta-cyclodextrin-based open-tubular capillary electrochromatography column and application for Enantioseparation of zopiclone, chlorphenamine maleate, brompheniramine maleate, dioxopromethazine hydrochloride, carvedilol, homatropine hydrobromide, homatropine methylbromide, venlafaxine, sibutramine hydrochloride and terbutaline sulfate [1562]; analysis of psychotropic drugs using an ultra-high-speed HPLC [1563]; **2017** Response surface methodology based on central composite design accompanied by multivariate curve resolution to model gradient hydrophilic interaction liquid chromatography for separation of five major opium alkaloids [1564]; **2018** LC/MS/MS for detection of prohibited substances in exhaled breath [1565]; HPLC-DAD method to characterize thirteen common colorants from five key classes of dyes found in illicit ecstasy and diazepam tablets [1566]; **2019** reversed-phase liquid chromatography by using functionalized multi-walled carbon nanotubes for separation and analysis of barbiturates, steroid hormones and alkaloids [1567].

Mass Spectrometry: 2016 forensic applications of LA-ICP-MS [1568]; **2017** comparison of different GC-MS instruments, different injectors, ion sources, ionization modes, mass analyzers, operating modes, and acquisition modes, in order to find the optimal configuration in terms of sensitivity and precision [1569]; simultaneous analysis by Quadrupole-Orbitrap mass spectrometry and UHPLC-MS/MS for the determination of sedative-hypnotics and sleep inducers in adulterated products (including barbital, benzodiazepam, zolpidem, and first-generation antihistamines) [1297]; GC-MS characterization of psychotropic substances (i.e., nicotine, cotinine, caffeine, cocaine, cannabinol, Delta(9)-tetrahydrocannabinol, cannabidiol, amphetamine, heroin, and methadone) in dusts [1570]; analytical validation of a portable mass spectrometer featuring interchangeable, ambient ionization sources for high throughput forensic evidence screening [1571]; **2018** sheath-flow PESI for nondestructive profile analysis of dry samples, such as lines of ballpoint pen ink on paper, pharmaceutical tablets, instant coffee, brown rice, and narcotics [1572]; quadrupole mass spectrometer for field identification of gases and volatile/semivolatile organic compounds (VOCs/SVOCs) [1573];

Nuclear Magnetic Resonance Spectroscopy: 2016 investigation of the solid-state C-13 and N-15 NMR spectra for multiple crystal forms of acetaminophen, phenobarbital, and testosterone [1574]; **2018** application of a desktop NMR spectrometer to qualitatively analyze samples in drug-related cases to identify new drugs [1575]; detection and identification of designer drugs by nanoparticle-based NMR chemosensing [1576]; review of the use of NMR for forensic science applications [1577]; **2019** low-field(1)H NMR spectroscopy for elucidation of components present in seized drug samples (specifically NPS and other controlled substances) [1578].

Raman: 2016 Raman spectroscopy in forensic analysis: identification of cocaine and other illegal drugs of abuse [1579]; Surface-enhanced Raman spectroscopy (SERS) methods to detect trace levels of cocaine, heroin, methamphetamine and THC [1292]; optimization of SERS for implementation into a microfluidic device for detection of drugs, specifically morphine, cocaine, and methamphetamine [1580]; analytical assays that combine plasmon-free surface enhanced Raman scattering (SERS) and surface assisted laser desorption/ionization (SALDI) mass spectrometry (RaMassays) [1581]; integration of protein tethering in a rapid and label-free SERS screening platform for drugs of abuse [1582]; **2018** surface-enhanced Raman scattering (SERS) sensing of common forensic substances with commercially available SERS substrates and handheld Raman spectrometers [1583];

Spectrophotometry: 2016 THz-TDS method for the detection and identification of substances (amphetamine type) in real conditions [1584].

Stable Isotopes: 2016 review of the use of stable isotopes in forensic science [1585]; **2019** use of IRMS for drug profiling to establish origin of ephedrines used as precursors for illicit production of methamphetamine [1586].

Supercritical Fluid Chromatography: 2016 SFC-MS/MS as an orthogonal technique for improved screening of polar analytes in anti-doping control [1587]; **2018** review of forensic applications [1588].

V**oltammetry:** electrochemical behavior of phenobarbital sodium, paracetamol and their binary mixtures was investigated using cyclic voltammetry and square wave voltammetry [1589];

X-ray fluorescence: 2017 portable X-ray fluorescence (PXRF) and visible near infrared diffuse reflectance spectroscopy (DRS) for unknown pharmaceutical substances and/or illicit narcotics [1590].

3. Miscellaneous Topics

Abuse Deterrent Formulations (see also numerous, specific examples under oxycodone and opiates)**: 2016** comprehensive review of currently available extended-release opioid drugs [1591]; study to examine the use of superabsorbent polymers as an abuse deterrent formulation to thwart extraction, filtration, and syringe ability attempts for abuse [1592]; identification of drugs in injectable formulations used in a diversion program by DART-MS and HPLC [1277]; **2017** study of the efficacy and safety or hydromorphone hydrochloride extended-release tablets versus oxycodone hydrochloride extended-release tablets [1593]; comparison between prolonged-release oxycodone-naloxone and transdermal fentanyl [1594]; use of zein protein from corn as a pharmaceutical excipient for formulation of oral controlled-release matrices [1595]; **2018** review of the strategies used to confer abuse-deterrent properties on opioid abuse-deterrent formulations (ADFs) and the characteristics and supporting data for each of the available ADFs [1596]; relative abuse potential of crush-resistant prescription opioid tablets [1597]; statistical considerations in the evaluation of post-market studies to assess whether opioids with abuse-deterrent properties result in reduced abuse [1598]; efficacy and safety of titration with controlled-release (CR) oxycodone tablets in comparison with immediate-release (IR) morphine tablets [1599]; studies of abuse-deterrent opioids: lessons from oral and intranasal studies with morphine abuse-deterrent, extended-release, injection-molded tablets [1600];

Anions and Cations: 2016 10,000-fold sensitivity increase in chiral capillary electrophoresis: Cation-selective exhaustive injection and sweeping cyclodextrin-modified micellar electrokinetic chromatography [1601];

Body Packing: 2016 Fatal cocaine intoxication in a body packer [1602], use of radiology in the detection and monitoring of drug mules carrying drugs in both powder and liquid form [1603]; **2017** international smuggling of cocaine by body concealment (case report) [1604]; report of previously unreported heroin body packaging technique [1605].

Canines: 2018 review of canine teams in the fight against drug trafficking: contribution, strategies and recent trends [1606]; **2019** evaluation of the ability of twelve certified narcotic detection canines to detect confiscated illegal synthetic cathinones (bath salts) [1607]; physico-chemistry of scents and consequences for the every-day work of dog handlers and trainers [1608].

Clandestine Laboratories – Appraisals and Safety: 2016 review of published literature on the characterization of exposure at clandestine laboratories [1609]; review of clandestine produces heroin and amphetamine-type stimulant substitutes [1610].

Cryptomarket and the Dark Web: 2016 Wholesale of drugs on the cryptomarket [1611]; Norwegian study examining the role of online drug communities in the development of new drug trends (focus on synthetic cannabinoids) [1612]; role of the dark web in social marketing heroin [1613]; purity data for 219 samples purchased from the cryptomarket and analyzed by GC/MS [1614]; study of the online illicit drug market through the analysis of digital, physical and chemical data [1615]; Characterization of dark net marketplace purchasers [1616]; study documenting NPS for sale on the Tor site (Agora) from February to June 2015 [1617]; overview of the Canadian illicit drug market including the most prevalent illicit drugs vendors offer for sale and preferred destination countries [1618]; overview of internet sales of counterfeit medicines in Slovenia [1619]; use of a Python scripts to extract information about listings and sellers of illicit drug products online revealed more than 48,000 listings and 2700 vendors in 70 countries [1615]; case reports of heroin purchased from Craigslist [1620]; study of consumer motivations for purchasing illicit substances on the dark net [1616]; **2017** overview of on-line drug purchases and comparison of on-line with off-line purchased drugs regarding purity, adulteration and price through laboratory analyses of 32663 drug consumer samples (stimulants and hallucinogens) purchased between January 2013 and January 2016–928 of which were bought on-line [1621]; forensic drug intelligence through the study of the Australian virtual cryptomarket [1622]; trends in market dynamics of NPS within cryptomarkets [1623]; comparison of drug-related information posted on Pillreports.net and Partyflock.nl between January 1, 2014 and December 31, 2015 to actual concentration found in ecstasy tablets were investigated for accuracy [1624]; analysis of the Australian cryptomarket in regard to drug products available for purchase and prices [1625]; study of buyers of illegal product from cryptomarkets focused on loyalty and repeat buyers [1626]; impact of online drug market [1627]; impact of the Psychoactive Substances Act (UK) on the availability of the synthetic cannabinoid receptor agonist MDMB-CHMICA from online suppliers [1628]; evaluation of the online market of non-prescription somatropin products [198]; review of the NPS market on the visible and hidden Web [1629]; **2018** natural language processing and machine learning to identify NPS and correlate patterns of co-mentions of substances across posts in online forums [1630]; data collected from a large e-commerce website for drugs over 305 days in 2014 and 2015 documents that drug dealers give away samples of all major substance categories and sample distribution increases vendor sales for prescription drugs and opioid-based painkillers [1631]; EMCDDA assessment of the pre- and post-control availability of 25I–NBOMe, AH-7921, MDPV and MXE, from data were collected by a semi-automated software tool (I-TREND SASF) on e-shops in national languages (Czech, French, Dutch, Polish and English) that offered shipping of these compounds into the respective countries [1632]; combination of data from the physical and cryptomarkets for forensic drug intelligence [1633]; geographic analysis of drug trafficking patterns on the tor network [1634]; illicit drug markets and distribution networks in Scotland [1635]; study of demographic characteristics, methods and preferences of buyers who purchase illicit drugs online in the Netherlands [1636]; effect of the rescheduling of hydrocodone on the online illicit market for opioids [1637]; study of the activity of drug sellers on cryptomarket discussion forums [1638]; market competition and the size and scope of drug vendors' activities on AlphaBay [1639]; comparison of online trafficking of weapons to drugs on cryptomarkets [1640]; **2019** availability of fentanyl-type drugs on the dark web [1641]; study of the impact of the seizure of the original Silk Road and the shutdown of Silk Road 2.0 [1642]; limitations in metrics collected for evaluating threats and trends on the Dark Web [1643].

Drug Disposal: 2016 validated multi-drug determination using LC-MS/MS for the evaluation of a commercial drug disposal product [1644].

Drug Take Back Programs: controlled substances collected from a multi-state medication take back initiative between 2011 to 2015 [1645].

Education: 2017 development and implementation of a Forensic Science Education Toolbox in 6 language by the Euro4-Science project consortium [1646];

2018 IUPAC (International Union of Pure and Applied Chemistry) periodic table of the elements and isotopes (IPTEI) including practical applications of isotopic measurements and technologies for forensic science [1647]; overview of the state of forensic science training and education and future needs [1648]; the state of forensic science education and practice [1649]; mobile augmented reality (MAR) assisted chemical education [1650]; **2019** reinforcing mass spectrometry concepts through an undergraduate laboratory exercise utilizing a direct analysis in real time enabled mass spectrometer [1651]; method of learning, teaching and assessing forensic peer review [1652]; state of forensic science with an emphasis on education [1653]; study looking at training on cognitive processes as an integral part of all forensic education [1654]; integration of Cloud Technology Integrated Learning with chemistry instruction [1655]; framework for enriching thinking and action in chemistry education [1656]; importance of the periodic system in the scientific and technological development of the chemistry [1657]; experiential learning model using a virtual chemistry laboratory to affect academic achievement [1658].

Electronic Drug Delivery Systems 2017 review of electronic drug delivery devices [1659];

Immunoassays: 2016 gold nanoparticles based multiplex lateral flow Immunoassay for detection of drugs of abuse [1660]; **2017** Cross-Reactivity of Chloroquine and Hydroxychloroquine With DRI Amphetamine Immunoassay [1661]; Cross-reactivity of selected old and novel psychoactive substances (NPS) in an amphetamine and ecstasy immunoassay [1662].

Impurities and Impurity Profiling: 2017 impurity profiling of methylone and intermediate compounds synthesized from catechol [1663]; **2018** overview of drug profiling including implementation of new technologies and continued process improvements [1664]; detection of impurities in pharmaceuticals using ultra-high performance supercritical fluid chromatography with UV and MS detection [1665];

Labelling and Packaging: 2016 Study to assess the tampering potential of codeine combination analgesics on the market (containing codeine/non-opioid analgesics) by the extraction of codeine followed by analysis by LC-MS/MS [1666]; **2018** study to assess the tampering risk of tablets and suppositories containing codeine, tramadol and oxycodone [1667].

Legal Issues: 2016 impact of Texas's September 2010 "pill mill" law [1668]; legal issues regarding what products are considered psychoactive under New Zealand's legal market for new psychoactive substances (NPS, 'legal highs') [1669]; **2017** assessment of the concordance between illicit drug laws on the books and drug law enforcement in three states [1670]; examination of the pre- and post-control availability of 25I–NBOMe, AH-7921, MDPV and MXE [1632]; **2018** review of international drug control treaties [1671]; juror's perception of the forensic scientists' expertise and credibility during testimony [1672].

Precursors: 2016 Stereoselective method for the synthesis of derivatives of (2E)-3-(3-methoxyphenyl)-2-methylpent-2-enoic

acid ((E)-2c, precursors for the synthesis of Tapentadol [1673]; impacts of US sodium permanganate and Mexico pseudoephedrine controls [1674]; effect of precursor control on retail street price [1675]; single analyzer precursor scans using an ion trap [1676]; **2017** capacitive biosensor was developed to monitor trace amounts of an amphetamine precursor in aqueous samples [1677]; data-driven machine learning approach to detect drug- and explosives-precursors using colorimetric sensor technology for air-sampling [1678]; combined colorimetric and gravimetric CMUT sensor for detection of Phenylacetone [1679]; portable infrared laser for the identification of psychoactive substances and of their main precursors [1680]; **2018** a sensor system consisting of a capacitive micromachined ultrasonic transducer and a colorimetric array for detection of benzyl methyl ketone [1681]; a poly-acrylonitrile nanofiber-based quartz crystal microbalance for detecting safrole, the main precursor for producing MDMA [1682];

Quality Assurance: 2016 approaches to the statistical evaluation and the interpretation and reporting of results in forensic studies [1683]; **2017** method to discover and correct errors in the NIST/EPA/NIH mass spectral libraries [1684]; **2018** importance of estimating the uncertainty of sampling in forensic interpretation of data [1685]; **2019** approach to proficiency testing that is designed to test specific aspects of the analytical process that are not typically addressed, specifically sampling [1686].

Safety 2017 fentanyl in the US heroin supply: a rapidly changing risk environment [1687]; **2018** determination of air quality inside police drug safes and drug storage areas using carbon traps extracted and analyzed by LC-MS-MS for a suite of 22 licit and illicit drug residues and 2 metabolites and GC-MS analysis for general volatile organic compound (VOC) residues [1688];

Schedule: 2016 Up-Scheduling of Alprazolam to a "Controlled Drug": Interrupted time series analysis of the effect of rescheduling Alprazolam in Australia [1689,1690]; impact of codeine re-scheduling on misuse [1691]; comparison of Unintentional Exposures to Codeine and Hydrocodone Reported to Texas Poison Centers after reclassification of Hydrocodone to a Schedule II drug in the United States [1692] **2017** Alprazolam in fatal overdose following regulatory rescheduling [1693] **2018** utility of an alternate method used worldwide to assess the internal subjective effects of drugs to predict the abuse liability [1694];

Sensors (Biological and Instrumental): 2016 Domain Adaptation Methods for Improving Lab-to-field Generalization of Cocaine Detection using Wearable ECG sensor data [1695]; novel Tetrahydrocannabinol electrochemical nano Immunosensor based on horseradish peroxidase and double-layer gold nanoparticles [1696]; amperometric sensor for chlorpromazine based on reduced graphene oxide (RGO) and polydopamine (PDA) composite modified glassy carbon electrode [1697]; **2017** Methods of preparation of ZnO-CNT nanocomposite and its application as electrochemical sensor [1698]; new electrocatalytic sensor for determination of diclofenac, morphine and mefenamic acid using synergic effect of NiO-SWCNT and 2, 4-dimethyl-N/[1-(2, 3-dihydroxy phenyl) methylidene] aniline [1699]; **2018** biosensor based on cadmium selenide/zinc sulphide core shell quantum dot modified with the redox protein cytochrome c (CdSe/ZnS-Cytc) for the photo-electrochemical determination uric acid, ascorbic acid, folic acid, barbital, glucose, epinephrine, and urea [1700].

Social Media: 2016 assessment of utilizing social media as a resource for automatic monitoring of prescription medication abuse [1701]**; 2017** Exploring trends of nonmedical use of prescription drugs and polydrug abuse using unsupervised machine learning surveillance of Twitter by collecting 11 million tweets filtered for three commonly abused prescription opioid analgesic drugs Percocet (acetaminophen/oxycodone), OxyContin (oxycodone), and Oxycodone [1702]; methodology accurately identifying tweets marketing the illegal online sale of controlled substances [1703]; content analysis of tweets about marijuana [1704]; national substance use patterns on Twitter [1705]; data mining of 300,000 marijuana related tweets [1706]; patterns of twitter behavior among cannabis dispensaries and followers in California [1707]; Hidden Markov Model (HMM) for real-time topical filtering of tweets [1708]; **2018** trends in online information about cannabis and kratom on Facebook [1709]; content analysis of edible marijuana tweets [1710]; anomaly detection using Global Vectors on a Polish Internet discussion forum devoted to psychoactive substances [1711]; twitter survey on marijuana concentrate use [1712]; overview and analysis of social media that contribute to the popularity of NPS especially among young people [1713]; use of Machine Learning and Web Forensics tools to detect, classify and report illicit online marketing and sales of opioids [1714]; review of sales and marketing of NPS through social media [1713]; analyses on the use of encrypted messaging apps (e.g. Snapchat, Instagram and WhatsApp) to buy and sell illicit drugs [1715].

Soil: 2016 discriminating ability of forensic soil analysis techniques including X-ray fluorescence spectrometry (XRF) and element analyzer-isotope ratio mass spectrometry (EA-IRMS) [1716]; review of soil fingerprinting including uses in forensic and criminal investigations [1717]; overview of forensic soil examination in Russia [1718]; **2018** LC/MS method to measure pentobarbital in soils [1719]; HPLC-HR-MS/MS for detection of ricin in soil [1720].

Surveys and Patterns of Drug Use: 2016 The stigmatization of 'ice' and under-reporting of meth/amphetamine use in general population surveys: a case study from Australia [1721]; cannabis, heroin, and cocaine dominate Europe's (sic)24bn illegal drugs market [1722]; Survey of substance use in the United Arab Emirates (UAE) [1723]; Fentanyl Law Enforcement Submissions and Increases in Synthetic Opioid-Involved Overdose Deaths-27 States, 2013–2014 [1724]; Increases in Fentanyl-Related Overdose Deaths - Florida and Ohio, 2013–2015 [1725]; survey of drug use among the indigenous people of Australia [1726], drug use trends in Kelantan, Malaysia [1727]; trends in the distribution of Opioids in Puerto Rico, 1999–2013 [1728]; network scale-up approach to estimate the prevalence of illicit drug use in Iran [1729] examination of web-based forums used to discuss access over-the-counter morphine for misuse [1730]; survey of drug use among male sex workers in the Hunan Province of China [1731]; report on the lifetime use of specific NPS among nightlife attendees in the United States [1732]; survey of use of synthetic cathinones and 3-MMC in Slovenia [1733]; an overview of data available on illicit drugs and new psychoactive substances from European monitoring in 2015 [1734]; current status of the opioid epidemic in Maine using three data sets [1735]; results of a National Rehabilitation Centre cohort study indicating the pattern of substance use disorder in the United Arab Emirates in 2015 [1736]; **2017** NBOMe hallucinogenic drug exposures reported to the Danish Poison Information Centre [1737]; trends and correlates of cocaine use in the United States from 2011 to 2015 [1738]; Heroin, cocaine and methamphetamine exposures reported to US poison centers (NPDS): 2005–2016 [1739]; Codeine use among children in the United States: a nationally representative study from 1996 to 2013 [1740]; Fentanyl use in Australia [1741]; misuse of Fentanyl among those in opioid maintenance treatment programs [1742]; estimating the magnitude of illicit fentanyl use from 2012 to 2016 using a national opioid abuse surveillance system [1743]; overdose deaths related to fentanyl in Ohio, January–February 2017 [1744]; fentanyl-involved drug overdose deaths in Rhode Island, USA [1745]; fentanyl laced heroin in relation to a spike in heroin overdose in Miami-Dade County [1746]; patterns and perceptions of fentanyl exposure among opioid users in Rhode Island [1747]; Heroin overdose rates in the United States from 2006-2015 [1748]; 2006–2015 trends in

deaths involving heroin and synthetic opioids in the United States [1749]; geographical trends of heroin use across the United States [1750]; fentanyl laced heroin deaths in Australia in 2015 [1751]; analysis of opioid overdose deaths in Australia between 2001-2012 [1752]; analysis of opioid and heroin deaths reported in the US in 2014 and analysis of geographical changes from 2008-2014 [1753]; study of changes in overdose deaths related to heroin and fentanyl in Kentucky from 2011-2015 [1754]; study of heroin and fentanyl related overdoses in relation to prescription opioids [1755]; study of accessibility of heroin in the United States among adolescents between 2002-2014 [1756]; surveillance of mephedrone, MDMA and cocaine in the UK [1757]; study of the shift of drug use from ecstasy tablets to MDMA crystals [1758]; consumption patterns of NPS by nightlife attendees in Munich [1759]; patterns of substance use and abuse among French adolescents [1760] increasing use of crystal MDMA in Australia [1761]; population-based study of Australian young adult illicit stimulant users [1762]; survey of 679 individuals ages 18–25 regarding the use of Molly at electronic dance music parties in New York City in 2015 [1763]; shifting trends in the characteristics of ecstasy users in the United States [1764]; Molly use among a sample of college students (N = 151; 66.7% female) aged 18 to 25 years who reported previously using Molly over three separate periods of time, October to November 2014, February to April 2015, and September to November 2015 [1765]; the changes in classical illicit and licit drug, as well as stimulant designer drug consumption of suspected drug users in South-East Hungary between 2008 and 2015 [1766]; changes in classical illicit and licit drug, as well as stimulant designer drug (SDD) consumption of suspected drug users in South-East Hungary between 2008 and 2015 [1766]; French national OPPIDUM program as a surveillance system on drug abuse [1767]; trends in opioid consumption in Taiwan during 2002–2014 [1768]; comparative analysis of Opioid queries on Erowid.org as a mechanism to identify emerging trends [1769]; study was to explore self-reported experiences of three commonly used NPS classes within the Australian context (synthetic cathinones, hallucinogenic phenethylamines and hallucinogenic tryptamines) relative to traditional illicit drug counterparts [1770]; French national OPPIDUM program as a Surveillance system on drug abuse [1767]; opioid analgesic misuse and abuse in participants from the Global Drug Survey [1771]; relative abuse ratios were calculated for hydrocodone, oxycodone, hydromorphone, and morphine using negative binomial regression [1772]; geographic patterns of drug poisoning deaths involving heroin by county for the USA from 2000 to 2014 [1773]; survey on patterns of use of illicit substances in Germany [1774]; **2018** survey of 1045 nightclub/festival-attending adults in New York City regarding their awareness that ecstasy/MDMA/Molly were the same compound in different forms [1775]; consumption trends of three groups of analgesics (non-opioids, and mild and strong opioids) between 2006 and 2015 in France compared to the pattern of use with six European countries in 2015 [1776]; study to characterize diversion of prescription drugs in France through a comparative analysis of falsified prescriptions collected during three periods from 2001 to 2012 [1777]; study to examine changes in the polydrug use pattern in Norway in 2000 and 2009 [1778]; Surveillance of drug abuse in Hong Kong using LC-MS/MS [1779]; trends in opioid utilization in Australia, 2006–2015 [1780].

Other: 2016 Development of a dual test procedure for DNA typing and methamphetamine detection using a trace amount of stimulant-containing blood from the syringe used to inject the drug [1781]; **2017** Developing Data to Transform Death Prevention: Lessons from the Fentanyl Crisis [1782]; literature review on Captagon as a stimulant in terrorist attacks and civil war zones [1783]; typology method for distinguishing presence of fentanyl [1784]; **2018** implementation of workflow mechanisms that are in place in order to facilitate the monitoring, communication and management of analytical data and overview of collaboration of the Joint Research Centre and European Customs laboratories for the identification of new psychoactive substances [1785]; noninvasive detection of cocaine and heroin use with single fingerprints: determination of an environmental cutoff [1786]; detection of exogenous substances in latent fingermarks using AgLDI IMS [1787].

Disclaimer

This is a republication in journal form of a conference proceeding that was produced for the 19th Interpol Forensic Science Managers Symposium in 2019 and was originally published online at the Interpol website: https://www.interpol.int/content/download/14458/file/Interpol Review Papers 2019.pdf. The publication process was coordinated for the Symposium by the Interpol Organizing Committee and the proceeding was not individually commissioned or externally reviewed by the journal. The article provides a summation of published literature from the previous 3 years (2016-2019) in the field of controlled substances and does not contain any experimental data. Any opinions expressed are solely those of the authors and do not necessarily represent those of their agencies, institutions, governments, Interpol, or the journal.

Declaration of Competing Interests

The authors have no competing interests to declare.

References

[1] A.M. Arens, et al., Adverse effects from counterfeit alprazolam tablets, JAMA Intern. Med. 176 (10) (2016) 1554–1555.
[2] P. Samiec, Z. Navratilova, Electrochemical behaviour of bromazepam and alprazolam and their determination in pharmaceutical tablets lexauring and Xanax on carbon paste electrode, Xxxvi Moderni Elektrochemicke Metody (2016) 186–190.
[3] N. Goudarzi, et al., Application of ultrasound-assisted surfactant-enhanced emulsification microextraction Based on Solidification of floating organic Droplets and high performance liquid Chromatography for Preconcentration and Determination of Alprazolam and Chlordiazepoxide in human serum samples, J. Chromatogr. Sci. 55 (6) (2017) 669–675.
[4] J. Narang, et al., Detection of alprazolam with a lab on paper economical device integrated with urchin like Ag@ Pd shell nano-hybrids, Mater. Sci. Eng. C: Mater. Biol. Appl. 80 (2017) 728–735.
[5] E. Parhizkar, et al., PLS-LS-SVM based modeling of ATR-IR as a robust method in detection and qualification of alprazolam, Spectrochim. Acta Mol. Biomol. Spectrosc. 173 (2017) 87–92.
[6] A.O. Ferreira, et al., Stability of alprazolam, atropine sulfate, glutamine, Levofloxacin, metoprolol tartrate, Nitrofurantoin, ondansetron hydrochloride, Oxandrolone, pregabaline, and Riboflavin in SyrSpend SF pH4 oral suspensions, Int. J. Pharm. Compd. 21 (3) (2017) 255–263.
[7] A. Romeiro, et al., Effect of the calcination temperature on the photocatalytic efficiency of acidic sol-gel synthesized TiO2 nanoparticles in the degradation of alprazolam, Photochem. Photobiol. Sci. 16 (6) (2017) 935–945.
[8] K. Texter, et al., Identification of pyrolysis products of the new psychoactive substance 2-amino-1-(4-bromo-2,5-dimethoxyphenyl)ethanone hydrochloride (bk-2C-B) and its iodo analogue bk-2C-I, Drug Test. Anal. 10 (1) (2018) 229–236.
[9] S. Arnoldi, et al., Determination of 1-phenyl-2-propanone (P2P) by HS-GC/MS in a material sold as "wet amphetamine", Forensic Toxicol. 34 (2) (2016) 411–418.
[10] V.B. Dos Santos, et al., Amphetamine and derivatives in natural weight loss pills and dietary supplements by capillary electrophoresis-tandem mass spectrometry, J. Chromatogr. B: Anal. Technol. Biomed. Life Sci. 1038 (2016) 19–25.
[11] A. El-Beqqali, et al., Molecularly imprinted polymer-sol-gel tablet toward micro-solid phase extraction: II 1063 (2017) 130–135. Determination of amphetamine in human urine samples by liquid chromatography-tandem mass spectrometry. Journal of Chromatography. B: Analytical Technologies in the Biomedical and Life Sciences.
[12] M. Hadener, et al., Accelerated quantification of amphetamine enantiomers in human urine using chiral liquid chromatography and on-line column-switching coupled with tandem mass spectrometry, Anal. Bioanal. Chem. 409 (5) (2017) 1291–1300.

[13] F.M. Hauser, et al., Identification of specific markers for amphetamine synthesised from the pre-precursor APAAN following the Leuckart route and retrospective search for APAAN markers in profiling databases from Germany and The Netherlands, Drug Test. Anal. 10 (4) (2018) 671–680.
[14] F.M. Hauser, et al., New approaches to gather information about the clandestine production of amphetamine, Forensic Sci. Int. 277 (2017), p. 42–42.
[15] J.D. Power, et al., 'APAAN in the neck' - a reflection on some novel impurities found in seized materials containing amphetamine in Ireland during routine forensic analysis, Drug Test. Anal. 9 (7) (2017) 966–976.
[16] J.D. Power, et al., Forensic analysis of P2P derived amphetamine synthesis impurities: identification and characterization of indene by-products, Drug Test. Anal. 9 (3) (2017) 446–452.
[17] J. Yun, et al., Monitoring of the amphetamine-like substances in dietary supplements by LC-PDA and LC-MS/MS, Food Sci. Biotechnol. 26 (5) (2017) 1185–1190.
[18] I. Ayodeji, et al., Rapid pre-filtering of amphetamine and derivatives by direct analysis in real time (DART)-differential mobility spectrometry (DMS), Anal. Methods 9 (34) (2017) 5044–5051.
[19] S. Bashiri, et al., Utility of extrinsic [60] fullerenes as work function type sensors for amphetamine drug detection: DFT studies, Vacuum 136 (2017) 156–162.
[20] J. Gallardo-Gonzalez, et al., Sensitive potentiometric determination of amphetamine with an all-solid-state micro ion-selective electrode, Anal. Lett. 51 (3) (2018) 348–358.
[21] J. Gallardo-Gonzalez, et al., A highly selective potentiometric amphetamine microsensor based on all-solid-state membrane using a new ion-pair complex, [3,3 '-Co(1,2-closo-C2B9H11)(2)](-) [C9H13NH](+), Sensor. Actuator. B Chem. 266 (2018) 823–829.
[22] F. Hauser, et al., Characterisation of aqueous waste produced during the clandestine production of amphetamine following the Leuckart route utilising solid-phase extraction gas chromatography-mass spectrometry and capillary electrophoresis with contactless conductivity detection, Drug Test. Anal. 10 (9) (2018) 1368–1382.
[23] A. Moosavi-zare, et al., Adsorption behavior of amphetamine on the inorganic BC3 nanotube and nanosheet: DFT studies, Inorg. Chem. Commun. 91 (2018) 95–101.
[24] F. Hauser, et al., Identification of specific markers for amphetamine synthesised from the pre-precursor APAAN following the Leuckart route and retrospective search for APAAN markers in profiling databases from Germany and The Netherlands, Drug Test. Anal. 10 (4) (2018) 671–680.
[25] L. Nielsen, P. Villesen, C. Lindholst, Stability of amphetamine impurity profiles during 12 months of storage, Forensic Sci. Int. 290 (2018) 129–136.
[26] M. Monier, I. Youssef, D. Abdel-Latif, Synthesis of imprinted styrene-maleic acid functionalized resin for enantio-selective extraction of R-amphetamine, Chem. Eng. J. 356 (2019) 693–701.
[27] D. Spalovska, et al., Structure determination of butylone as a new psychoactive substance using chiroptical and vibrational spectroscopies, Chirality 30 (5) (2018) 548–559.
[28] K. Shanks, G. Behonick, Detection of carfentanil by LC-MS-MS and reports of associated fatalities in the USA, J. Anal. Toxicol. 41 (6) (2017) 466–472.
[29] T.C. De Carvalho, et al., Thin layer chromatography coupled to paper spray ionization mass spectrometry for cocaine and its adulterants analysis, Forensic Sci. Int. 262 (2016) 56–65.
[30] M. de Jong, et al., Electrochemical fingerprint of street samples for fast on-site screening of cocaine in seized drug powders, Chem. Sci. 7 (3) (2016) 2364–2370.
[31] J.M.P.J. Garrido, et al., Carbon nanotube beta-cyclodextrin-modified electrode for quantification of cocaine in seized street samples, Ionics 22 (12) (2016) 2511–2518.
[32] I.C. Eleoterio, et al., Analysis of cocaine using a chemically modified electrode with Vanadium hexacyanoferrate film by cyclic voltammetry, Sens. Electron. Instrum. Adv. (Seia) (2016) 112–113.
[33] K.N. Ellefsen, et al., Cocaine and benzoylecgonine oral fluid on-site screening and confirmation, Drug Test. Anal. 8 (3–4) (2016) 296–303.
[34] L.M. de Souza, et al., A survey of adulterants used to cut cocaine in samples seized in the Espirito Santo State by GC-MS allied to chemometric tools, Sci. Justice 56 (2) (2016) 73–79.
[35] D. Mainali, J. Seelenbinder, Automated fast screening method for cocaine identification in seized drug samples using a portable fourier transform infrared (FT-IR) instrument, Appl. Spectrosc. 70 (5) (2016) 916–922.
[36] F.B. D'Avila, et al., Analysis of cocaine/crack biomarkers in meconium by LC-MS, J. Chromatograp. B-Anal. Technol. Biomed. Life Sci. 1012 (2016) 113–117.
[37] F. Indorato, G. Romano, N. Barbera, Levamisole-adulterated cocaine: Two fatal case reports and evaluation of possible cocaine toxicity potentiation, Forensic Sci. Int. 265 (2016) 103–106.
[38] S.B. Karch, et al., Levamisole adulterated cocaine and pulmonary vasculitis: presentation of two lethal cases and brief literature review, Forensic Sci. Int. 265 (2016) 96–102.
[39] L.S. Nielsen, C. Lindholst, P. Villesen, Cocaine classification using alkaloid and residual solvent profiling, Forensic Sci. Int. 269 (2016) 42–49.
[40] A.G. Pereira, et al., Method development and validation for determination of cocaine, its main metabolites and pyrolytic products by HPLC-UV-CAD, Chromatographia 79 (3–4) (2016) 179–187.
[41] M.F.M. Ribeiro, et al., Voltammetric determination of cocaine using carbon screen printed electrodes chemically modified with Uranyl Schiff base films, Electroanalysis 28 (2) (2016) 320–326.
[42] F. Haddache, et al., A label-free photoelectrochemical cocaine aptasensor based on an electropolymerized ruthenium-intercalator complex, Electrochim. Acta 219 (2016) 82–87.
[43] A.S. Emrani, et al., A novel fluorescent aptasensor based on hairpin structure of complementary strand of aptamer and nanoparticles as a signal amplification approach for ultrasensitive detection of cocaine, Biosens. Bioelectron. 79 (2016) 288–293.
[44] M.P. Chantada-Vazquez, et al., Synthesis and characterization of novel molecularly imprinted polymer - coated Mn-doped ZnS quantum dots for specific fluorescent recognition of cocaine, Biosens. Bioelectron. 75 (2016) 213–221.
[45] Z.H. Chen, et al., Stimulus-response mesoporous silica nanoparticle-based chemiluminescence biosensor for cocaine determination, Biosens. Bioelectron. 75 (2016) 8–14.
[46] R. Bujak, et al., Selective determination of cocaine and its metabolite benzoylecgonine in environmental samples by newly developed sorbent materials, Talanta 146 (2016) 401–409.
[47] I. Campestrini, W.F. Jardim, Occurrence of cocaine and benzoylecgonine in drinking and source water in the Sao Paulo State region, Brazil, Sci. Total Environ. 576 (2017) 374–380.
[48] S. Arimoto, et al., Improvement of electrochemical response of cocaine sensors based on DNA aptamer by heat treatment, Anal. Sci. 32 (4) (2016) 469–472.
[49] K. Abnous, et al., A novel electrochemical aptasensor based on H-shape structure of aptamer-complimentary strands conjugate for ultrasensitive detection of cocaine, Sensor. Actuator. B Chem. 224 (2016) 351–355.
[50] F. Aljanabi, et al., Detection of cocaine using gravure printed silver nanoparticle based SERS substrate. 2016, IEEE Sens. (2016) 1–3.
[51] M. Roushani, F. Shahdost-fard, Fabrication of an electrochemical nanoaptasensor based on AuNPs for ultrasensitive determination of cocaine in serum sample, Mater. Sci. Engi. C-Mater. Biol. Appl. 61 (2016) 599–607.
[52] M. Roushani, F. Shahdost-fard, An aptasensor for voltammetric and impedimetric determination of cocaine based on a glassy carbon electrode modified with platinum nanoparticles and using rutin as a redox probe, Microchimica Acta 183 (1) (2016) 185–193.
[53] D. Russo, et al., Investigation on the removal of the major cocaine metabolite (benzoylecgonine) in water matrices by UV254/H2O2 process by using a flow microcapillary film array photoreactor as an efficient experimental tool, Water Res. 89 (2016) 375–383.
[54] A. Sachan, et al., Specificity and ligand affinities of the cocaine aptamer: impact of structural features and physiological NaCl, Anal. Chem. 88 (15) (2016) 7715–7723.
[55] G.D. Silveira, et al., Development of a method for the determination of cocaine, cocaethylene and norcocaine in human breast milk using liquid phase microextraction and gas chromatography-mass spectrometry, Forensic Sci. Int. 265 (2016) 22–28.
[56] F. Tosato, et al., Direct quantitative analysis of cocaine by thin layer chromatography plus a mobile phone and multivariate calibration: a cost-effective and rapid method, Anal. Methods 8 (42) (2016) 7632–7637.
[57] S. van der Heide, et al., Location-specific immunodetection of cocaine on banknotes, Analyst 141 (21) (2016) 6116–6125.
[58] J. Mallette, et al., Geographically sourcing cocaine's origin - Delineation of the nineteen major coca growing Regions in south America, Sci. Rep. (2016) 6.
[59] N.A. Abdelshafi, U. Panne, R.J. Schneider, Screening for cocaine on Euro banknotes by a highly sensitive enzyme immunoassay, Talanta 165 (2017) 619–624.
[60] C.G.G. Aitken, et al., Distribution of cocaine on banknotes in general circulation in England and Wales, Forensic Sci. Int. 270 (2017) 261–266.
[61] M. Arslan, et al., Double fluorescence assay via a beta-cyclodextrin containing conjugated polymer as a biomimetic material for cocaine sensing, Polym. Chem. 8 (21) (2017) 3333–3340.
[62] X. Chen, et al., A quantitative LC-MS/MS method for simultaneous determination of cocaine and its metabolites in whole blood, J. Pharmaceut. Biomed. Anal. 134 (2017) 243–251.
[63] R.R. dos Santos, et al., Efficient extraction method using magnetic carbon nanotubes to analyze cocaine and benzoylecgonine in breast milk by GC/MS, Bioanalysis 9 (21) (2017) 1655–1666.
[64] J. Eliaerts, et al., Rapid classification and quantification of cocaine in seized powders with ATR-FTIR and chemometrics, Drug Test. Anal. 9 (10) (2017) 1480–1489.
[65] J.M. Freitas, et al., A portable electrochemical method for cocaine quantification and rapid screening of common adulterants in seized samples, Sensor. Actuator. B Chem. 243 (2017) 557–565.
[66] Y. Garcia, et al., Development of competitive 'pseudo'-ELISA assay for measurement of cocaine and its metabolites using molecularly imprinted polymer nanoparticles, Anal. Methods 9 (31) (2017) 4592–4598.
[67] E. Guler, et al., An aptamer folding-based sensory platform decorated with nanoparticles for simple cocaine testing, Drug Test. Anal. 9 (4) (2017) 578–587.
[68] E. Guler, et al., Mobile phone sensing of cocaine in a lateral flow assay combined with a biomimetic material, Anal. Chem. 89 (18) (2017) 9629–9632.
[69] M. Ismail, et al., A diagnostic test for cocaine and benzoylecgonine in urine

and oral fluid using portable mass spectrometry, Anal. Methods 9 (12) (2017) 1839–1847.
[70] O. Kudlacek, et al., Cocaine adulteration, J. Chem. Neuroanat. 83 (2017) 75–81.
[71] C. Liu, Z. Hua, X. Meng, Applicability of ultra-high performance liquid chromatography-quadrupole-time of flight mass spectrometry for cocaine profiling, Drug Test. Anal. 9 (8) (2017) 1152–1161.
[72] C.M. Liu, Z.D. Hua, X. Meng, Profiling of illicit cocaine seized in China by ICP-MS analysis of inorganic elements, Forensic Sci. Int. 276 (2017) 77–84.
[73] Y.X. Liu, Q. Zhao, Direct fluorescence anisotropy assay for cocaine using tetramethylrhodamine-labeled aptamer, Anal. Bioanal. Chem. 409 (16) (2017) 3993–4000.
[74] J.R. Mallette, et al., The isotopic fractionation of carbon, nitrogen, hydrogen, and oxygen during illicit production of cocaine base in South America, Forensic Sci. Int. 270 (2017) 255–260.
[75] C.N. Manrique, Analysis of cocaine and adulterating agents in different matrices in the narcotic laboratory, Forensic Sci. Int. 277 (2017), p. 107–107.
[76] S. Materazzi, et al., Cocaine profiling: Implementation of a predictive model by ATR-FTIR coupled with chemometrics in forensic chemistry, Talanta 166 (2017) 328–335.
[77] J. Meng, et al., Designing of ordered two-dimensional gold nanoparticles film for cocaine detection in human urine using surface-enhanced Raman spectroscopy, Talanta 164 (2017) 693–699.
[78] H. Michelot, et al., Chemometrics applied to chemical profiles of cocaine seizures: a forensic intelligence approach, Forensic Sci. Int. 277 (2017) 229–230.
[79] J. Nickley, A.J. Pesce, K. Krock, A sensitive assay for urinary cocaine metabolite benzoylecgonine shows more positive results and longer half-lives than those using traditional cut-offs, Drug Test. Anal. 9 (8) (2017) 1214–1216.
[80] L.S. Nielsen, C. Lindholst, P. Villesen, Development and application of a highly efficient cocaine classification method, Forensic Sci. Int. 277 (2017) 253–254.
[81] L.S. Nielsen, P. Villesen, C. Lindholst, Variation in chemical profiles within large seizures of cocaine bricks, Forensic Sci. Int. 280 (2017) 194–199.
[82] L.S. Nielsen, P. Villesen, C. Lindholst, Batch variation within seizures containing multiple cocaine bricks: a case study, Forensic Sci. Int. 277 (2017), p. 202–202.
[83] C.A.F.D. Penido, et al., Quantification of cocaine in ternary mixtures using partial least squares regression applied to Raman and Fourier transform infrared spectroscopy, J. Raman Spectrosc. 48 (12) (2017) 1732–1743.
[84] R. Populeanu, et al., Methods for increasing the sensitivity and signal-to-noise ratio in mass spectrometry for the determination of cocaine and ethylbenzoylecgonine in urine, in: Proceedings of the 9th International Conference on Electronics, Computers and Artificial Intelligence - Ecai, 2017, p. 2017.
[85] S. Rauf, et al., Label-free nanopore Biosensor for Rapid and highly sensitive cocaine Detection in complex biological fluids, ACS Sens. 2 (2) (2017) 227–234.
[86] D.P. Rocha, et al., Electrochemically reduced graphene oxide for forensic electrochemistry: detection of cocaine and its adulterants paracetamol, caffeine and levamisole, Electroanalysis 29 (11) (2017) 2418–2422.
[87] T. Rosado, et al., Rapid analysis of cocaine and metabolites in urine using microextraction in packed sorbent and GC/MS, Anal. Bioanal. Chem. 409 (8) (2017) 2051–2063.
[88] H. Santos, et al., Quantification of cocaine and its adulterants (lidocaine and levamisole) using the Dragendorff reagent allied to paper spray ionization mass spectrometry, Anal. Methods 9 (24) (2017) 3662–3668.
[89] A.A. Shoara, et al., Analysis of the interaction between the cocaine-binding aptamer and its ligands using fluorescence spectroscopy, Can. J. Chem. 95 (12) (2017) 1253–1260.
[90] K. Smolinska-Kempisty, et al., New potentiometric sensor based on molecularly imprinted nanoparticles for cocaine detection, Biosens. Bioelectron. 96 (2017) 49–54.
[91] A. Sorribes-Soriano, et al., Cocaine abuse determination by ion mobility spectrometry using molecular imprinting, J. Chromatogr. A 1481 (2017) 23–30.
[92] F.F. Su, et al., Two-dimensional zirconium-based metal organic framework nanosheet composites Embedded with Au nanoclusters: a highly sensitive electrochemical Aptasensor toward detecting cocaine, ACS Sens. 2 (7) (2017) 998–1005.
[93] G. Troiano, How much cocaine is there on our money? Eur. J. Publ. Health (2017) 27.
[94] G. Troiano, et al., Cocaine contamination of banknotes: a review, Eur. J. Publ. Health 27 (6) (2017) 1097–1101.
[95] K. Tsujikawa, et al., Development of a new field-test procedure for cocaine, Forensic Sci. Int. 270 (2017) 267–274.
[96] P. Villesen, L.S. Nielsen, Profiling of cocaine using ratios of GC-MS peaks, Sci. Rep. (2017) 7.
[97] J. Wu, et al., Magnetic lateral flow strip for the detection of cocaine in urine by naked eyes and smart phone camera, Sensors (6) (2017) 17.
[98] F.Y. Yang, et al., Magnetic dispersive solid-phase extraction based on modified magnetic nanoparticles for the detection of cocaine and cocaine metabolites in human urine by high-performance liquid chromatography-mass spectrometry, J. Separ. Sci. 40 (21) (2017) 4234–4245.
[99] J. Mallette, et al., Changes in illicit cocaine hydrochloride processing identified and revealed through multivariate analysis of cocaine signature data, Sci. Justice 58 (2) (2018) 90–97.
[100] K. Vinkovic, N. Galic, M. Schmid, Micro-HPLC-UV analysis of cocaine and its adulterants in illicit cocaine samples seized by Austrian police from 2012 to 2017, J. Liq. Chromatogr. Relat. Technol. 41 (1) (2018) 6–13.
[101] L. Benedito, A. Maldaner, A. Oliveira, An external reference H-1 qNMR method (PULCON) for characterization of high purity cocaine seizures, Anal. Methods 10 (5) (2018) 489–495.
[102] A. da Silva, et al., Cocaine and adulterants analysis in seized drug samples by infrared spectroscopy and MCR-ALS, Forensic Sci. Int. 290 (2018) 169–177.
[103] J. Eliaerts, et al., Practical tool for sampling and fast analysis of large cocaine seizures, Drug Test. Anal. 10 (6) (2018) 1039–1042.
[104] D. Lieblein, et al., A Comparison of portable infrared spectrometers, portable Raman spectrometers, and color-based field Tests for the on-scene Analysis of cocaine, Spectroscopy 33 (12) (2018) 20.
[105] L. Poltorak, et al., Electrified soft interface as a selective sensor for cocaine detection in street samples, Anal. Chem. 90 (12) (2018) 7428–7433.
[106] R. Populeanu, et al., Multiple reactions monitoring for determinating cocaine and ethylbenzoylecgonine to increase the signal/noise ratio in mass spectrometry analysis, Adv. Topics Optoelectron. Microelectron. Nanotechnol. Ix (2018) 10977.
[107] Y. Qiu, et al., Rapid detection of cocaine using aptamer-based biosensor on an evanescent wave fibre platform, R. Soc. Open Sci. (10) (2018) 5.
[108] J. Raveendran, et al., Ultrasensitive analyte detection by combining nanoparticle-based surface-enhanced Raman scattering (SERS) substrates with multivariate analysis, Mater. Today-Proc. 5 (14) (2018) 27377–27386.
[109] W. Rocha, et al., Quantification of cocaine and its adulterants by nuclear magnetic resonance spectroscopy without deuterated solvents (No-D qNMR), Anal. Methods 10 (15) (2018) 1685–1694.
[110] K. Scotcher, R. Bradshaw, The analysis of latent fingermarks on polymer banknotes using MALDI-MS, Sci. Rep. (2018) 8.
[111] R. Sharma, J. Kumar, Development and validation of a high-performance thin-layer chromatographic method for the simultaneous determination of levamisole and cocaine in seized cocaine sample, JPC-J. Planar Chromatograp.-Modern Tlc 31 (5) (2018) 383–388.
[112] L. Xiao, et al., Development of a quantitative method for the analysis of cocaine analogue impregnated into textiles by Raman spectroscopy, Drug Test. Anal. 10 (4) (2018) 761–767.
[113] M. Yemloul, et al., Rapid characterization of cocaine in illicit drug samples by 1D and 2D NMR spectroscopy, Anal. Bioanal. Chem. 410 (21) (2018) 5237–5244.
[114] N. Oliveira, et al., A holographic sensor based on a biomimetic affinity ligand for the detection of cocaine, Sensor. Actuator. B Chem. 270 (2018) 216–222.
[115] T. Fiorentin, et al., Determination of cutting agents in seized cocaine samples using GC-MS, GC-TMS and LC-MS/MS, Forensic Sci. Int. 295 (2019) 199–206.
[116] R. Rocha, et al., Simple strategy for selective determination of levamisole in seized cocaine and pharmaceutical samples using disposable screen-printed electrodes, Electroanalysis 31 (1) (2019) 153–159.
[117] N. Abdelshafi, et al., Microfluidic electrochemical immunosensor for the trace analysis of cocaine in water and body fluids, Drug Test. Anal. 11 (3) (2019) 492–500.
[118] R. Moreira, et al., Screening of seized cocaine samples using electrophoresis microchips with integrated contactless conductivity detection, Electrophoresis 39 (17) (2018) 2188–2194.
[119] N. Kumar, et al., Potential impurities of anxiolytic drug, clobazam: identification, synthesis and characterization using HPLC, LC-ESI/MSn and NMR, J. Pharmaceut. Biomed. Anal. 137 (2017) 268–278.
[120] N. Kumar, et al., Potential impurities of the anti-epileptic drug, clobazam: synthesis and characterization, Lett. Org. Chem. 14 (10) (2017) 769–777.
[121] S.M. Havig, et al., Codeine-spiked beer in a date rape case? Int. J. Leg. Med. 130 (6) (2016) 1513–1518.
[122] J. Rautschek, P. Metz, Toward the synthesis OF (-)-CODEINE BY chiral auxiliary -mediated nitrone cycloaddition, Heterocycles 95 (2) (2017) 1106–1120.
[123] S. Hosztafi, et al., Synthesis of 1-Iodo-substituted codeine derivatives, Lett. Org. Chem. 15 (12) (2018) 1012–1020.
[124] J. Rautschek, A. Jager, P. Metz, Formal synthesis of (-)-Codeine by application of temporary thio derivatization, Org. Lett. 20 (3) (2018) 832–835.
[125] A. Azadbakht, A. Abbasi, Engineering an aptamer-based recognition sensor for electrochemical opium alkaloid biosensing, J. Mater. Sci. Mater. Electron. 30 (4) (2019) 3432–3442.
[126] S. Maher, S. Elliott, S. George, The analytical challenges of cyclopropylfentanyl and crotonylfentanyl: an approach for toxicological analysis, Drug Test. Anal. 10 (9) (2018) 1483–1487.
[127] J. Mallette, J. Casale, P. Hays, Characterization and differentiation of cyclopropylfentanyl from E-crotonylfentanyl, Z-crotonylfentanyl, and 3-butenylfentanyl, Sci. Justice 59 (1) (2019) 67–74.
[128] J. Maixner, et al., X-ray powder diffraction data for (S)-Deschloroketamine hydrochloride, C13H18ClNO, Powder Diffr. 32 (3) (2017) 193–195.
[129] E.A. Alves, et al., Identification of a complex mixture of opioids on krokodil street-like samples, Toxicol. Lett. 258 (2016) p. S300–S300.
[130] A.B. Escribano, et al., Orally ingestion of krokodil in Spain: report of a case, Adicciones 28 (4) (2016) 242–245.
[131] D.H.A. Florez, et al., Desomorphine (Krokodil): An overview of its chemistry, pharmacology, metabolism, toxicology and analysis, Drug Alcohol Depend. 173 (2017) 59–68.

[132] S.E. Hall, et al., Trace-level Screening of chemicals Related to clandestine desomorphine Production with ambient sampling, portable mass spectrometry, J. Chem. (2017), 8571928.
[133] J.X. Soares, et al., Street-like Synthesis of krokodil Results in the Formation of an enlarged Cluster of Known and new morphinans, Chem. Res. Toxicol. 30 (8) (2017) 1609–1621.
[134] J. Winborn, S. Kerrigan, Desomorphine screening using commercial enzyme-linked immunosorbent assays, J. Anal. Toxicol. 41 (5) (2017) 455–460.
[135] F. Aman-Pommier, G. Degobert, C. Jallut, Solubility of diazepam in water plus tert-butyl alcohol solvent mixtures: Part 1. Experimental data and thermodynamic analysis, Fluid Phase Equil. 408 (2016) 284–298.
[136] M. Dehghanzade, E. Alipour, Voltammetric determination of diazepam using a bismuth modified pencil graphite electrode, Anal. Methods 8 (9) (2016) 1995–2004.
[137] G. Famiglini, et al., Liquid chromatography-electron ionization tandem mass spectrometry with the Direct-EI interface in the fast determination of diazepam and flunitrazepam in alcoholic beverages, Electrophoresis 37 (7–8) (2016) 1048–1054.
[138] A.A. Pebdani, et al., Preconcentration and determination of chlordiazepoxide and diazepam drugs using dispersive nanomaterial-ultrasound assisted microextraction method followed by high performance liquid chromatography, J. Chromatograp. B-Anal. Technol. Biomed. Life Sci. 1008 (2016) 146–155.
[139] M. De Luca, et al., A single MCR-ALS model for drug analysis in different formulations: Application on diazepam commercial preparations, J. Pharmaceut. Biomed. Anal. 134 (2017) 346–351.
[140] S.Q.G.W. Han, et al., Rapid detection of diazepam injection based on surface enhanced Raman spectroscopy, Anal. Sci. 33 (7) (2017) 789–792.
[141] X.B. Li, et al., Preferential solvation of diazepam in some aqueous co-solvent mixtures, J. Chem. Thermodyn. 112 (2017) 59–67.
[142] A.P.S. Matos, et al., Compatibility study between diazepam and tablet excipients, J. Therm. Anal. Calorim. 127 (2) (2017) 1675–1682.
[143] J. Narang, et al., Lab on paper chip integrated with Si@GNRs for electroanalysis of diazepam, Anal. Chim. Acta 980 (2017) 50–57.
[144] M. Rahimi-Nasrabadi, A. Khoshroo, M. Mazloum-Ardakani, Electrochemical determination of diazepam in real samples based on fullerene-functionalized carbon nanotubes/ionic liquid nanocomposite, Sensor. Actuator. B Chem. 240 (2017) 125–131.
[145] N. Xu, et al., Pretreatment-free detection of diazepam in beverages based on a thermometric biosensor, Sensor. Actuator. B Chem. 241 (2017) 504–512.
[146] V. Antunovic, et al., Development of a flow injection system for differential pulse amperometry and its application for diazepam determination, Journal of Analytical Methods in Chemistry (2018), 6121489.
[147] S. Chakraborty, et al., Stability-indicating UV/vis spectrophotometric Method for diazepam, Development and validation, Indian J. Pharmaceut. Sci. 80 (2) (2018) 366–373.
[148] C. Nunes, V. dos Anjos, S. Quinaia, Determination of diazepam and clonazepam in natural water - a voltammetric study, Electroanalysis 30 (1) (2018) 109–118.
[149] V. Prakash, et al., Graphene oxide/lysine composite - a potent electron mediator for detection of diazepam, Anal. Methods 10 (41) (2018) 5038–5046.
[150] X. Zhang, et al., Determination of emerging chlorinated byproducts of diazepam in drinking water, Chemosphere 218 (2019) 223–231.
[151] V. Coopman, et al., A case of acute intoxication due to combined use of fentanyl and 3,4-dichloro-N-[2-(dimethylamino)cyclohexyl]-N-methylbenzamide (U-47700), Forensic Sci. Int. 266 (2016) 68–72.
[152] K. Domanski, et al., U-47700, a synthetic opioid obtained online, Clin. Toxicol. 54 (8) (2016), p. 715–715.
[153] P. Nikolaou, et al., U-47700. An old opioid becomes a recent danger, Forensic Toxicol. 35 (1) (2017) 11–19.
[154] K.A. Rambaran, et al., U-47700: a clinical Review of the literature, J. Emerg. Med. 53 (4) (2017) 509–519.
[155] J.W. Li, et al., Formulation and development of ternary hybrid matrix tablets of diltiazem hydrochloride, Powder Technol. 294 (2016) 66–70.
[156] M.A.C.E. Souza, et al., In vitro dissolution profiles of two diltiazem tablet formulations and a compounded capsule formulation: a comparative study, Dissolution Technol. 24 (2) (2017) 38–42.
[157] M.A.C.E. Souza, et al., Development and validation of a stability indicating HPLC method to determine diltiazem hydrochloride in tablets and compounded capsules, Braz. J. Pharm. Sci. (3) (2017) 53.
[158] C. Salamanca-Neto, et al., In-house validation of a totally aqueous voltammetric method for determination of diltiazem hydrochloride, J. Electroanal. Chem. 837 (2019) 159–166.
[159] B. Loi, et al., 4,4-Dimethylaminorex ("4,4-DMAR"; "Serotoni") misuse: a Web-based study, Hum. Psychopharmacol. Clin. Exp. (3) (2017) 32.
[160] J. Lucchetti, et al., A validated, sensitive HPLC-MS/MS method for quantification of cis-para-methyl-4-methylaminorex (cis-4,4'-DMAR) in rat and human plasma: application to pharmacokinetic studies in rats, Drug Test. Anal. 9 (6) (2017) 870–879.
[161] M. Dunn, Have prohibition policies made the wrong decision? A critical review of studies investigating the effects of DMAA, Int. J. Drug Pol. 40 (2017) 26–34.
[162] S. Barker, N, N-dimethyltryptamine (DMT), an endogenous hallucinogen: past, present, and future Research to determine its Role and function, Front. Neurosci. (2018) 12.
[163] S.Y. Liu, et al., Determination and correlation of solubility and thermodynamic properties of eszopiclone in pure and mixed solvents, J. Mol. Liq. 221 (2016) 1035–1044.
[164] S. Kori, et al., Cloud point extraction coupled with microwave-assisted back-extraction (CPE-MABE) for determination of Eszopiclone (Z-drug) using UV-Visible, HPLC and mass spectroscopic (MS) techniques: spiked and in vivo analysis, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1074 (2018) 129–138.
[165] C.R. Maheux, et al., Identification of polymorphism in ethylone hydrochloride: synthesis and characterization, Drug Test. Anal. 8 (8) (2016) 847–857.
[166] G.L. Scheel, et al., Feasibility study of ethylone determination in seized samples using boron-doped diamond electrode associated with solid phase extraction, Sensor. Actuator. B Chem. 259 (2018) 1113–1122.
[167] A.T. Caspar, et al., LC-high resolution-MS/MS for identification of 69 metabolites of the new psychoactive substance 1-(4-ethylphenyl-)-N-[(2-methoxyphenyl)methyl] propane-2-amine (4-EA-NBOMe) in rat urine and human liver S9 incubates and comparison of its screening power with further MS techniques, Anal. Bioanal. Chem. 410 (3) (2018) 897–912.
[168] M. Katselou, et al., Fenethylline (captagon) abuse - local Problems from an old drug become universal, Basic Clin. Pharmacol. Toxicol. 119 (2) (2016) 133–140.
[169] E. Vitale, J. Banoub, R. Caprioli, Prospect for the detection of the jihadists drug catagon in waste water, Mol. Technol. Detection Chem. Biol. Agents (2017) 283–287.
[170] B.P. Mayer, et al., Chemical attribution of fentanyl using multivariate statistical analysis of orthogonal mass spectral data, Anal. Chem. 88 (8) (2016) 4303–4310.
[171] T.C. Green, M. Gilbert, Counterfeit medications and fentanyl, JAMA Intern. Med. 176 (10) (2016) 1555–1557.
[172] M. Backberg, et al., Emergence of fentanyls on the Swedish novel psychoactive substance market: analytically confirmed intoxications from the STRIDA project, Clin. Toxicol. 55 (5) (2017), p. 417–417.
[173] M.J. Barratt, et al., Establishing a surveillance study for early detection of fentanyl-laced heroin in Australia, Drug Alcohol Rev. 36 (2017), p. 20–20.
[174] L. Beletsky, C.S. Davis, Today's fentanyl crisis: prohibition's Iron Law, revisited, Int. J. Drug Pol. 46 (2017) 156–159.
[175] A. Bennett, et al., Source attribution of fentanyl through impurity and stable isotope and trace element profiling, Abstr. Pap. Am. Chem. Soc. (2017) 253.
[176] J. Casale, J. Mallette, Signature profiling of illicit fentanyl and fentanyl-related seizures for tactical and strategic intelligence, Abstr. Pap. Am. Chem. Soc. (2017) 253.
[177] M. Fogarty, D. Papsun, B. Logan, Analysis of fentanyl and 18 novel fentanyl analogs and metabolites by LC-MS-MS, and report of fatalities associated with methoxyacetylfentanyl and cyclopropylfentanyl, J. Anal. Toxicol. 42 (9) (2018) 592–604.
[178] K. Kuczynska, et al., Abuse of fentanyl: An emerging problem to face, Forensic Sci. Int. 289 (2018) 207–214.
[179] J. Howard, J. Hornsby-Myers, Fentanyls and the safety of first responders: science and recommendations, Am. J. Ind. Med. 61 (8) (2018) 633–639.
[180] P. Armenian, et al., Fentanyl, fentanyl analogs and novel synthetic opioids: a comprehensive review, Neuropharmacology 134 (2018) 121–132.
[181] J. Duffy, et al., Differentiation of fentanyl analogues by low-field NMR spectroscopy, Anal. Chim. Acta 1049 (2019) 161–169.
[182] S. Goodchild, et al., Ionic liquid-modified disposable electrochemical sensor Strip for Analysis of fentanyl, Anal. Chem. 91 (5) (2019) 3747–3753.
[183] D. Guerrieri, et al., Validation and cross-reactivity Data for fentanyl analogs With the immunalysis fentanyl ELISA, J. Anal. Toxicol. 43 (1) (2019) 18–24.
[184] M. Lukasik-Glebocka, et al., Flubromazolam - a new life-threatening designer benzodiazepine, Clin. Toxicol. 54 (1) (2016) 66–68.
[185] Q.H. Wu, et al., Highly sensitive mass spectrometric detection of flunitrazepam using magnetic graphene framework enrichment, Anal. Methods 8 (32) (2016) 6168–6175.
[186] E.M. Ali, H.G. Edwards, The detection of flunitrazepam in beverages using portable Raman spectroscopy, Drug Test. Anal. 9 (2) (2017) 256–259.
[187] M. Rojkiewicz, et al., Identification and physicochemical characterization of 4-fluorobutyrfentanyl (1-((4-fluorophenyl)(1-phenethylpiperidin-4-yl) amino)butan-1-one, 4-FBF) in seized materials and post-mortem biological samples, Drug Test. Anal. 9 (3) (2017) 405–414.
[188] G. Grass, et al., Technical Note: simple, scalable, and sensitive protocol for retrieving Bacillus anthracis (and other live bacteria) from heroin, Forensic Sci. Int. 259 (2016) 32–35.
[189] F. Anwar, et al., Use of nicotinamide as an internal standard for gas chromatographic quantitation of heroin in illicit forensic drug seizures in Pakistan, Aust. J. Forensic Sci. 49 (6) (2017) 660–667.
[190] J.F. Casale, et al., Characterization and origin of the 'B' and 'C' compounds in the acid/neutral forensic signatures of heroin - products from the acylation of porphyroxine and subsequent hydrolysis, Drug Test. Anal. 9 (3) (2017) 462–469.
[191] J.S. Debord, A. Pourmand, J.R. Almirall, Discrimination of Mexican and South American heroin hcl with 87sr/86sr isotopic analysis, Forensic Sci. Int. 277 (2017), p. 80–80.
[192] J. DeBord, et al., Profiling of heroin and assignment of provenance by Sr-87/Sr-86 isotope ratio analysis, Inorg. Chim. Acta. 468 (2017) 294–299.
[193] N. Stam, et al., Determining the effective dose of street-level heroin: a new

way to consider fluctuations in heroin purity, mass and potential contribution to overdose, Forensic Sci. Int. 290 (2018) 219–226.
[194] M. Marciano, et al., Development of a method to extract opium poppy (papaver somniferum L.) DNA from heroin, Sci. Rep. (2018) 8.
[195] R. Xie, et al., Rapid determination of heroin in adulterated commercial beverage in drug transportation cases, Chin. J. Anal. Chem. 46 (10) (2018) E1880–E1886.
[196] M. Rezk, et al., Stability indicating determination of human growth hormone by novel SE-LC method, J. AOAC Int. 99 (5) (2016) 1266–1272.
[197] X.F. Qin, et al., Isoform separation and structural identification of mono-PEGylated recombinant human growth hormone (PEG-rhGH) with pH gradient chromatography, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1044 (2017) 206–213.
[198] R. Vida, et al., Availability and quality of illegitimate somatropin products obtained from the Internet, Int. J. Clin. Pharm. 39 (1) (2017) 78–87.
[199] L. Anderson, J. Tamayose, J. Garcia, Use of growth hormone, IGF-I, and insulin for anabolic purpose: pharmacological basis, methods of detection, and adverse effects, Mol. Cell. Endocrinol. 464 (C) (2018) 65–74.
[200] M. Poplawska, A. Blazewicz, Identification of a novel growth hormone releasing peptide (a glycine analogue of GHRP-2) in a seized injection vial, Drug Test. Anal. 11 (1) (2019) 162–167.
[201] S. Butler, et al., Evaluation of the relative abuse of an OROS extended-release hydromorphone HCl product: results from 3 postmarket surveillance studies, Clin. J. Pain 34 (7) (2018) 618–628.
[202] R. Jimenez-Perez, et al., Study of the electro-oxidation of a recreational drug GHB (gamma hydroxybutyric acid) on a platinum catalyst-type electrode through chronoamperometry and spectro-electrochemistry, J. Electroanal. Chem. 766 (2016) 141–146.
[203] R. Jimenez-Perez, et al., Temperature effect on the electrooxidation of gamma hydroxybutyric acid (GHB) on platinum catalyst through cyclic voltammetry, chronoamperometry, impedance spectroscopy and SERS spectroelectrochemistry, Int. J. Electrochem. Sci. 11 (12) (2016) 10473–10487.
[204] S.P. Elliott, P. Fais, Further evidence for GHB naturally occurring in common non-alcoholic beverages, Forensic Sci. Int. 277 (2017) E36–E38.
[205] M. Lamarche, S. Savard, C. Lapointe, Development of a new method for simultaneous quantitative bhb and ghb analysis by gc-ms, Forensic Sci. Int. 277 (2017), p. 257-257.
[206] W.H. Wang, et al., A long-lived iridium(III) chemosensor for the real-time detection of GHB, J. Mater. Chem. B 5 (15) (2017) 2739–2742.
[207] R. Jimenez-Perez, et al., Electrocatalytic performance enhanced of the electrooxidation of gamma-hydroxybutyric acid (GHB) and ethanol on platinum nanoparticles surface 256 (2018) 553–563. A contribution to the analytical determination of GHB in the presence of ethanol. Sensors and Actuators B-Chemical.
[208] M. Dziadosz, Isomer detection on the basis of analyte adduct formation with the components of the mobile phase and tandem mass spectrometry, Arab. J. Chem. 12 (2) (2019) 181–187.
[209] R. Hussain, M. Khan, A. Khan, Tetrahydrofuran vapour sensing by electrically conductive silver nanoparticle doped Poly-1-napthylamine-titanium(IV) sulphosalicylophosphate ion exchange nanocomposite, J. Ind. Eng. Chem. 70 (2019) 186–195.
[210] J. Liu, et al., Tetrahydrofuran (THF)-Mediated Structure of THF center dot(H2O)(n=1-10): a Computational Study on the Formation of the THF Hydrate, Crystals 2 (2019) 9.
[211] F. Krengel, et al., Quantification of anti-addictive alkaloids Ibogaine and Voacangine in in vivo- and in vitro-grown Plants of two Mexican Tabernaemontana species, Chem. Biodivers. 13 (12) (2016) 1730–1737.
[212] M. Wasko, P. Witt-Enderby, C. Surratt, DARK Classics in chemical neuroscience: ibogaine, ACS Chem. Neurosci. 9 (10) (2018) 2475–2483.
[213] M. Hermanns-Clausen, et al., Bad trip due to 25I-NBOMe: a case report from the EU project SPICE II plus, Clin. Toxicol. 55 (8) (2017) 922–924.
[214] E. Han, et al., Illegal use patterns, side effects, and analytical methods of ketamine, Forensic Sci. Int. 268 (2016) 25–34.
[215] S. Sassano-Higgins, et al., A review OF ketamine abuse and diversion, Depress. Anxiety 33 (8) (2016) 718–727.
[216] A. Argente-Garcia, et al., A passive solid sensor for in-situ colorimetric estimation of the presence of ketamine in illicit drug samples, Sensor. Actuator. B Chem. 253 (2017) 1137–1144.
[217] Y.H. Liao, Y.L. Tang, W. Hao, Ketamine and international regulations, Am. J. Drug Alcohol Abuse 43 (5) (2017) 495–504.
[218] V.K. Vashistha, J. Martens, R. Bhushan, Sensitive RP-HPLC Enantioseparation of (RS)-Ketamine via chiral derivatization Based on (S)-Levofloxacin, Chromatographia 80 (10) (2017) 1501–1508.
[219] C. Liu, et al., False positive ketamine urine immunoassay screen result induced by quetiapine: a case report, J. Formos. Med. Assoc. 116 (9) (2017) 720–722.
[220] G. Mion, A story of ketamine and psychedelics, Ann. Med.-Psychol. 175 (7) (2017) 661–664.
[221] B. Deiminiat, G.H. Rounaghi, Fabrication of a new electrochemical imprinted sensor for determination of ketamine based on modified polytyramine/sol-gel/f-MWCNTs@AuNPs nanocomposite/pencil graphite electrode, Sensor. Actuator. B Chem. 259 (2018) 133–141.
[222] E. Goktas, F. Arioz, A review of chromatographic methods for ketamine and its metabolites norketamine and dehydronorketamine, Biomed. Chromatogr. 1 (2018) 32.
[223] G. Carlos, et al., Development, validation and comparison of two stability-indicating RP-LC methods using charged aerosol and UV detectors for analysis of lisdexamfetamine dimesylate in capsules, Arab. J. Chem. 9 (2016) S1905–S1914.
[224] G. Carlos, et al., Photodegradation kinetics of lisdexamfetamine dimesylate and structure elucidation of its degradation products by LC-ESI-QTOF, Anal. Methods 10 (19) (2018) 2287–2292.
[225] K. Ward, L. Citrome, Lisdexamfetamine: chemistry, pharmacodynamics, pharmacokinetics, and clinical efficacy, safety, and tolerability in the treatment of binge eating disorder, Expet Opin. Drug Metabol. Toxicol. 14 (2) (2018) 229–238.
[226] G. Carlos, et al., Assessment of lisdexamfetamine dimesylate stability and identification of its degradation product by NMR spectroscopy, Drug Dev. Ind. Pharm. 45 (1) (2019) 139–146.
[227] S.D. Brandt, et al., Return of the lysergamides. Part I: analytical and behavioural characterization of 1-propionyl-d-lysergic acid diethylamide (1P-LSD), Drug Test. Anal. 8 (9) (2016) 891–902.
[228] S.D. Brandt, et al., Return of the lysergamides. Part II: analytical and behavioural characterization of N(6) -allyl-6-norlysergic acid diethylamide (AL-LAD) and (2'S,4'S)-lysergic acid 2,4-dimethylazetidide (LSZ), Drug Test. Anal. 9 (1) (2017) 38–50.
[229] A.E. Steuer, et al., Development and validation of an ultra-fast and sensitive microflow liquid chromatography-tandem mass spectrometry (MFLC-MS/MS) method for quantification of LSD and its metabolites in plasma and application to a controlled LSD administration study in humans, Drug Test. Anal. 9 (5) (2017) 788–797.
[230] L. Coney, et al., Genie in a blotter: a comparative study of LSD and LSD analogues' effects and user profile, Hum. Psychopharmacol. Clin. Exp. (3) (2017) 32.
[231] P.C. Dolder, M.E. Liechti, K.M. Rentsch, Development and validation of an LC-MS/MS method to quantify lysergic acid diethylamide (LSD), iso-LSD, 2-oxo-3-hydroxy-LSD, and nor-LSD and identify novel metabolites in plasma samples in a controlled clinical trial, J. Clin. Lab. Anal. (2) (2018) 32.
[232] S. Brandt, et al., Return of the lysergamides. Part IV: analytical and pharmacological characterization of lysergic acid morpholide (LSM-775), Drug Test. Anal. 10 (2) (2018) 310–322.
[233] K. Kellett, et al., Small molecule recognition of mephedrone using an anthracene molecular clip, Chem. Commun. 52 (47) (2016) 7474–7477.
[234] K.M. Mohamed, GC-MS Method for Quantification of Mephedrone in human blood sample, J. Chromatograp. Sci. 55 (8) (2017) 784–789.
[235] A.L. Rathod, S.S. Sahota, R.K. Garg, Mephedrone - an emerging drug of abuse in India, Curr. Sci. 112 (11) (2017) 2212–2218.
[236] D. Zuba, P. Adamowicz, Distinction of constitutional isomers of mephedrone by chromatographic and spectrometric methods, Aust. J. Forensic Sci. 49 (6) (2017) 637–649.
[237] I. Razavipanah, et al., A novel electrochemical imprinted sensor for ultrasensitive detection of the new psychoactive substance "Mephedrone", Biosens. Bioelectron. 119 (2018) 163–169.
[238] B. Ferreira, et al., The novel psychoactive substance 3-methylmethcathinone (3-MMC or metaphedrone): a review, Forensic Sci. Int. 295 (2019) 54–63.
[239] M.X. He, et al., Fabrication of a new fluorescent film and its superior sensing performance to N-methamphetamine in vapor phase, Sensor. Actuator. B Chem. 227 (2016) 255–262.
[240] H.J. Lee, et al., Development of visual peak selection system based on multi-ISs normalization algorithm to apply to methamphetamine impurity profiling, Forensic Sci. Int. 268 (2016) 116–122.
[241] J. McGeehan, L. Dennany, Electrochemiluminescent detection of methamphetamine and amphetamine, Forensic Sci. Int. 264 (2016) 1–6.
[242] M.V. Nair, G.M. Miskelly, Capillary microextraction: a new method for sampling methamphetamine vapour, Forensic Sci. Int. 268 (2016) 131–138.
[243] W. Pei, et al., Using Monte Carlo simulation to assess uncertainty and variability of methamphetamine use and prevalence from wastewater analysis, Int. J. Drug Pol. 36 (2016) 1–7.
[244] A. Shekari, et al., Impurity characteristics of street methamphetamine crystals seized in Tehran, Iran, J. Subst. Use 21 (5) (2016) 501–505.
[245] M. Yarbakht, M. Nikkhah, Unmodified gold nanoparticles as a colorimetric probe for visual methamphetamine detection, J. Exp. Nanosci. 11 (7) (2016) 593–601.
[246] X.N. Zhang, et al., Optimization of conditions of the electrochemical detection of methamphetamine, Chem. J. Chin. Univ.-Chin. 37 (10) (2016) 1799–1803.
[247] S. Choe, et al., Estimation of the synthetic routes of seized methamphetamines using GC-MS and multivariate analysis, Forensic Sci. Int. 259 (2016) 85–94.
[248] K. Mao, et al., G-quadruplex-hemin DNAzyme molecular beacon probe for the detection of methamphetamine, RSC Adv. 6 (67) (2016) 62754–62759.
[249] L. Ward, et al., Improved chiral separation of methamphetamine enantiomers using CSP-LC-MS-MS, J. Anal. Toxicol. 40 (4) (2016) 255–263.
[250] B. Bogun, S. Moore, H-1 and P-31 benchtop NMR of liquids and solids used in and/or produced during the manufacture of methamphetamine by the HI reduction of pseudoephedrine/ephedrine, Forensic Sci. Int. 278 (2017) 68–77.
[251] J. Brown, S. Toske, Impurity profiling of methamphetamine synthesized from clandestine methylamine, Abstr. Pap. Am. Chem. Soc. (2017) 253.

[252] K. Caldwell, Remediating interior building surfaces contaminated by methamphetamine: methods development, Abstr. Pap. Am. Chem. Soc. (2017) 254.
[253] H. Deen, et al., The first mobile application for the Australian community with evidence-based information on crystal methamphetamine, Drug Alcohol Rev. 36 (2017), p. 28-28.
[254] M.V. Nair, G.M. Miskelly, Airborne methamphetamine sampling using capillary microextraction, Forensic Sci. Int. 277 (2017), p. 199–199.
[255] H. Segawa, et al., Enantioseparation of methamphetamine by supercritical fluid chromatography with cellulose-based packed column, Forensic Sci. Int. 273 (2017) 39–44.
[256] N. Shekari, M. Vosough, K.T. Heidar, Chemometrics-assisted chromatographic fingerprinting: an illicit methamphetamine case study, J. Separ. Sci. 40 (6) (2017) 1318–1326.
[257] S.G. Toske, et al., Isolation and characterization of a newly identified impurity in methamphetamine synthesized via reductive amination of 1-phenyl-2-propanone (P2P) made from phenylacetic acid/lead (II) acetate, Drug Test. Anal. 9 (3) (2017) 453–461.
[258] J. Hassanzadeh, A. Khataee, R. Lotfi, Sensitive fluorescence and chemiluminescence procedures for methamphetamine detection based on CdS quantum dots, Microchem. J. 132 (2017) 371–377.
[259] T. Li, et al., A Simple and effective physical characteristic profiling Method for methamphetamine tablet Seized in China, J. Forensic Sci. 63 (2) (2018) 541–547.
[260] L. Li, J. Brown, S. Toske, Simultaneous detection and quantitation of organic impurities in methamphetamine by ultra-high-performance liquid chromatography-tandem mass spectrometry, a complementary technique for methamphetamine profiling, Drug Test. Anal. 10 (7) (2018) 1209–1219.
[261] E. McBride, G. Verbeck, Investigation by direct-infusion ESI-MS and GC-MS of an alleged Leuckart route-specific impurity of methamphetamine, Forensic Sci. Int. 288 (2018) 278–282.
[262] M. Rajabi, et al., Emulsification microextraction of amphetamine and methamphetamine in complex matrices using an up-to-date generation of eco-friendly and relatively hydrophobic deep eutectic solvent, J. Chromatogr. A 1576 (2018) 1–9.
[263] Z. Saberi, et al., A fluorometric aptasensor for methamphetamine based on fluorescence resonance energy transfer using cobalt oxyhydroxide nanosheets and carbon dots, Microchimica Acta (6) (2018) 185.
[264] S. Shahvandi, M. Banitaba, H. Ahmar, Development of a new pH assisted homogeneous liquid-liquid microextraction by a solvent with switchable hydrophilicity: application for GC-MS determination of methamphetamine, Talanta 184 (2018) 103–108.
[265] M. Souza, et al., The adsorption of methamphetamine on Ag nanoparticles dispersed in agarose gel - detection of methamphetamine in fingerprints by SERS, Vib. Spectrosc. 98 (2018) 152–157.
[266] F. Takahashi, et al., Electrochemiluminescence and voltammetry of tris(2,2'-bipyridine)ruthenium (II) with amphetamine-type stimulants as coreactants: an application to the discrimination of methamphetamine, Forensic Toxicol. 36 (1) (2018) 185–191.
[267] T. Zargar, T. Khayamian, M. Jafari, Aptamer-modified carbon nanomaterial based sorption coupled to paper spray ion mobility spectrometry for highly sensitive and selective determination of methamphetamine, Microchimica Acta 2 (2018) 185.
[268] C. Liu, et al., Carbon and nitrogen stable isotope analyses of ephedra plant and ephedrine samples and their application for methamphetamine profiling, J. Forensic Sci. 63 (4) (2018) 1053–1058.
[269] A. Grzechnik, et al., Enantiomeric resolution of methylamphetamine and ephedrine: does this affect the delta C-13, delta N-15, and delta H-2 stable isotope ratios of the product? Drug Test. Anal. 10 (10) (2018) 1543–1553.
[270] C. Liu, et al., The structure identification of a diphenhydramine-related impurity in methamphetamine, Drug Test. Anal. 10 (7) (2018) 1192–1197.
[271] H. Segawa, et al., Simultaneous chiral impurity analysis of methamphetamine and its precursors by supercritical fluid chromatography-tandem mass spectrometry, Forensic Toxicol. 37 (1) (2019) 145–153.
[272] J. Peng, et al., Palladium-catalyzed four-component carbonylative synthesis of 2,3-disubstituted quinazolin-4(3H)-ones: convenient methaqualone preparation, J. Catal. 365 (2018) 10–13.
[273] P.M. Nowak, et al., Simultaneous enantioseparation of methcathinone and two isomeric methylmethcathinones using capillary electrophoresis assisted by 2-hydroxyethyl-beta-cyclodextrin, Electrophoresis 39 (19) (2018) 2406–2409.
[274] Y. Zhang, et al., Development and application of the diffusive gradients in thin films technique for simultaneous measurement of methcathinone and ephedrine in surface river water, Sci. Total Environ. 618 (2018) 284–290.
[275] P. Kus, et al., Crystal structures and other properties of ephedrone (methcathinone) hydrochloride, N-acetylephedrine and N-acetylephedrone, Forensic Toxicol. 37 (1) (2019) 224–230.
[276] K. Hajkova, et al., Salting-out-assisted liquid-liquid extraction as a suitable approach for determination of methoxetamine in large sets of tissue samples. Analytical and Bioanalytical Chemistry 408 (4) (2016) 1171–1181.
[277] A. Winstock, et al., Methoxetamine: an early report on the motivations for use, effect profile and prevalence of use in a UK clubbing sample, Drug Alcohol Rev. 35 (2) (2016) 212–217.
[278] M. Zanda, et al., Methoxetamine, a novel psychoactive substance with serious adverse pharmacological effects: a review of case reports and preclinical findings, Behav. Pharmacol. 27 (6) (2016) 489–496.
[279] B. Jurasek, et al., Synthesis of methoxetamine, its metabolites and deuterium labelled analog as analytical standards and their HPLC and chiral capillary electrophoresis separation, RSC Adv. 7 (89) (2017) 56691–56696.
[280] J. Maixner, et al., X-ray powder diffraction data for methoxetamine hydrochloride, C15H22ClNO2, Powder Diffr. 32 (4) (2017) 265–267.
[281] B. Jurasek, et al., X-ray powder diffraction data for methoxmetamine hydrochloride, C14H20ClNO2, Powder Diffr. 33 (3) (2018) 242–245.
[282] G. McLaughlin, et al., Test purchase, synthesis, and characterization of 2-methoxydiphenidine (MXP) and differentiation from its meta- and para-substituted isomers, Drug Test. Anal. 8 (1) (2016) 99–110.
[283] B. Boateng, et al., Chromatographic retention behaviour, modelling and optimization of a UHPLC-UV separation of the regioisomers of the Novel Psychoactive Substance (NPS) methoxphenidine (MXP), J. Pharmaceut. Biomed. Anal. 153 (2018) 238–247.
[284] G. McLaughlin, et al., Synthesis, characterization and monoamine transporter activity of the new psychoactive substance mexedrone and its N-methoxy positional isomer, N-methoxymephedrone, Drug Test. Anal. 9 (3) (2017) 358–368.
[285] T. Colestock, et al., Syntheses, analytical and pharmacological characterizations of the "legal high' 4-[1-(3-methoxyphenyl)cyclohexyl]morpholine (3-MeO-PCMo) and analogues, Drug Test. Anal. 10 (2) (2018) 272–283.
[286] J.C. Barreiro, et al., A high-resolution magic angle spinning NMR Study of the Enantiodiscrimination of 3,4-methylenedioxymethamphetamine (MDMA) by an immobilized polysaccharide-based chiral phase, PloS One 11 (9) (2016) e0162892.
[287] M. Poetzsch, et al., Development of a high-speed MALDI-triple quadrupole mass spectrometric method for the determination of 3,4-methylenedioxymethamphetamine (MDMA) in oral fluid, Drug Test. Anal. 8 (2) (2016) 235–240.
[288] K. Tsujikawa, et al., Development of a library search-based screening system for 3,4-methylenedioxymethamphetamine in ecstasy tablets using a portable near-infrared spectrometer, J. Forensic Sci. 61 (5) (2016) 1208–1214.
[289] L. Cumba, et al., Forensic electrochemistry: simultaneous voltammetric detection of MDMA and its fatal counterpart "Dr Death" (PMA), Anal. Methods 8 (1) (2016) 142–152.
[290] C. Plummer, et al., The synthesis and characterisation of MDMA derived from a catalytic oxidation of material isolated from black pepper reveals potential route specific impurities, Sci. Justice 56 (3) (2016) 223–230.
[291] M. Spadari, et al., The current aspects of the use of ecstasy/MDMA in France, Therapie 71 (6) (2016) 553–562.
[292] K. Tsujikawa, et al., Development of a library search-based screening system for 3,4-methylenedioxymethamphetamine in ecstasy tablets using a portable near-infrared spectrometer, J. Forensic Sci. 61 (5) (2016) 1208–1214.
[293] T. Passie, U. Benzenhofer, The history of MDMA as an underground drug in the United States, 1960-1979, J. Psychoact. Drugs 48 (2) (2016) 67–75.
[294] H. Salouros, M. Collins, D. Hibbert, Assignment of batch membership of 3,4-methylenedioxy methylamphetamine hydrochloride by comparison of organic impurity profiles, Chemometr. Intell. Lab. Syst. 159 (2016) 181–186.
[295] M. Collins, et al., Identification and characterization of N-tert-butoxycarbonyl-MDMA: a new MDMA precursor, Drug Test. Anal. 9 (3) (2017) 399–404.
[296] Y. Liou, et al., Development of an on-line microextraction method for use in fiber-spray/mass spectrometry, Int. J. Mass Spectrom. 421 (2017) 178–183.
[297] B. Lozano-Torres, et al., Pseudorotaxane capped mesoporous silica nanoparticles for 3,4-methylenedioxy-methamphetamine (MDMA) detection in water, Chem. Commun. 53 (25) (2017) 3559–3562.
[298] S. Saleemi, et al., Who is "Molly'? MDMA adulterants by product name and the impact of harm-reduction services at raves, J. Psychopharmacol. 31 (8) (2017) 1056–1060.
[299] L. Dunlap, A. Andrews, D. Olson, Dark classics in chemical neuroscience: 3,4-methylenedioxymethamphetamine, ACS Chem. Neurosci. 9 (10) (2018) 2408–2427.
[300] Z. Ye, et al., Exploiting the chemical differences between Ag and Au colloids allows dramatically improved SERS detection of "non-adsorbing" molecules, Analyst 144 (2) (2019) 448–453.
[301] Y. Abiedalla, et al., GC-MS and GC-IRD studies on S cathinones: Bath salt-type aminoketone designer drugs related to MDPV, Abstr. Pap. Am. Chem. Soc. (2016) 252.
[302] A. Griffiths, M. Johnston, L. Hadley, MDPV in Queensland drivers, Aust. J. Forensic Sci. 48 (2) (2016) 222–229.
[303] Y.F. Abiedalla, et al., GC-MS, MS/MS and GC-IR Analysis of a Series of methylenedioxyphenyl-aminoketones: precursors, ring Regioisomers and side-chain Homologs of 3,4-methylenedioxypyrovalerone, J. Chromatogr. Sci. 55 (2) (2017) 99–108.
[304] P. Cohen, et al., An amphetamine isomer whose efficacy and safety in humans has never been studied, -methylphenylethylamine (BMPEA), is found in multiple dietary supplements, Drug Test. Anal. 8 (3–4) (2016) 328–333.
[305] J. Yun, et al., Monitoring of the amphetamine-like substances in dietary supplements by LC-PDA and LC-MS/MS, Food Sci. Biotechnol. 26 (5) (2017) 1185–1190.
[306] P. Kuban, et al., Micro-electromembrane extraction using multiple free liquid

membranes and acceptor solutions -Towards selective extractions of analytes based on their acid-base strength, Anal. Chim. Acta 943 (2016) 64–73.
[307] H. Nozawa, et al., Simultaneous determination of cyclic antidepressants and their related drugs and the estimation of new metabolites in human whole blood and urine by MALDI-QTOF-mass spectrometry, Forensic Toxicol. 34 (2) (2016) 244–255.
[308] E. Forss, et al., Chemometric evaluation of the combined effect of temperature, pressure, and co-solvent fractions on the chiral separation of basic pharmaceuticals using actual vs set operational conditions, J. Chromatogr. A 1499 (2017) 165–173.
[309] J. Maksic, et al., Determination of olopatadine in human tears by hydrophilic interaction liquid chromatography-MS/MS method, Bioanalysis 9 (24) (2017) 1943–1954.
[310] M. Stanescu, et al., Amino acids based chiral IONIC liquids for enantiomer separation BY capillary electrophoresis, FARMACIA 65 (1) (2017) 46–55.
[311] S. Agatonovic-Kustrin, et al., Chemical characterization of the photo-degradation products of midazolam complexes with randomly methylated-beta-cyclodextrin by HPLC and LC-MS/MS, J. Serb. Chem. Soc. 81 (9) (2016) 1037–1053.
[312] Y. Panahi, et al., High sensitive and selective nano-molecularly imprinted polymer based electrochemical sensor for midazolam drug detection in pharmaceutical formulation and human urine samples, Sensor. Actuator. B Chem. 273 (2018) 1579–1586.
[313] S. Cheraghi, M. Taher, H. Karimi-Maleh, A novel Strategy for Determination of Paracetamol in the Presence of morphine Using a carbon paste electrode Modified with CdO Nanoparticles and ionic liquids, Electroanalysis 28 (2) (2016) 366–371.
[314] S. Chu, et al., A cascade strategy Enables a total Synthesis of (+/-)-Morphine, Angew. Chem. Int. Ed. 55 (46) (2016) 14304–14307.
[315] L. Harbaugh, D. Fish, Extraction of morphine from poppy seeds, Abstr. Pap. Am. Chem. Soc. (2016) 251.
[316] M. Jafari-Nodoushan, J. Barzin, H. Mobedi, A stability-indicating HPLC method for simultaneous determination of morphine and naltrexone, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1011 (2016) 163–170.
[317] S. McAlister, et al., The Environmental footprint of morphine: a life cycle assessment from opium poppy farming to the packaged drug, Bmj Open (10) (2016) 6.
[318] G. Miolo, et al., Photostability of 6-MAM and morphine exposed to controlled UV irradiation in water and methanol solution: HRMS for the characterization of transformation products and comparison with the dry state, J. Pharmaceut. Biomed. Anal. 126 (2016) 48–59.
[319] Y. Yang, et al., Determination of morphine in pharmaceutical products by on-line solid-phase extraction and high-performance liquid chromatography, Anal. Lett. 49 (9) (2016) 1303–1309.
[320] B. Koteska, et al., Modeling the solid-state vibrational spectroscopic properties of morphine-based formulations with hybrid meta density functional theory, 17th Ieee International Conference on Smart Technologies - Ieee Eurocon 2017 Conference Proceedings (2017) 938–943.
[321] Q. Li, H. Zhang, Research progress on the synthesis of morphine alkaloids. Chinese journal of organic chemistry 37 (7) (2017) 1629–1652.
[322] A. Petkovska, et al., Impurity profiling of morphine by liquid chromatography-heated electrospray ionization mass spectrometry (LC-HESI-MS), Turk. J. Chem. 41 (6) (2017) 904–916.
[323] S. Razzaque, et al., Development of functionalized hollow microporous organic capsules encapsulating morphine - an in vitro and in vivo study, J. Mater. Chem. B 5 (4) (2017) 742–749.
[324] C. Romanuk, et al., Application of 1-Dimensional and 2-dimensional solid-state nuclear magnetic resonance Spectroscopy to the Characterization of morphine, morphine hydrochloride, and their Hydrates, J. Pharmaceut. Sci. 106 (10) (2017) 3033–3040.
[325] J. Shao, et al., A one-pot multicomponent approach to a new series of morphine derivatives and their biological evaluation, Org. Biomol. Chem. 15 (37) (2017) 7796–7801.
[326] A. Sharma, et al., Development and validation of a high-performance thin-layer chromatography-densitometry method for the quantitative estimation of morphine in the classical ayurvedic formulation kamini vidrawan ras, JPC-J. Planar Chromatogr.-Mod. Tlc 30 (3) (2017) 188–192.
[327] H. Shibuya, et al., Tandem Brook rearrangement/silicon Polonovski Reaction via oxidative Generation of ammonium ylides, J. Oleo Sci. 66 (8) (2017) 833–842.
[328] H. Umihara, et al., Total synthesis of (-)-Morphine, Chem.-A Eur. J. 23 (29) (2017) 6993–6995.
[329] J. Yadlapalli, et al., Stability studies of potent opioid analgesic, morphine-6-O-sulfate in various buffers and biological matrices by HPLC-DAD analysis, Biomed. Chromatogr. 31 (9) (2017).
[330] C. Zhang, et al., Development of quantum dots-labeled antibody fluorescence immunoassays for the detection of morphine, J. Agric. Food Chem. 65 (6) (2017) 1290–1295.
[331] H. Zhang, et al., Rapid construction of the 6/6/5 tricyclic framework via a tandem radical cyclization reaction and its application to the synthesis of 5-epi-7-deoxy-isoabietenin A, Org. Chem. Front. 4 (11) (2017) 2211–2215.
[332] [Anonymous], *Arymo ER - a new abuse deterrent morphine formulation.* Medical letter on drugs and therapeutics 59 (1519) (2017) 68–69.
[333] E. Cone, et al., The ALERRT((R)) instrument: a quantitative measure of the effort required to compromise prescription opioid abuse-deterrent tablets, Am. J. Drug Alcohol Abuse 43 (3) (2017) 291–298.
[334] M. Smith, et al., Human abuse potential of an abuse-deterrent (AD), extended-release (ER) morphine product candidate (Morphine-ADER injection-molded tablets) versus extended-release morphine administered orally in nondependent recreational opioid users, Pain Med. 18 (5) (2017) 898–907.
[335] L. Webster, et al., Human abuse potential of an abuse-deterrent (AD), extended-release (ER) morphine product candidate (Morphine-ADER injection-molded tablets) vs extended-release morphine administered intranasally in nondependent recreational opioid users, Pain Med. 18 (9) (2017) 1695–1705.
[336] K. Park, R. Chen, D. Chen, Programmed serial stereochemical relay and its application in the synthesis of morphinans, Chem. Sci. 8 (10) (2017) 7031–7037.
[337] S. Barthwal, B. Singh, N. Singh, A novel electrochemical sensor fabricated by embedding ZnO nano particles on MWCNT for morphine detection, Mater. Today-Proc. 5 (3) (2018) 9061–9066.
[338] A. Buck, S. Tartakoff, Progress towards efficient synthesis of morphine analogue using the Wagner-Jauregg reaction, Abstr. Pap. Am. Chem. Soc. (2018) 255.
[339] N. Hartrampf, et al., Total synthesis of the norhasubanan alkaloid stephadiamine, J. Am. Chem. Soc. 140 (28) (2018) 8675–8680.
[340] E.B. Maria, S.R. Fuensanta, B.O. Catalina, Determination of compatibility and stability of haloperidol and morphine mixtures used in palliative care, Braz. J. Pharm. Sci. (2) (2018) 54.
[341] M. Masteri-Farahani, K. Khademabbasi, N. Mollatayefeh, A selective morphine nanosensor derived from functionalized CdS quantum dots, Mater. Lett. 228 (2018) 68–71.
[342] J. Nebu, et al., Fluorometric determination of morphine via its effect on the quenching of fluorescein by gold nanoparticles through a surface energy transfer process, Microchimica Acta (12) (2018) 185.
[343] K. Ogasawara, et al., Characterization of absorption profile of morphine after manipulation of morphine sulfate extended-release tablets with or without abuse-deterrent properties, J. Pharmacokinet. Pharmacodyn. 45 (2018) p. S65–S65.
[344] A. Shahvar, M. Saraji, D. Shamsaei, Smartphone-based chemiluminescence sensing for TLC imaging, Sensor. Actuator. B Chem. 255 (2018) 891–894.
[345] M.D. Soltani, et al., Synthesis, characterization and application of magnetic carbon nanotubes for the simultaneous extraction and high performance liquid chromatographic determination of codeine and morphine in human urine, blood serum, opium and tablet samples, Sensor Actuator Phys. 280 (2018) 31–37.
[346] N. Wester, et al., Selective detection of morphine in the presence of paracetamol with anodically pretreated dual layer Ti/tetrahedral amorphous carbon electrodes, Electrochem. Commun. 86 (2018) 166–170.
[347] M. Masteri-Farahani, N. Mollatayefeh, Chiral colloidal CdSe quantum dots functionalized with cysteine molecules: New optical nanosensor for selective detection and measurement of morphine, Colloid. Surface. Physicochem. Eng. Aspect. 569 (2019) 78–84.
[348] M. Masteri-Farahani, N. Mosleh, Functionalization of graphene quantum dots with antimorphine: design of selective nanosensor for detection of morphine, Mater. Lett. 241 (2019) 206–209.
[349] M. Salajegheh, et al., Morphine sensing by a green modified molecularly imprinted poly L-lysine/sodium alginate-activated carbon/glassy carbon electrode based on computational design, Electroanalysis 31 (3) (2019) 468–476.
[350] T. Eisenhauer, et al., Evaluation of the tamper-resistant properties of biphasic immediate-release/extended-release oxycodone/acetaminophen tablets. Drug Development and Industrial Pharmacy 42 (1) (2016) 157–165.
[351] S. Severtson, et al., Sustained reduction of diversion and abuse after introduction of an abuse deterrent formulation of extended release oxycodone, Drug Alcohol Depend. 168 (2016) 219–229.
[352] D. Dupoiron, et al., Long-term efficacy and safety of oxycodone-naloxone prolonged-release formulation (up to 180/90 mg daily) - results of the open-label extension phase of a phase III multicenter, multiple-dose, randomized, controlled study, Eur. J. Pain 21 (9) (2017) 1485–1494.
[353] S. Fukui, et al., Design and evaluation of an extended-release matrix tablet formulation; the combination of hypromellose acetate succinate and hydroxypropylcellulose, Asian J. Pharm. Sci. 12 (2) (2017) 149–156.
[354] E. Kopecky, et al., Oral human abuse potential of oxycodone DETERx (R) (xtampza (R) ER), J. Clin. Pharmacol. 57 (4) (2017) 500–512.
[355] B. Parodi, et al., Development and characterization of a mucoadhesive sublingual formulation for pain control: extemporaneous oxycodone films in personalized therapy, Drug Dev. Ind. Pharm. 43 (6) (2017) 917–924.
[356] B. Scheidel, et al., Bioavailability of oxycodone after administration of a new prolonged-release once-daily tablet formulation in healthy subjects, in comparison to an established twice-daily tablet, Int. J. Clin. Pharm. Ther. 55 (11) (2017) 881–890.
[357] [Anonymous], Roxybond - an abuse-deterrent formulation of immediate-release oxycodone, Med. Lett. Drugs Ther. 60 (1555) (2018) 145–146.
[358] A. Alpert, D. Powell, R. Pacula, Supply-side drug Policy in the Presence of substitutes: Evidence from the Introduction of abuse-deterrent opioids, Am. Econ. J. Econ. Pol. 10 (4) (2018) 1–35.
[359] T. Gomes, et al., Trends and uptake of new formulations of controlled-release oxycodone in Canada, Pharmacoepidemiol. Drug Saf. 27 (5) (2018) 520–525.

[360] A. Kibbe, T. Franko, V. Shah, Oxycodone hydrochloride immediate-release analgesic for managing severe pain: abuse-deterrent formulations, Therapeut. Clin. Risk Manag. 14 (2018) 779–782.
[361] M. Jauncey, et al., The impact of OxyContin reformulation at the sydney medically supervised injecting centre: pros and cons, Int. J. Drug Pol. 53 (2018) 17–22.
[362] B. Larance, et al., The effect of a potentially tamper-resistant oxycodone formulation on opioid use and harm: main findings of the National Opioid Medications Abuse Deterrence (NOMAD) study, Lancet Psychiatr. 5 (2) (2018) 155–166.
[363] J. Markman, et al., Analgesic efficacy, safety, and tolerability of a long- acting abuse-deterrent formulation of oxycodone for moderate-to-severe chronic low back pain in subjects successfully switched from immediate- release oxycodone, J. Pain Res. 11 (2018) 2051–2059.
[364] K. Park, D. Chen, A desymmetrization-based approach to morphinans: application in the total synthesis of oxycodone, Chem. Commun. 54 (92) (2018) 13018–13021.
[365] L. Webster, et al., Human abuse potential of the new opioid analgesic molecule NKTR-181 compared with oxycodone, Pain Med. 19 (2) (2018) 307–318.
[366] A. Lipp, et al., Total synthesis of (-)-Oxycodone via anodic aryl-aryl coupling, Org. Lett. 21 (6) (2019) 1828–1831.
[367] W. Lim, et al., Detection of phenazepam in illicitly manufactured Erimin 5 tablets, Drug Test. Anal. 9 (2) (2017) 293–305.
[368] A. Ahmadi, et al., Synthesis and antinociception properties of phencyclidine derivatives with modified aromatic or cycloalkyl rings and amino group, Monatshefte Fur Chemie 147 (2) (2016) 457–464.
[369] A. Ahmadi, et al., Synthesis and antinociception activities of some novel derivatives of phencyclidine with substituted aminobenzothiazoles, Mini Rev. Med. Chem. 17 (1) (2017) 78–84.
[370] J. Bertron, M. Seto, C. Lindsley, DARK Classics in chemical neuroscience: phencyclidine (PCP), ACS Chem. Neurosci. 9 (10) (2018) 2459–2474.
[371] K. Figueiredo, et al., Phenobarbital loaded microemulsion: development, kinetic release and quality control, Braz. J. Pharm. Sci. 52 (2) (2016) 251–263.
[372] T. Gelbrich, D. Braun, U. Griesser, Specific energy contributions from competing hydrogen-bonded structures in six polymorphs of phenobarbital, Chem. Cent. J. (2016) 10.
[373] A. Pebdani, et al., Application of Ni:ZnS nanoparticles loaded on magnetic multi-walled carbon nanotubes as a sorbent for dispersive micro-solid phase extraction of phenobarbital and phenytoin prior to HPLC analysis: experimental design, RSC Adv. 6 (92) (2016) 89250–89258.
[374] M. Baghayeri, Pt nanoparticles/reduced graphene oxide nanosheets as a sensing platform: Application to determination of droxidopa in presence of phenobarbital, Sensor. Actuator. B Chem. 240 (2017) 255–263.
[375] F. Martinez, A. Jouyban, W. Acree, Solubility of phenobarbital in aqueous cosolvent mixtures revisited: IKBI preferential solvation analysis, Phys. Chem. Liq. 55 (4) (2017) 432–443.
[376] A. Sahmi, K. Bensadok, M. Trari, Photoelectrochemical properties of CaWO4 synthetized by chemical route. Application to the phenobarbital electrophotocatalysis, J. Photochem. Photobiol. A-Chem. 349 (2017) 36–41.
[377] L. Bao, et al., Quantitative detection of phenobarbital in an injectable solution based on surface-enhanced Raman spectroscopy, Spectroscopy 33 (10) (2018) 40–45.
[378] A. Pebdani, et al., Modified dispersive liquid-phase microextraction based on sequential injection solidified floating organic drop combined with HPLC for the determination of phenobarbital and phenytoin, J. Separ. Sci. 41 (2) (2018) 509–517.
[379] R. Shariati, et al., Application of coated green source carbon dots with silica molecularly imprinted polymers as a fluorescence probe for selective and sensitive determination of phenobarbital, Talanta 194 (2019) 143–149.
[380] M. Beigi, et al., Regio- and stereoselective aliphatic-aromatic cross-benzoin reaction: enzymatic divergent catalysis, Chem.-A Eur. J. 22 (39) (2016) 13999–14005.
[381] M. Doostmohammadi, et al., L-phenylacetylcarbinol production by yeast petite mutants, Ann. Microbiol. 66 (3) (2016) 1049–1055.
[382] S. Bruder, E. Boles, Improvement of the yeast based (R)-phenylacetylcarbinol production process via reduction of by-product formation, Biochem. Eng. J. 120 (2017) 103–112.
[383] H. Li, et al., An improved enzymatic method for the preparation of (R)-phenylacetyl carbinol, RSC Adv. 7 (52) (2017) 32664–32668.
[384] T. Sehl, et al., Asymmetric synthesis of (S)-phenylacetylcarbinol - closing a gap in C-C bond formation, Green Chem. 19 (2) (2017) 380–384.
[385] C. Andreu, M. del Olmo, Biotransformation using halotolerant yeast in seawater: a sustainable strategy to produce R-(-)-phenylacetylcarbinol, Appl. Microbiol. Biotechnol. 102 (11) (2018) 4717–4727.
[386] J. Khemacheewakul, et al., Development of mathematical model for pyruvate decarboxylase deactivation kinetics by benzaldehyde with inorganic phosphate activation effect, Chiang Mai J. Sci. 45 (3) (2018) 1426–1438.
[387] Y. Lee, et al., Stereoselective synthesis of (1R, 2S)-norephedrine by recombinant whole-cell biocatalysts coupling acetohydroxyacid synthase I and omega-transaminase, Process Biochem. 73 (2018) 74–81.
[388] P. Mahendran, et al., Synthesis of novel beta-amino alcohols from phenylacetylcarbinol: cytotoxicity activity against A549 cells and molecular docking, Res. Chem. Intermed. 44 (1) (2018) 535–552.
[389] R. Nunta, et al., Ethanol and phenylacetylcarbinol production processes of Candida tropicalis TISTR 5306 and Saccharomyces cerevisiae TISTR 5606 in fresh juices from longan fruit of various sizes, J. Food Process. Preserv. (11) (2018) 42.
[390] V. Bodai, et al., Wickerhamomyces subpelliculosus as whole-cell biocatalyst for stereoselective bioreduction of ketones, J. Mol. Catal. B Enzym. 134 (2016) 206–214.
[391] M. Krzek, et al., Covalent immobilization of a flavoprotein monooxygenase via its flavin cofactor, Enzym. Microb. Technol. 82 (2016) 138–143.
[392] A. Carvalho, et al., Catalytic mechanism of phenylacetone monooxygenases for non-native linear substrates, Phys. Chem. Chem. Phys. 19 (39) (2017) 26851–26861.
[393] A. Carvalho, et al., Spatial requirement for PAMO for transformation of non-native linear substrates, Phys. Chem. Chem. Phys. 20 (4) (2018) 2558–2570.
[394] L. Chennuru, et al., Direct separation of pregabalin enantiomers using a zwitterionic chiral selector by high performance liquid chromatography coupled to mass spectrometry and ultraviolet detection, Molecules 21 (11) (2016).
[395] D. Driot, et al., Pregabalin abuse in France: results of a national retrospective and comparative cohort study, Fund. Clin. Pharmacol. 30 (2016), p. 40–40.
[396] N. Kanwar, et al., Preparation and evaluation of floating tablets of pregabalin, Drug Dev. Ind. Pharm. 42 (4) (2016) 654–660.
[397] F. Mohamed, et al., The use of separation techniques in the analysis of some antiepileptic drugs: a critical review, J. Liq. Chromatogr. Relat. Technol. 39 (17–18) (2016) 783–798.
[398] O. Schjerning, et al., Use of pregabalin - a nationwide pharmacoepidemiological drug utilization study with focus on abuse potential, Pharmacopsychiatry 49 (4) (2016) 155–161.
[399] O. Schjerning, et al., Abuse potential of pregabalin, CNS Drugs 30 (1) (2016) 9–25.
[400] N. Yoshikawa, et al., A validated fluorometric Method for the rapid Determination of Pregabalin in human plasma Applied to patients with pain, Ther. Drug Monit. 38 (5) (2016) 628–633.
[401] R. Zheng, et al., Enhanced activity of Thermomyces lanuginosus lipase by site-saturation mutagenesis for efficient biosynthesis of chiral intermediate of pregabalin, Biochem. Eng. J. 113 (2016) 12–18.
[402] M. Buttram, et al., Law enforcement-derived data on gabapentin diversion and misuse, 2002-2015: diversion rates and qualitative research findings, Pharmacoepidemiol. Drug Saf. 26 (9) (2017) 1083–1086.
[403] K. Evoy, M. Morrison, S. Saklad, Abuse and misuse of pregabalin and gabapentin, Drugs 77 (4) (2017) 403–426.
[404] C. Hoyte, S. Banerji, A. Bronstein, Pregabalin misuse and abuse reported to US Poison Centers, Clin. Toxicol. 55 (5) (2017) 450–451.
[405] H. Ishitani, et al., Synthesis of (+/-)-Pregabalin by Utilizing a three-step sequential-flow System with heterogeneous catalysts, European journal of organic chemistry (44) (2017) 6491–6494.
[406] B. Snellgrove, T. Steinert, S. Jaeger, Pregabalin use among users of illicit drugs: a cross-sectional survey in southern Germany, CNS Drugs 31 (10) (2017) 891–898.
[407] B. Stacey, et al., A systematic review of the effectiveness of policies restricting access to pregabalin, BMC Health Serv. Res. (2017) 17.
[408] N. Zellner, F. Eyer, T. Zellner, Alarming pregabalin abuse in Munich: prevalence, patterns of use and complications, deutsche medizinische wochenschrift 142 (19) (2017) E140–E147.
[409] N. Zellner, F. Eyer, T. Zellner, Pregabalin abuse in Munich: an increasing problem, Clin. Toxicol. 55 (5) (2017) 463–464.
[410] A. Al-Husseini, M. Van Hout, M. Wazaify, Pregabalin misuse and abuse: a scoping review of extant literature, J. Drug Issues 48 (3) (2018) 356–376.
[411] M. Asghar, et al., Formulation of pregabalin controlled-release tablets: influence of some lipid-based matrix systems on the release rate, Lat. Am. J. Pharm. 37 (11) (2018) 2326–2332.
[412] M. Asghar, et al., Design and optimization of pregabalin conventional release formulations using central composite design and response surface methodology, Lat. Am. J. Pharm. 37 (6) (2018) 1173–1181.
[413] S. Kim, et al., Preparation and evaluation of non-effervescent gastroretentive tablets containing pregabalin for once-daily administration and dose proportional pharmacokinetics, Int. J. Pharm. 550 (1–2) (2018) 160–169.
[414] K. Ponnusamy, et al., A novel Method for the Synthesis of racemic pregabalin, Baclofen and 3-phenibut involving lossen rearrangement, Indian J. Heterocycl. Chem. 28 (2) (2018) 275–278.
[415] A. Sason, et al., Pregabalin misuse in methadone maintenance treatment patients in Israel: prevalence and risk factors, Drug Alcohol Depend. 189 (2018) 8–11.
[416] W. Abu Dayyih, et al., Establishment and validation of a sensitive method for the detection of pregabalin in pharmacological formulation by GC/MS spectrometry, Curr. Pharmaceut. Anal. 15 (2) (2019) 165–171.
[417] L. Li, Y. Li, Study of azo-coupling derivatization by sequential injection coupled with spectrophotometric optical fibre detection for propofol analysis, Anal. Methods 8 (32) (2016) 6176–6184.
[418] A. Maas, et al., 1,2-Dimethylimidazole-4-sulfonyl chloride (DMISC), a novel derivatization strategy for the analysis of propofol by LC-ESI-MS/MS, Anal. Bioanal. Chem. 409 (6) (2017) 1547–1554.
[419] C. Maier, et al., Deaths from propofol abuse survey of institutes of forensic medicine in Germany, Austria and Switzerland, Anaesthesist 66 (2) (2017) 109–114.

[420] A. Maas, et al., Propofol-dependence potential and forensic relevance, Rechtsmedizin 28 (5) (2018) 453–467.
[421] F. Stradolini, et al., Long-term monitoring of propofol and fouling effect on pencil graphite electrodes, Electroanalysis 30 (7) (2018) 1363–1369.
[422] F. Stradolini, et al., Raspberry-Pi based system for propofol monitoring, Integ.-Vlsi J. 63 (2018) 213–219.
[423] M. Dziadosz, The study and application of analyte adduct based ionisation of propofol in the analysis with liquid chromatography-tandem mass spectrometry, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1114 (2019) 1–4.
[424] M. Katselou, et al., alpha-PVP ("flakka'): a new synthetic cathinone invades the drug arena, Forensic Toxicol. 34 (1) (2016) 41–50.
[425] K. Sugie, M. Akutsu, K. Saito, Quantitative analysis of NPS (new psychoactive substance) containing alpha-PVP by direct analysis in real time (DART)-TOF-MS with micro syringe injection, Bunseki Kagaku 65 (8) (2016) 439–446.
[426] B. Byrska, R. Stanaszek, D. Zuba, Alpha-PVP as an active component of herbal highs in Poland between 2013 and 2015, Drug Test. Anal. 9 (8) (2017) 1267–1274.
[427] E. Richman, et al., Alpha-pyrrolidinopentiophenone ('Flakka') catalyzing catatonia: a case Report and literature review, J. Addiction Med. 12 (4) (2018) 336–338.
[428] L. Nobrega, R. Dinis-Oliveira, The synthetic cathinone -pyrrolidinovalerophenone (-PVP): pharmacokinetic and pharmacodynamic clinical and forensic aspects, Drug Metabol. Rev. 50 (2) (2018) 125–139.
[429] J. Palamar, C. Rutherford, K. Keyes, Flakka" use among high school seniors in the United States, Drug Alcohol Depend. 196 (2019) 86–90.
[430] T. Kolesnikova, et al., DARK Classics in chemical neuroscience: alpha-pyrrolidinovalerophenone ("Flakka"), ACS Chem. Neurosci. 10 (1) (2019) 168–174.
[431] S. Kummer, et al., Abuse of the over-the-counter antispasmodic butylscopolamine for the home synthesis of psychoactive scopolamine, Eur. J. Pediatr. 175 (7) (2016) 1019–1021.
[432] F. Bagheri, et al., FRET-based nanobiosensor for detection of scopolamine in hairy root extraction of Atropa belladonna, Talanta 164 (2017) 593–600.
[433] L. Bao, et al., Detection of scopolamine hydrobromide via surface-enhanced Raman spectroscopy, Anal. Sci. 33 (11) (2017) 1237–1240.
[434] H. Chen, et al., Simultaneous determination of atropine and scopolamine in buckwheat and related products using modified QuEChERS and liquid chromatography tandem mass spectrometry, Food Chem. 218 (2017) 173–180.
[435] M. Cirlini, et al., Are tropane alkaloids present in organic foods? Detection of scopolamine and atropine in organic buckwheat (Fagopyron esculentum L.) products by UHPLC-MS/MS, Food Chem. 239 (2018) 141–147.
[436] L. Fernandez-Lopez, et al., Improving detection window of scopolamine, Forensic Sci. Int. 287 (2018). E101E10.
[437] R. Rudyk, et al., Structural, FT-IR, FT-Raman and ECD studies on the free base, cationic and hydrobromide species of scopolamine alkaloid, J. Mol. Struct. 1180 (2019) 603–617.
[438] M. Ashraf, et al., Phytochemical investigation of Hyoscyamus albus, Pak. J. Pharm. Sci. 32 (2) (2019) 661–667.
[439] S. Cheng, et al., Simple interface for scanning chemical compounds on developed thin layer chromatography plates using electrospray ionization mass spectrometry, Anal. Chim. Acta 1049 (2019) 1–9.
[440] T. Oliveira, et al., Electrochemical portable method for on site screening of scopolamine in beverage and urine samples, Electroanalysis 31 (3) (2019) 567–574.
[441] W. Zheng, et al., A modified QuEChERS method coupled with liquid chromatography-tandem mass spectrometry for the simultaneous detection and quantification of scopolamine, L-hyoscyamine, and sparteine residues in animal-derived food products, J. Adv. Res. 15 (2019) 95–102.
[442] Y. Guo, et al., A kinetic spectrofluorometric method, aided by chemometrics, for the analysis of sibutramine, indapamide and hydrochlorothiazide compounds found in weight-reducing tonic samples, Anal. Methods 8 (1) (2016) 197–204.
[443] G. Hancu, et al., Enantiomeric separation of sibutramine by capillary zone electrophoresis, J. Braz. Chem. Soc. 27 (6) (2016) 1116–1120.
[444] A. Krivohlavek, et al., Sibutramine in slimming food supplements on the Croatian market determined by validated high-pressure liquid chromatography-electrospray tandem mass spectrometry method, J. Food Nutr. Res. 55 (3) (2016) 222–228.
[445] F. Rosa, P. Negrier, P. Espeau, Racemic compound and conglomerate of anhydrous sibutramine hydrochloride: a rare case of relative stability, CrystEngComm 18 (36) (2016) 6903–6907.
[446] F. van Hunsel, et al., A 'natural' weight loss product containing sibutramine, Drug Test. Anal. 8 (3–4) (2016) 311–314.
[447] D. Wang, et al., Detection of sibutramine and phenolphthalein in functional foods using capillary electrophoresis, Anal. Methods 8 (3) (2016) 621–626.
[448] N. Cebi, M. Yilmaz, O. Sagdic, A rapid ATR-FTIR spectroscopic method for detection of sibutramine adulteration in tea and coffee based on hierarchical cluster and principal component analyses, Food Chem. 229 (2017) 517–526.
[449] A. Lanzarotta, et al., Simultaneous orthogonal drug detection using fully integrated gas chromatography with fourier transform infrared detection and mass spectrometric detection, Appl. Spectrosc. 71 (5) (2017) 1050–1059.
[450] L. Ouyang, et al., Rapid surface enhanced Raman scattering (SERS) detection of sibutramine hydrochloride in pharmaceutical capsules with a -cyclodextrin- Ag/polyvivnyl alcohol hydrogel substrate, Sensors (7) (2017) 17.
[451] A. Lanzarotta, et al., Forensic drug identification, confirmation, and quantification using fully integrated gas Chromatography with fourier transform Infrared and mass spectrometric detection (GC-FT-IR-MS), Appl. Spectrosc. 72 (5) (2018) 750–756.
[452] J. Yun, et al., Isolation and structural characterization of a novel sibutramine analogue, chlorosipentramine, in a slimming dietary supplement, by using HPLC-PDA, LC-Q-TOF/MS, FT-IR, and NMR, Forensic Sci. Int. 286 (2018) 199–207.
[453] L. Zhang, et al., Detection and verification of sibutramine adulterated in herbal slimming supplements using electrospray ionization mass spectrometry, Bull. Kor. Chem. Soc. 39 (4) (2018) 504–511.
[454] S. de Freitas, et al., Microwave-assisted extraction and differential scanning calorimetry in the chemical identification of sliming agents apprehended in the south region of Brazil, Sci. Justice 59 (2) (2019) 190–198.
[455] J. Freitas, et al., A simple and fast-portable method for the screening of the appetite-suppressant drug sibutramine in natural products and multivitamins supplements, Sensor. Actuator. B Chem. 282 (2019) 449–456.
[456] R. Dart, et al., Diversion and illicit sale of extended release tapentadol in the United States, Pain Med. 17 (8) (2016) 1490–1496.
[457] W. Sweileh, et al., Worldwide research productivity on tramadol: a bibliometric analysis, SpringerPlus (2016) 5.
[458] J. Xiao, et al., Efficacy and safety of tapentadol immediate release assessment in treatment of moderate to severe pain: a systematic review and meta-analysis, Pain Med. 18 (1) (2017) 14–24.
[459] P. Graczyk, O. Zbrojkiewicz, S. Nerdinger, Evolution of synthetic routes towards homochiral Tapentadol, Tetrahedron Asymmetry 28 (3) (2017) 387–400.
[460] B. Lange, et al., Efficacy and safety of tapentadol prolonged release formulation in the treatment of elderly patients with moderate-to-severe chronic osteoarthritis knee pain: a pooled analysis of two double-blind, randomized, placebo-, and active-controlled trials, Curr. Med. Res. Opin. 34 (12) (2018) 2113–2123.
[461] S. Vosburg, et al., Assessment of tapentadol API abuse liability with the researched abuse, diversion and addiction-related surveillance system, J. Pain 19 (4) (2018) 439–453.
[462] A. Basu, et al., Is tapentadol a potential Trojan horse in the post-dextropropoxyphene era in India? Indian J. Pharmacol. 50 (1) (2018) 44–46.
[463] E. Partridge, et al., The increasing use and abuse of tapentadol and its incorporation into a validated quantitative method, J. Anal. Toxicol. 42 (7) (2018) 485–490.
[464] S. Omkar, C. Komal, M. Priti, Identification and structural characterization of major degradation products of tapentadol by using liquid chromatography-tandem mass spectrometry, J. Liq. Chromatogr. Relat. Technol. 39 (12) (2016) 558–567.
[465] M. El-Shal, et al., Application of nano graphene-modified electrode as an electrochemical sensor for determination of tapentadol in the presence of paracetamol, J. Iran. Chem. Soc. 16 (5) (2019) 1123–1130.
[466] P. Gaztanaga, et al., Thermal, spectroscopic and structural analysis of a thermosalient phase transformation in tapentadol hydrochloride, Acta Crystallogr. Sec. B-Struct. Sci. Crystal Eng. Mater. (2019) 75.
[467] J. Chang, et al., NMR investigation of magnesium chelation and cation-induced signal shift effect of testosterone, Steroids 115 (2016) 18–25.
[468] P. Kozlik, B. Tircova, Development of the fast, simple and fully validated high performance liquid chromatographic method with diode array detector for quantification of testosterone esters in an oil-based injectable dosage form, Steroids 115 (2016) 34–39.
[469] J. McBride, et al., The ubiquitous availability and easy acquisition OF illicit anabolic androgenic steroids and testosterone preparations ON the internet, J. Sex. Med. 13 (5) (2016) p. S62–S62.
[470] S. El Fellah, G. Duporte, H. Siren, *Steroid hormones, inorganic ions and botrydial in drinking water*. Determination with capillary electrophoresis and liquid chromatography-orbitrap high resolution mass spectrometry, Microchem. J. 133 (2017) 126–136.
[471] M. Jurasek, et al., Highly sensitive avidin-biotin ELISA for detection of nandrolone and testosterone in dietary supplements, Drug Test. Anal. 9 (4) (2017) 553–560.
[472] W. Liu, et al., Molecularly imprinted polymers on graphene oxide surface for EIS sensing of testosterone, Biosens. Bioelectron. 92 (2017) 305–312.
[473] S. Musharraf, et al., Stability-indicating TLC-densitometric Assay for Methyltestosterone and quantum chemical calculations, J. Chromatogr. Sci. 55 (9) (2017) 954–960.
[474] T. Omar, et al., An improved SPE-LC-MS/MS method for multiclass endocrine disrupting compound determination in tropical estuarine sediments, Talanta 173 (2017) 51–59.
[475] H. Zhang, et al., Quantitative determination of testosterone levels with biolayer interferometry, Chem. Biol. Interact. 276 (2017) 141–148.
[476] R. Appa, et al., Simultaneous quantitative monitoring of four indicator contaminants of emerging concern (CEC) in different water sources of Central India using SPE/LC-(ESI)MS-MS, Environ. Monit. Assess. (8) (2018) 190.
[477] A. Kadhem, et al., Photonic molecularly imprinted polymer film for the detection of testosterone in aqueous samples, Polymers (4) (2018) 10.
[478] E. Kellens, et al., Micro-patterned molecularly imprinted polymer structures on functionalized diamond-coated substrates for testosterone detection,

Biosens. Bioelectron. 118 (2018) 58–65.
[479] S. Davies, et al., Comprehensive certification of a testosterone calibration standard facilitating the investigation of charged aerosol detection for the quantification of impurities of related structure, Metrologia (2) (2019) 56.
[480] K. Goeury, et al., Analysis of Environmental Protection Agency priority endocrine disruptor hormones and bisphenol A in tap, surface and wastewater by online concentration liquid chromatography tandem mass spectrometry, J. Chromatogr. A 1591 (2019) 87–98.
[481] S. Gupta, R. Wallace, J. Sloshower, Online sales of unscheduled pharmaceutical agents: a case report of tianeptine use in the United States, J. Addiction Med. 11 (5) (2017) 411–412.
[482] E. Medyantseva, et al., Surface modification of electrodes by carbon nanotubes and gold and silver nanoparticles in monoaminoxidase biosensors for the determination of some antidepressants, J. Anal. Chem. 72 (4) (2017) 362–370.
[483] E. Bakota, et al., Case reports of fatalities involving tianeptine in the United States, J. Anal. Toxicol. 42 (7) (2018) 503–509.
[484] T. El Zahran, et al., Characteristics of tianeptine exposures reported to the national poison data system - United States, 2000-2017, Mmwr-Morbidity and Mortality Weekly Report 67 (30) (2018) 815–818.
[485] T. El Zahran, et al., Characterizing tianeptine exposures reported to the national poison data system - United States, 2000-2017, Clin. Toxicol. 56 (10) (2018) 970–971.
[486] J. Marraffa, et al., Poison control center experience with tianeptine: an unregulated pharmaceutical product with potential for abuse, Clin. Toxicol. 56 (11) (2018) 1155–1158.
[487] N. Abdallah, Carbon nanotube electrodes in comparison to coated platinum wire and carbon paste selective electrodes for the determination of tramadol hydrochloride in bulk, pharmaceutical formulations, and spiked human plasma and urine, Sensor. Mater. 28 (7) (2016) 797–816.
[488] S. Chitravathi, N. Munichandraiah, Voltammetric determination of paracetamol, tramadol and caffeine using poly(Nile blue) modified glassy carbon electrode. Journal of Electroanalytical Chemistry 764 (2016) 93–103.
[489] S. Donda, et al., Development and validation OF RP-HPLC method for the simultaneous estimation OF tramadol hydrochloride and dicyclomine IN bulk and pharmaceutical formulation, J. Chil. Chem. Soc. 61 (2) (2016) 2852–2855.
[490] F. Faridbod, A. Shafaat, M. Ganjali, Conducting polymer all solid state potentiometric sensor for the tramadol assay, Int. J. Electrochem. Sci. 11 (12) (2016) 10123–10134.
[491] F. Fathirad, A. Mostafavi, D. Afzali, Electrospun Pd nanoparticles loaded on Vulcan carbon/conductive polymeric ionic liquid nanofibers for selective and sensitive determination of tramadol, Anal. Chim. Acta 940 (2016) 65–72.
[492] M. Ganjali, B. Larijani, E. Pourbasheer, Fabrication of an all solid state (ASS) polymeric membrane sensor (PME) for tramadol and its application, Int. J. Electrochem. Sci. 11 (3) (2016) 2119–2129.
[493] S. Glavanovic, M. Glavanovic, V. Tomisic, Simultaneous quantitative determination of paracetamol and tramadol in tablet formulation using UV spectrophotometry and chemometric methods, Spectrochim. Acta Mol. Biomol. Spectrosc. 157 (2016) 258–264.
[494] A. Komersova, et al., Formulation and dissolution kinetics study of hydrophilic matrix tablets with tramadol hydrochloride and different co-processed dry binders, Eur. J. Pharmaceut. Sci. 95 (2016) 36–45.
[495] S. Thomas, H. Sankar, A simple colorimetric method for estimation of tramadol hydrochloride in pure and tablet dosage forms, Indian J. Pharmacol. 48 (5) (2016) 550–554.
[496] J. Wang, et al., Predictive pharmacokinetics OF tramadol hydrochloride floating tablets, Acta Pol. Pharm. 73 (3) (2016) 755–759.
[497] B. Deiminiat, G. Rounaghi, M. Arbab-Zavar, Development of a new electrochemical imprinted sensor based on poly-pyrrole, sol-gel and multiwall carbon nanotubes for determination of tramadol, Sensor. Actuator. B Chem. 238 (2017) 651–659.
[498] M. Gousuddin, et al., Stability-indicating RP-HPLC method for simultaneous quantitation of tramadol and aceclofenac in presence of their major degradation products: Method development and validation, J. Liq. Chromatogr. Relat. Technol. 40 (17) (2017) 887–893.
[499] T. Madrakian, et al., A novel electrochemical sensor based on magneto LDH/Fe3O4 nanoparticles @ glassy carbon electrode for voltammetric determination of tramadol in real samples, Ionics 23 (4) (2017) 1005–1015.
[500] J. Manokaran, et al., Nitrogen doped graphene supported Pt-Pd nanoparticle modified GC electrode for electrochemical determination of tramadol and paracetamol, Indian J. Chem. Section A-Inorg. Bio-Inorg. Phys. Theor. Anal. Chem. 56 (1) (2017) 63–68.
[501] K. Miotto, et al., Trends in tramadol: pharmacology, metabolism, and misuse, Anesth. Analg. 124 (1) (2017) 44–51.
[502] M. Mohamed, et al., Highly selective sensing platform utilizing graphene oxide and multiwalled carbon nanotubes for the sensitive determination of tramadol in the presence of Co-formulated drugs, Electroanalysis 29 (4) (2017) 1038–1048.
[503] E. Molaakbari, et al., Synthesis of conductive polymeric ionic liquid/Ni nanocomposite and its application to construct a nanostructure based electrochemical sensor for determination of warfarin in the presence of tramadol, Talanta 171 (2017) 25–31.
[504] S. Patra, et al., Anisotropic (spherical/hexagon/cube) silver nanoparticle embedded magnetic carbon nanosphere as platform for designing of tramadol imprinted polymer, Biosens. Bioelectron. 97 (2017) 208–217.
[505] S. Rasheed, et al., Synthesis, spectral characterization, and pro- and antioxidant activity of phosphorylated derivatives of cis-tramadol, Phosphorus, Sulfur, Silicon Relat. Elem. 192 (12) (2017) 1247–1251.
[506] A. Rehman, et al., DESIGNING AND DEVELOPMENT OF CONTROLLED RELEASE MATRIX TABLETS OF TRAMADOL HCl THROUGH IN VITRO-IN VIVO EVALUATION, Acta Pol. Pharm. 74 (6) (2017) 1887–1900.
[507] C. Silva, et al., Enantiomeric separation of tramadol and its metabolites: method validation and application to environmental samples, Symmetry-Basel 9 (9) (2017).
[508] P. Nagaraju, et al., LC-MS/MS Quantification of Tramadol and gabapentin utilizing solid phase extraction, Int. J. Anal. Chem. (2018), 1605950.
[509] H. Ahmar, et al., Switchable hydrophilicity solvent-based homogenous liquid-liquid microextraction (SHS-HLLME) Combined with GC-FID for the Quantification of Methadone and tramadol, Chromatographia 81 (7) (2018) 1063–1070.
[510] H. Bagheri, et al., Determination of tramadol in pharmaceutical products and biological samples using a new nanocomposite carbon paste sensor based on decorated nanographene/tramadol-imprinted polymer nanoparticles/ionic liquid, Ionics 24 (3) (2018) 833–843.
[511] T. Chen, L. Chen, R. Knaggs, A 15-year overview of increasing tramadol utilisation and associated mortality and the impact of tramadol classification in the United Kingdom, Pharmacoepidemiol. Drug Saf. 27 (5) (2018) 487–494.
[512] F. Hosseini, M. Ebrahimi, H. Karimi-Maleh, An amplified sensor based on improved carbon paste electrode with 1,3-Dipropylimidazolium Bromide and MgO/SWCNTs Nanocomposite for tradamol determination, Int. J. Electrochem. Sci. 13 (5) (2018) 4923–4932.
[513] M. Mabrouk, et al., Newly developed controlled release subcutaneous formulation for tramadol hydrochloride, Saudi Pharmaceut. J. 26 (4) (2018) 585–592.
[514] E. Naghdi, A. Fakhari, Simultaneous chiral separation of tramadol and methadone in tablets, human urine, and plasma by capillary electrophoresis using maltodextrin as the chiral selector, Chirality 30 (10) (2018) 1161–1168.
[515] A. Abdel-Megied, K. Badr El-din, Development of a novel LC-MS/MS method for detection and quantification of tramadol hydrochloride in presence of some mislabeled drugs: application to counterfeit study, Biomed. Chromatogr. 33 (6) (2019).
[516] S. Al Samarrai, F. Abdoon, K. Hashim, A simple method to determine tramadol using a coated-wire electrode as a detector in the flow injection analysis, Microchem. J. 146 (2019) 588–591.
[517] N. Atta, A. Galal, S. Hassan, Ultrasensitive determination of nalbuphine and tramadol narcotic analgesic drugs for postoperative pain relief using nanocobalt oxide/ionic liquid crystal/carbon nanotubes-based electrochemical sensor, J. Electroanal. Chem. 839 (2019) 48–58.
[518] M. Foroughi, S. Jahani, H. Nadiki, Lanthanum doped fern-like CuO nanoleaves/MWCNTs modified glassy carbon electrode for simultaneous determination of tramadol and acetaminophen, Sensor. Actuator. B Chem. 285 (2019) 562–570.
[519] A. Yousefzadeh, et al., Surface molecular imprinting and powerfully enhanced chemiluminescence emission by Cu nanoclusters/MOF composite for detection of tramadol, Sensor. Actuator. B Chem. 286 (2019) 154–162.
[520] A. Naeemy, E. Sedighi, A. Mohammadi, Electrooxidation of zolpidem and its voltammetric quantification in standard and pharmaceutical formulation using pencil graphite electrode, J. Electrochem. Sci. Technol. 7 (1) (2016) 68–75.
[521] L. Gruberova, B. Kratochvil, Dosage forms of zolpidem tartrate, Chem. Listy 112 (11) (2018) 734–740.
[522] G. Heide, et al., The appearance, taste, and Concentrations of zolpidem Dissolved in still Water and carbonated beverages, J. Forensic Sci. 63 (3) (2018) 911–914.
[523] R. Shayegani, et al., Patterns of zolpidem use among Iraq and Afghanistan veterans: a retrospective cohort analysis, PloS One 13 (1) (2018).
[524] S. Dehgan-Reyhan, M. Najafi, Defective mesoporous carbon ceramic electrode modified graphene quantum dots as a novel surface-renewable electrode: the application to determination of zolpidem, J. Electroanal. Chem. 832 (2019) 241–246.
[525] K. Inaba, et al., Evaluation of dissolution profile between original and generic products of zolpidem tartrate by microdialysis-HPLC, Chem. Pharm. Bull. 67 (2) (2019) 120–124.
[526] J. Taborsky, et al., Electrochemical oxidation of zopiclone, Monatshefte Fur Chemie 147 (1) (2016) 53–60.
[527] H. Zaazaa, et al., Strategy approach for direct enantioseparation of hyoscyamine sulfate and zopiclone on a chiral alpha(1)-acid glycoprotein column and determination of their eutomers: thermodynamic study of complexation, Chirality 28 (1) (2016) 49–57.
[528] A. Al-Attas, et al., First derivative spectrofluorimetric determination of zopiclone and its degradation product, 2-amino-5-chloropyridine, in pharmaceutical formulations with preliminary tool in biological fluids for clinical evidence of zopiclone intake, Spectrochim. Acta Mol. Biomol. Spectrosc. 181 (2017) 148–152.
[529] S. Razeq, S. Soliman, A. Mohamed, Validated stability-indicating high-performance liquid Chromatography and thin-layer chromatography Methods for the Determination of Zopiclone in pharmaceutical formulation, JPC-J. Planar Chromatogr.-Mod. Tlc 31 (4) (2018) 297–308.

[530] B. Moussa, et al., Indirect synchronous fluorescence spectroscopy and direct high-performance thin-layer chromatographic methods for enantioseperation of zopiclone and determination of chiral-switching eszopiclone: evaluation of thermodynamic quantities of chromatographic separation, Chirality 31 (5) (2019) 362–374.
[531] M. Yoshida, et al., Bitterness-masking Effects of different Beverages on Zopiclone and eszopiclone tablets, Chem. Pharm. Bull. 67 (5) (2019) 404–409.
[532] S. Jan, et al., Microclimatic variation in UV perception and related disparity in tropane and quinolizidine alkaloid composition of Atropa acuminata, Lupinus polyphyllus and Hyoscyamus Niger, J. Photochem. Photobiol. B Biol. 161 (2016) 230–235.
[533] R. Mopuri, M. Islam, Medicinal plants and phytochemicals with anti-obesogenic potentials: a review, Biomed. Pharmacother. 89 (2017) 1442–1452.
[534] M. Foroughi, et al., Identification of undeclared active pharmaceutical ingredients in counterfeit herbal medicines used as opioid substitution therapy, Aust. J. Forensic Sci. 49 (6) (2017) 720–729.
[535] L. Calvo-Irabien, Native Mexican aromatic flora and essential oils: current research status, gaps in knowledge and agro-industrial potential, Ind. Crop. Prod. 111 (2018) 807–822.
[536] J. Pio-Leon, et al., Wild plants consumed as recreational teas by ranchers in Baja California Sur, Mexico, Acta Bot. Mex. 123 (2018) 7–19.
[537] S. Graziano, et al., Herbal highs: review on psychoactive effects and neuropharmacology, Curr. Neuropharmacol. 15 (5) (2017) 750–761.
[538] F. Gunes, Medicinal plants used in the Uzunkopru district of Edirne, Turkey, Acta Soc. Bot. Pol. (4) (2017) 86.
[539] A. Dasgupta, G. Makowski, Challenges in laboratory detection of unusual substance abuse: issues with magic mushroom, peyote cactus, khat, and solvent abuse, Adv. Clin. Chem. 78 (2017) 163–186, 78.
[540] K. Kohnen-Johannsen, O. Kayser, Tropane alkaloids: chemistry, pharmacology, Biosynthesis and production, Molecules (4) (2019) 24.
[541] M. Yasir, B. Sultana, M. Amicucci, Biological activities of phenolic compounds extracted from Amaranthaceae plants and their LC/ESI-MS/MS profiling, J. Funct. Foods 26 (2016) 645–656.
[542] L. Hussain, et al., Analgesic and anti-inflammatory activity of aqueous-methanolic extract of Aerva javanica, Pak. J. Pharm. Sci. 30 (1) (2017) 213–215.
[543] M. Khalid, et al., ANTIMICROBIAL, antioxidant, cytotoxicity and LC-MS analyses OF AERVA javanica: an ETHNOMEDICINALLY important plant, J. Biol. Regul. Homeost. Agents 31 (4) (2017) 963–969.
[544] S. Musaddiq, et al., Aervfuranoside: a new chlorinated dibenzofuran Glycoside and other Metabolites from the Flowers of Aerva javanica, J. Chem. Soc. Pakistan 39 (4) (2017) 572–577.
[545] K. Karthishwaran, et al., GC-MS assisted phytoactive chemical compounds Identification and Profiling with mineral Constituents from biologically active Extracts of Aerva javanica (Burm.f) juss. Ex schult, Not. Bot. Horti Agrobot. Cluj-Napoca 46 (2) (2018) 517–524.
[546] A. Abbaspour, et al., Optimization of atropine extraction process from atropa belladonna by modified bubble column extractor with ultrasonic bath, Iran. J. Chem. Chem. Eng.-Int. English Ed. 35 (4) (2016) 49–60.
[547] A. Jaber, et al., Bithiophenic MALDI matrices as valuable leads for the selective detection of alkaloids, Anal. Bioanal. Chem. 409 (29) (2017) 6791–6801.
[548] J. Marin-Saez, et al., Screening of drugs and homeopathic products from Atropa belladonna seed extracts: tropane alkaloids determination and untargeted analysis, Drug Test. Anal. 10 (10) (2018) 1579–1589.
[549] D. Corinti, et al., An integrated approach to study novel properties of a MALDI matrix (4-maleicanhydridoproton sponge) for MS imaging analyses, Anal. Bioanal. Chem. 411 (4) (2019) 953–964.
[550] M. Horak, P. Novak, W. Vozaryova, Legal aspects of the ayahuasca consumption in the European union, Sbornik Prispevku Z Mezinarodni Vedecke Konference: Region V Rozvoji Spolecnosti 2016 (2016) 276–283.
[551] A. Lesiak, R. Musah, Application of ambient ionization high resolution mass spectrometry to determination of the botanical provenance of the constituents of psychoactive drug mixtures, Forensic Sci. Int. 266 (2016) 271–280.
[552] M. Santos, S. Navickiene, A. Gaujac, Determination of tryptamines and beta-carbolines in ayahuasca beverage consumed during Brazilian religious ceremonies, J. AOAC Int. 100 (3) (2017) 820–823.
[553] S. Navickiene, et al., Use of coconut charcoal and menthone-thiosemicarbazone polymer as solid phase materials for the determination of N,N-dimethyltryptamine, harmine, harmaline, harmalol, and tetrahydroharmine in ayahuasca beverage by liquid chromatography-tandem mass spectrometry, J. Braz. Chem. Soc. 30 (1) (2019) 180–187.
[554] A. Lesiak, R. Musah, More than just heat: ambient ionization mass spectrometry for determination of the species of origin of processed commercial products-application to psychoactive pepper supplements, Anal. Methods 8 (7) (2016) 1646–1658.
[555] S. Das, et al., Biotechnological intervention in. Betelvine (Piper betle L.): a review on recent advances and future prospects, Asian Pac. J. Trop. Med. 9 (10) (2016) 916–923.
[556] S. Das, et al., Variation in volatile constituents and eugenol content of five important betelvine (piper betle L.) landraces exported from eastern India, J. Essen. Oil Bearing Plants 19 (7) (2016) 1788–1793.
[557] D. Valle, et al., Thin layer chromatography-Bioautography and gas chromatography-mass Spectrometry of antimicrobial leaf Extracts from philippine Piper betle L. against multidrug-resistant bacteria, Evid. Base Compl. Alternative Med. (2016), 4976791.
[558] A. Atiya, B. Sinha, U. Ranjan Lal, New chemical constituents from the piper betle Linn. (Piperaceae), Nat. Prod. Res. 32 (9) (2018) 1080–1087.
[559] C. Hao, et al., Characterization of volatile compounds in ten Piper species cultivated in Hainan Island, South China, Int. J. Food Prop. 21 (1) (2018) 633–644.
[560] N. Rubio, et al., Behaviour of hygrine and cuscohygrine in illicit cocaine production establishes their use as markers for chewing coca leaves in contrast with cocaine abuse, Drug Test. Anal. 9 (2) (2017) 323–326.
[561] A. Urbizu-Gonzalez, et al., Natural variability of essential oil and antioxidants in the medicinal plant Turnera diffusa, Asian Pac. J. Trop. Med. 10 (2) (2017) 114–119.
[562] J. Willer, et al., Cytotoxic properties of damiana (tunera diffusa) extracts and constituents and A validated quantitative UHPLC-DAD assay, Molecules (5) (2019) 24.
[563] H. Durak, T. Aysu, Structural analysis of bio-oils from subcritical and supercritical hydrothermal liquefaction of Datura stramonium L, J. Supercrit. Fluids 108 (2016) 123–135.
[564] U. Karmakar, et al., Bioassay-guided Isolation of Compounds from Datura stramonium with TRAIL-resistance overcoming activity, Nat. Prod. Commun. 11 (2) (2016) 185–187.
[565] F. Babiker, et al., Characterization, purification and identification of some Alkaloids in Datura stramonium, Int. Food Res. J. 24 (2017) S540–S543.
[566] S. Siddiqui, et al., Comparative analysis of hyoscine in wild-type and in vitro-grown Datura innoxia by high performance liquid chromatography, Trop. J. Pharmaceut. Res. 16 (7) (2017) 1683–1692.
[567] G. Benitez, et al., The genus Datura L. (Solanaceae) in Mexico and Spain - ethnobotanical perspective at the interface of medical and illicit uses, J. Ethnopharmacol. 219 (2018) 133–151.
[568] B. Harfi, et al., Tropane alkaloids GC/MS analysis and low dose elicitors' effects on hyoscyamine biosynthetic pathway in hairy roots of Algerian Datura species, Sci. Rep. (2018) 8.
[569] M. Aghdasi, et al., Chemical components of the Ephedra major from Iran, Nat. Prod. Res. 30 (3) (2016) 369–371.
[570] A. Jerbi, et al., Essential oil composition, free-radical-Scavenging and antibacterial Effect from Stems of Ephedra alata alenda in Tunisia, J. Essen. Oil Bearing Plants 19 (6) (2016) 1503–1509.
[571] K. Kilpatrick, et al., Characterization of aromatic aminotransferases from Ephedra sinica Stapf, Amino Acids 48 (5) (2016) 1209–1220.
[572] S. Liao, et al., Adsorption characteristics, recognition properties, and preliminary application of nordihydroguaiaretic acid molecularly imprinted polymers prepared by sol-gel surface imprinting technology, Appl. Surf. Sci. 364 (2016) 579–588.
[573] M. Lv, et al., Comparative analysis of volatile oils in the stems and roots of Ephedra sinica via GC-MS-based plant metabolomics, Chin. J. Nat. Med. 14 (2) (2016) 133–140.
[574] M. Lv, et al., GC-MS based metabolomics study of stems and roots of Ephedra sinica (vol 114, pg 49, 2015), J. Pharmaceut. Biomed. Anal. 123 (2016), p. 213–213.
[575] J. Wang, et al., Determination the active compounds of herbal preparation by UHPLC-MS/MS and its application on the preclinical pharmacokinetics of pure ephedrine, single herbal extract of Ephedra, and a multiple herbal preparation in rats, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1026 (2016) 152–161.
[576] G. Xin, et al., A direct ionization mass spectrometry-based approach for differentiation of medicinal Ephedra species, J. Pharmaceut. Biomed. Anal. 117 (2016) 492–498.
[577] Y. Amakura, Characterization of phenolic constituents from ephedra herb extract, Yakugaku Zasshi-J. Pharmaceut. Soc. Jpn. 137 (2) (2017) 167–171.
[578] B. Kinsella, Determination of ephedra alkaloids and synephrine in dietary supplements via strong cation-exchange SPE and LC-MS/MS detection, LC-GC Eur. 30 (12) (2017), p. 696–696.
[579] J. Morris, et al., An N-methyltransferase from Ephedra sinica catalyzing the formation of ephedrine and pseudoephedrine enables microbial phenylalkylamine production, J. Biol. Chem. 293 (35) (2018) 13364–13376.
[580] C. Chang, et al., Ephedra alkaloid contents of Chinese herbal formulae sold in Taiwan, Drug Test. Anal. 10 (2) (2018) 350–356.
[581] B. Jeong, et al., Determination of five chemical markers in DF formula, the herbal composition of ephedra intermedia, Rheum palmatum, and Lithospermum erythrorhizon, using high-performance liquid chromatography-ultraviolet detection, Phcog. Mag. 14 (54) (2018) 162–166.
[582] X. Ma, et al., Discrimination of three Ephedra species and their geographical origins based on multi-element fingerprinting by inductively coupled plasma mass spectrometry, Sci. Rep. (2018) 8.
[583] X. Chen, et al., Identification and phylogenetic analysis of the complete chloroplast genomes of three ephedra herbs containing ephedrine, BioMed Res. Int. (2019), 5921725.
[584] S. Jiao, et al., Development of novel EST-SSR markers for Ephedra sinica (Ephedraceae) by transcriptome database mining, Appl. Plant Sci. (1) (2019) 7.
[585] B. Meena, et al., Molecular analysis of genetic diversity and population genetic structure in Ephedra foliata: an endemic and threatened plant species of arid and semi-arid regions of India, Physiol. Mol. Biol. Plants 25 (3) (2019)

753–764.
[586] B. Ziani, et al., Phenolic compounds characterization by LC-DAD- ESI/MSn and bioactive properties of Thymus algeriensis Boiss. & Reut. and Ephedra alata Decne, Food Res. Int. 116 (2019) 312–319.
[587] C. Ponte, M. Lapeyre-Mestre, Psychoactive effects of 'legal high': about lysergic acid amide (LSA), Therapie 72 (5) (2017) 605–608.
[588] A. Lesiak, et al., Direct analysis in real time high resolution mass spectrometry as a tool for rapid characterization of mind-altering plant materials and revelation of supplement adulteration - the case of Kanna, Forensic Sci. Int. 260 (2016) 66–73.
[589] M. Atlabachew, et al., A (-)-norephedrine-based molecularly imprinted polymer for the solid-phase extraction of psychoactive phenylpropylamino alkaloids from Khat (Catha edulis Vahl. Endl.) chewing leaves, Biomed. Chromatogr. 30 (7) (2016) 1007–1015.
[590] S. Combrinck, et al., Separating the old from the new; rapid differentiation of Catha edulis (Vahl. Endl.) using single point and imaging vibrational spectroscopy, Planta Med. (2016) 82.
[591] M. Getasetegn, Chemical composition of Catha edulis (khat): a review, Phytochemistry Rev. 15 (5) (2016) 907–920.
[592] J. Young, et al., Khat dependence, use patterns, and health Consequences in Australia: an exploratory study, J. Stud. Alcohol Drugs 77 (2) (2016) 343–348.
[593] M. Atlabachew, B. Chandravanshi, M. Redi-Abshiro, Preparative HPLC for large scale isolation, and salting-out assisted liquid-liquid extraction based method for HPLC-DAD determination of khat (Catha edulis Forsk) alkaloids, Chem. Cent. J. (2017) 11.
[594] T. Nabben, D. Korf, Consequences of criminalisation: the Dutch khat market before and after the ban, Drugs Educ. Prev. Pol. 24 (4) (2017) 332–339.
[595] L. Tembrock, et al., Employing two-stage derivatisation and GC-MS to assay for cathine and related stimulant alkaloids across the Celastraceae, Phytochem. Anal. 28 (4) (2017) 257–266.
[596] W. Abebe, Khat: a Substance of growing Abuse with adverse drug interaction risks, J. Natl. Med. Assoc. 110 (6) (2018) 624–634.
[597] N. Patel, Khat (Catha edulis Forsk) - And now there are three, Brain Res. Bull. 145 (2019) 92–96.
[598] A. Oliveira, et al., Chemical characterization and in vitro cyto- and genotoxicity of 'legal high' products containing Kratom (Mitragyna speciosa), Forensic Toxicol. 34 (2) (2016) 213–226.
[599] O. Griffin, J. Daniels, E. Gardner, Do you get what you paid for? An examination of products advertised as kratom, J. Psychoact. Drugs 48 (5) (2016) 330–335.
[600] R. Voelker, Kratom products seized, Jama-J. Am. Med. Assoc. 316 (11) (2016), p. 1142-1142.
[601] N. Yusoff, et al., Abuse potential and adverse cognitive effects of mitragynine (kratom), Addiction Biol. 21 (1) (2016) 98–110.
[602] W. Kong, et al., Physicochemical characterization of Mitragyna speciosa alkaloid extract and mitragynine using in vitro high throughput assays, Comb. Chem. High Throughput Screen. 20 (9) (2017) 796–803.
[603] S. Limsuwanchote, et al., Anti-mitragynine monoclonal antibody-based ELISA for determination of alkaloids in the kratom cocktail, Forensic Toxicol. 35 (1) (2017) 167–172.
[604] P. Brown, J. Lund, S. Murch, A botanical, phytochemical and ethnomedicinal review of the genus Mitragyna korth: Implications for products sold as kratom, J. Ethnopharmacol. 202 (2017) 302–325.
[605] K. Elkins, A. Cowan, Detection and identification of kratom (Mitragyna speciosa) using chemical tests and a quantitative real-time polymerase chain reaction high resolution melt (qPCR-HRM) assay, Abstr. Pap. Am. Chem. Soc. (2017) 254.
[606] E. Mudge, P. Brown, Determination of mitragynine in Mitragyna speciosa raw materials and finished products by liquid chromatography with UV detection: single-laboratory validation, J. AOAC Int. 100 (1) (2017) 18–24.
[607] L. Boffa, et al., Alkaloid profiles and activity in different Mitragyna speciosa strains, Nat. Prod. Commun. 13 (9) (2018) 1111–1116.
[608] O. Griffin, M. Webb, The scheduling of kratom and selective use of data, J. Psychoact. Drugs 50 (2) (2018) 114–120.
[609] I. Lainiotis, et al., The KRATOMic Bomb: Dangers arise behind America's newest street drug, Clin. Toxicol. 56 (10) (2018), p. 1045–1045.
[610] S. Likhitsathian, et al., Polydrug use among kratom users: findings from the 2011 Thailand national household survey, J. Subst. Use 23 (4) (2018) 384–389.
[611] S. Limsuwanchote, et al., Development of an immunochromatographic strip incorporating anti-mitragynine monoclonal antibody conjugated to colloidal gold for kratom alkaloids detection, Drug Test. Anal. 10 (7) (2018) 1168–1175.
[612] E. Mudge, P. Brown, Determination of alkaloids in Mitragyna speciosa (kratom) raw materials and dietary supplements by HPLC-UV: single-laboratory validation, first action 2017.14, J. AOAC Int. 101 (4) (2018) 964–965.
[613] S. Shekar, et al., Legally lethal kratom: a herbal supplement with overdose potential, J. Psychoact. Drugs 51 (1) (2019) 28–30.
[614] N. Tohar, et al., Chemical constituents and nitric oxide inhibitory activity of supercritical carbon dioxide extracts from Mitragyna speciosa leaves, Arab. J. Chem. 12 (3) (2019) 350–359.
[615] C. Andre, J. Hausman, G. Guerriero, Cannabis sativa: the plant of the thousand and one molecules, Front. Plant Sci. (2016) 7.
[616] M. Balbino, et al., The application of voltammetric analysis of delta(9)-THC for the reduction of false positive results in the analysis of suspected marijuana plant matter, J. Forensic Sci. 61 (4) (2016) 1067–1073.
[617] M. Balbino, et al., Voltammetric detection of delta(9)-THC using carbon screen printed electrode in aqueous media: improvements in forensic analysis, Sens. Electron. Instrum. Adv. (Seia) (2016) 62–63.
[618] J. Cherney, E. Small, Industrial hemp in North America: production, politics and potential, Agronomy-Basel 6 (4) (2016).
[619] A. Hazekamp, Evaluating the effects of gamma-irradiation for decontamination of medicinal cannabis, Front. Pharmacol. (2016) 7.
[620] M. Malvoisin, K. Wendling, Analysis of marijuana contamination on currency, Abstr. Pap. Am. Chem. Soc. (2016) 252.
[621] K. Mariotti, et al., Seized cannabis seeds cultivated in greenhouse: a chemical study by gas chromatography-mass spectrometry and chemometric analysis, Sci. Justice 56 (1) (2016) 35–41.
[622] B. Tipple, et al., The influences of cultivation setting on inflorescence lipid distributions, concentrations, and carbon isotope ratios of Cannabis sp, Forensic Sci. Int. 262 (2016) 233–241.
[623] K. Tsujikawa, et al., Development of a novel immunoassay for herbal cannabis using a new fluorescent antibody probe, "Ultra Quenchbody", Forensic Sci. Int. 266 (2016) 541–548.
[624] B. Wei, et al., Sensitive quantification of cannabinoids in milk by alkaline saponification-solid phase extraction combined with isotope dilution UPLC-MS/MS, ACS Omega 1 (6) (2016) 1307–1313.
[625] A. Brown, J. Sweet, C. Yu, Rapid quantitative chemical analysis of cannabinoids in seized cannabis using heated headspace solid-phase microextraction and gas chromatography/mass spectrometry, Abstr. Pap. Am. Chem. Soc. (2016) 251.
[626] L. Hanus, et al., The main cannabinoids content in hashish samples seized in Israel and Czech Republic, Isr. J. Plant Sci. 63 (3) (2016) 182–190.
[627] K. Aladic, et al., Effect of supercritical CO2 extraction process parameters on oil yield and pigment content from by-product hemp cake, Int. J. Food Sci. Technol. 51 (4) (2016) 885–893.
[628] M. Aubin, et al., Evaluation of eleven industrial hemp cultivars grown in eastern Canada, Agron. J. 108 (5) (2016) 1972–1980.
[629] A. Cozea, et al., Comparative study concerning the composition of certain oil cakes with phytotherapeutical potential, Rev. Chem. 67 (3) (2016) 422–425.
[630] A. Lalge, et al., GC-FID analysis OF food samples made OF hemp, in: Proceedings of International Phd Students Conference, (Mendelnet 2016), 2016, pp. 600–604.
[631] S. Multari, et al., Nutritional and phytochemical content of high-protein crops, J. Agric. Food Chem. 64 (41) (2016) 7800–7811.
[632] M. Welling, et al., Characterisation of cannabinoid composition in a diverse Cannabis sativa L. germplasm collection, Euphytica 208 (3) (2016) 463–475.
[633] D. Calzolari, et al., High added-value compounds from Cannabis threshing residues, Ind. Crop. Prod. 108 (2017) 558–563.
[634] C. Chang, et al., Determination of cannabinoids in hemp nut products in Taiwan by HPLC-MS/MS coupled with chemometric analysis: quality evaluation and a pilot human study, Drug Test. Anal. 9 (6) (2017) 888–897.
[635] U. Escriva, et al., Analysis of cannabinoids by liquid chromatography-mass spectrometry in milk, liver and hemp seed to ensure food safety, Food Chem. 228 (2017) 177–185.
[636] T. Guo, et al., Bioactive spirans and other constituents from the leaves of Cannabis sativa f. sativa, J. Asian Nat. Prod. Res. 19 (8) (2017) 793–802.
[637] M. Hanif, et al., Raman spectroscopy for the characterization of different fractions of hemp essential oil extracted at 130 degrees C using steam distillation method, Spectrochim. Acta Mol. Biomol. Spectrosc. 182 (2017) 168–174.
[638] Z. Jankauskiene, et al., Screening hemp (cannabis sativa L.) biomass and chemical composition as influenced BY seed rate and genotype, in: 16th International Scientific Conference: Engineering for Rural Development, 2017, pp. 317–322.
[639] B. Borille, et al., Near infrared spectroscopy combined with chemometrics for growth stage classification of cannabis cultivated in a greenhouse from seized seeds, Spectrochim. Acta Mol. Biomol. Spectrosc. 173 (2017) 318–323.
[640] B. Borille, et al., Chemical profiling and classification of cannabis through electrospray ionization coupled to Fourier transform ion cyclotron resonance mass spectrometry and chemometrics, Anal. Methods 9 (27) (2017) 4070–4081.
[641] V. Brighenti, et al., Development of a new extraction technique and HPLC method for the analysis of non-psychoactive cannabinoids in fibre-type Cannabis sativa L. (hemp), J. Pharmaceut. Biomed. Anal. 143 (2017) 228–236.
[642] C. Chang, et al., Microwave-assisted Extraction of Cannabinoids in hemp nut using response surface methodology: Optimization and comparative study, Molecules (11) (2017) 22.
[643] E. Cuypers, et al., The use of pesticides in Belgian illicit indoor cannabis plantations, Forensic Sci. Int. 277 (2017) 59–65.
[644] L. Dujourdy, F. Besacier, A study of cannabis potency in France over a 25 years period (1992-2016), Forensic Sci. Int. (272) (2017) 72–80.
[645] A. Gallos, et al., Exploring the microstructure of natural fibre composites by confocal Raman imaging and image analysis, Compos. Appl. Sci. Manuf. 94 (2017) 32–40.
[646] S. Havig, et al., THC and CBD in blood samples and seizures in Norway: does CBD affect THC-induced impairment in apprehended subjects? Forensic Sci. Int. 276 (2017) 12–17.
[647] R. Jamwal, et al., Ultra-high performance liquid chromatography tandem

mass-spectrometry for simple and simultaneous quantification of cannabinoids, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1048 (2017) 10–18.
[648] M. Lewis, et al., Chemical profiling of medical cannabis extracts, ACS Omega 2 (9) (2017) 6091–6103.
[649] A. McDaniel, et al., Detection of marijuana varieties based on chemical signatures extracted from sample headspace, Abstr. Pap. Am. Chem. Soc. (2017) 253.
[650] E. Mudge, S. Murch, P. Brown, Leaner and greener analysis of cannabinoids, Anal. Bioanal. Chem. 409 (12) (2017) 3153–3163.
[651] B. Patel, D. Wene, Z. Fan, Qualitative and quantitative measurement of cannabinoids in cannabis using modified HPLC/DAD method, J. Pharmaceut. Biomed. Anal. 146 (2017) 15–23.
[652] F. Piscitelli, et al., Development of a rapid LC-MS/MS method for the quantification of cannabidiol, cannabidivarin, delta(9)-tetrahydrocannabivarin, and cannabigerol in mouse peripheral tissues, Anal. Chem. 89 (8) (2017) 4749–4755.
[653] L. Rovetto, N. Aieta, Supercritical carbon dioxide extraction of cannabinoids from Cannabis sativa L, J. Supercrit. Fluids 129 (2017) 16–27.
[654] R. Smart, et al., Variation in cannabis potency and prices in a newly legal market: evidence from 30 million cannabis sales in Washington state, Addiction 112 (12) (2017) 2167–2177.
[655] A. Souleman, et al., Determination of delta-9-tetrahydrocannabinol content of cannabis seizures in Egypt, Asian Pac. J. Trop. Med. 10 (3) (2017) 291–294.
[656] B. Thalhamer, M. Himmelsbach, W. Buchberger, Trace level determination of 9-tetrahydrocannabinol in a perfume using liquid chromatography high resolution tandem mass spectrometry and gas chromatography mass spectrometry, Flavour Fragrance J. 32 (1) (2017) 46–53.
[657] L. Tose, et al., Isomeric separation of cannabinoids by UPLC combined with ionic mobility mass spectrometry (TWIM-MS) Part I, Int. J. Mass Spectrom. 418 (2017) 112–121.
[658] K. Watanabe, et al., The Duquenois reaction revisited: mass spectrometric estimation of chromophore structures derived from major phytocannabinoids, Forensic Toxicol. 35 (1) (2017) 185–189.
[659] C. Wolf, J. Poklis, A. Poklis, Stability of tetrahydrocannabinol and cannabidiol in prepared quality control medible brownies, J. Anal. Toxicol. 41 (2) (2017) 153–157.
[660] W. Sun, et al., Determination of three kinds of cannabinoids in cannabis using ultra. High performance liquid chromatography-tandem mass spectrometry and analysis of phenotype of cannabis, Chin. J. Anal. Chem. 45 (7) (2017) 1052–1058.
[661] T. Krizek, et al., Menthol-based hydrophobic deep eutectic solvents: towards greener and efficient extraction of phytocannabinoids, J. Clean. Prod. 193 (2018) 391–396.
[662] J. Leite, et al., Extraction and isolation of cannabinoids from marijuana seizures and characterization by H-1 NMR allied to chemometric tools, Sci. Justice 58 (5) (2018) 355–365.
[663] D. Potter, et al., Potency of Delta(9)-tetrahydrocannabinol and other cannabinoids in cannabis in England in 2016: Implications for public health and pharmacology, Drug Test. Anal. 10 (4) (2018) 628–635.
[664] J. Preston, S. Sadjadi, Analytical SFC applications for the cannabis industry, Abstr. Pap. Am. Chem. Soc. (2018) 256.
[665] A. Rigdon, et al., Chromatographic method validation for cannabis labs: addressing unique industry challenges, Abstr. Pap. Am. Chem. Soc. (2018) 255.
[666] J. Steimling, T. Kahler, Liquid chromatography's complementary Role to gas Chromatography in cannabis testing, LC-GC N. Am. 36 (6) (2018), 36-+.
[667] S. Bonini, et al., Cannabis sativa: a comprehensive ethnopharmacological review of a medicinal plant with a long history, J. Ethnopharmacol. 227 (2018) 300–315.
[668] V. Cardenia, et al., Development and validation of a Fast gas chromatography/mass spectrometry method for the determination of cannabinoids in Cannabis sativa L, J. Food Drug Anal. 26 (4) (2018) 1283–1292.
[669] L. Ciolino, T. Ranieri, A. Taylor, Commercial cannabis consumer products part 1: GC-MS qualitative analysis of cannabis cannabinoids, Forensic Sci. Int. 289 (2018) 429–437.
[670] L. Ciolino, T. Ranieri, A. Taylor, Commercial cannabis consumer products part 2: HPLC-DAD quantitative analysis of cannabis cannabinoids, Forensic Sci. Int. 289 (2018) 438–447.
[671] C. Citti, et al., A metabolomic approach Applied to a liquid chromatography Coupled to high-resolution tandem mass spectrometry method (HPLC-ESI-HRMS/MS): Towards the comprehensive Evaluation of the chemical Composition of cannabis medicinal extracts, Phytochem. Anal. 29 (2) (2018) 144–155.
[672] C. Citti, et al., Analysis of cannabinoids in commercial hemp seed oil and decarboxylation kinetics studies of cannabidiolic acid (CBDA), J. Pharmaceut. Biomed. Anal. 149 (2018) 532–540.
[673] M. Contreras, et al., Thermal desorption-ion mobility spectrometry: a rapid sensor for the detection of cannabinoids and discrimination of Cannabis sativa L. chemotypes, Sensor. Actuator. B Chem. 273 (2018) 1413–1424.
[674] G. Crescente, et al., Chemical composition and nutraceutical properties of hempseed: an ancient food with actual functional value, Phytochemistry Rev. 17 (4) (2018) 733–749.
[675] I. Di Marco Pisciottano, et al., A rapid method to determine nine natural cannabinoids in beverages and food derived from Cannabis sativa by liquid chromatography coupled to tandem mass spectrometry on a QTRAP 4000, Rapid Commun. Mass Spectrom. 32 (19) (2018) 1728–1736.
[676] U. Escriva, et al., Analysis of cannabinoids by liquid chromatography-mass spectrometry in milk, liver and hemp seed to ensure food safety (vol 228, pg 177, 2017), Food Chem. 254 (2018), p. 391–391.
[677] S. Frassinetti, et al., Nutraceutical potential of hemp (Cannabis sativa L.) seeds and sprouts, Food Chem. 262 (2018) 56–66.
[678] T. Franklin, et al., Detection of phytocannabinoids from buccal swabs by headspace solid phase microextraction - gas chromatography/mass spectrometry, Anal. Methods 10 (9) (2018) 942–946.
[679] T. Guo, et al., Stilbenoids and cannabinoids from the leaves of Cannabis sativa f. sativa with potential reverse cholesterol transport activity, Food Funct. 9 (12) (2018) 6609–6618.
[680] M. Hadener, et al., High-resolution ion mobility Spectrometry for rapid cannabis potency testing, Anal. Chem. 90 (15) (2018) 8764–8768.
[681] E. Ibrahim, et al., Determination of acid and neutral cannabinoids in extracts of different strains of cannabis sativa using GC-FID, Planta Med. 84 (4) (2018) 250–259.
[682] A. Leghissa, et al., Determination of cannabinoids from a surrogate hops matrix using multiple reaction monitoring gas chromatography with triple quadrupole mass spectrometry, J. Separ. Sci. 41 (2) (2018) 459–468.
[683] K. Leiman, et al., Fast extraction of cannabinoids in marijuana samples by using hard-cap espresso machines, Talanta 190 (2018) 321–326.
[684] R. Pavlovic, et al., Quality traits of "cannabidiol oils": cannabinoids content, terpene fingerprint and oxidation stability of European commercially available preparations, Molecules (5) (2018) 23.
[685] R. Ascrizzi, et al., VOCs as fingerprints for the chemical profiling of hashish samples analyzed by HS-SPME/GC-MS and multivariate statistical tools, Forensic Toxicol. 36 (2) (2018) 243–260.
[686] M. Sexton, et al., Evaluation of cannabinoid and terpenoid content: cannabis flower compared to supercritical CO (2) concentrate, Planta Med. 84 (4) (2018) 234–241.
[687] S. Zivovinovic, et al., Determination of cannabinoids in Cannabis sativa L. samples for recreational, medical, and forensic purposes by reversed-phase liquid chromatography-ultraviolet detection, J. Anal. Sci. Technol. (2018) 9.
[688] C. Grof, Cannabis, from plant to pill, Br. J. Clin. Pharmacol. 84 (11) (2018) 2463–2467.
[689] F. Pellati, et al., New methods for the comprehensive analysis of bioactive compounds in cannabis sativa L. (hemp), Molecules (10) (2018) 23.
[690] A. Elkins, et al., Development of a validated method for the qualitative and quantitative analysis of cannabinoids in plant biomass and medicinal cannabis resin extracts obtained by super-critical fluid extraction, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1109 (2019) 76–83.
[691] C. Citti, et al., Cannabinoid profiling of hemp seed oil by liquid chromatography coupled to high-resolution mass spectrometry, Front. Plant Sci. (2019) 10.
[692] N. dos Santos, et al., LDI and MALDI-FT-ICR imaging MS in Cannabis leaves: optimization and study of spatial distribution of cannabinoids, Anal. Methods 11 (13) (2019) 1757–1764.
[693] N. dos Santos, et al., Analysis of isomeric cannabinoid standards and cannabis products by UPLC-ESI-TWIM-MS: a comparison with GC-MS and GC x GC-QMS. Journal of the Brazilian chemical society 30 (1) (2019) 60–70.
[694] E. Ibrahim, et al., Analysis of terpenes in cannabis sativa L. Using GC/MS: method development, validation, and application, Planta Med. 85 (5) (2019) 431–438.
[695] M. Kotlaja, J. Carson, Cannabis prevalence and national drug policy in 27 countries: an analysis of adolescent substance use, Int. J. Offender Ther. Comp. Criminol. 63 (7) (2019) 1082–1099.
[696] B. Nie, J. Henion, I. Ryona, The role of mass spectrometry in the cannabis industry, J. Am. Soc. Mass Spectrom. 30 (5) (2019). CP4-730.
[697] L. Zamengo, et al., The role of time and storage conditions on the composition of hashish and marijuana samples: a four-year study, Forensic Sci. Int. 298 (2019) 131–137.
[698] R. Houston, et al., Evaluation of a 13-loci STR multiplex system for Cannabis sativa genetic identification, Int. J. Leg. Med. 130 (3) (2016) 635–647.
[699] M. Kitamura, et al., Development of loop-mediated isothermal amplification (LAMP) Assay for rapid Detection of Cannabis sativa, Biol. Pharm. Bull. 39 (7) (2016) 1144–1149.
[700] I. Mello, et al., A segment of rbcL gene as a potential tool for forensic discrimination of Cannabis sativa seized at Rio de Janeiro, Brazil, Int. J. Leg. Med. 130 (2) (2016) 353–356.
[701] P. Mendel, et al., Progress IN early sex determination OF cannabis plant BY DNA markers, in: Proceedings of International Phd Students Conference, (Mendelnet 2016), 2016, pp. 731–735.
[702] D. Vergara, et al., Genetic and genomic tools for cannabis sativa, Crit. Rev. Plant Sci. 35 (5–6) (2016) 364–377.
[703] J. Liu, et al., Transcriptome differences between fiber-type and seed-type Cannabis sativa variety exposed to salinity, Physiol. Mol. Biol. Plants 22 (4) (2016) 429–443.
[704] R. Lynch, et al., Genomic and chemical diversity in cannabis, Crit. Rev. Plant Sci. 35 (5–6) (2016) 349–363.
[705] S. Soler, et al., Use of embryos extracted from individual cannabis sativa seeds for genetic studies and forensic applications, J. Forensic Sci. 61 (2) (2016) 494–500.
[706] M. Welling, et al., A belated green Revolution for cannabis: virtual genetic Resources to fast-track cultivar development, Front. Plant Sci. (2016) 7.

[707] T. Borna, S. Salami, M. Shokrpour, High resolution melting curve analysis revealed SNPs in major cannabinoid genes associated with drug and non-drug types of cannabis, Biotechnol. Biotechnol. Equip. 31 (4) (2017) 839–845.
[708] S. Soler, et al., Genetic structure of Cannabis sativa var. indica cultivars based on genomic SSR (gSSR) markers: implications for breeding and germplasm management, Ind. Crop. Prod. 104 (2017) 171–178.
[709] N. Cirovic, et al., Differentiation of Cannabis subspecies by THCA synthase gene analysis using RFLP, J. Forensic Legal Med. 51 (2017) 81–84.
[710] R. Houston, et al., Developmental and internal validation of a novel 13 loci STR multiplex method for Cannabis sativa DNA profiling, Leg. Med. 26 (2017) 33–40.
[711] M. Kitamura, et al., Rapid identification of drug-type strains in Cannabis sativa using loop-mediated isothermal amplification assay, J. Nat. Med. 71 (1) (2017) 86–95.
[712] R. Rasoulpour, M. Salehi, E. Salehi, DETECTION AND PARTIAL CHARACTERIZATION OF A 16SrIX-C PHYTOPLASMA ASSOCIATED WITH HEMP WITCHES'-BROOM IN IRAN, J. Plant Pathol. 99 (1) (2017) 219–223.
[713] R. Houston, et al., Nuclear, chloroplast, and mitochondrial data of a US cannabis DNA database, Int. J. Leg. Med. 132 (3) (2018) 713–725.
[714] E. Ponzoni, I. Brambilla, I. Galasso, Genome-wide identification and organization of seed storage protein genes of Cannabis sativa, Biol. Plantarum 62 (4) (2018) 693–702.
[715] T. Yamamuro, et al., Development of rapid and simple method for DNA extraction from cannabis resin based on the evaluation of relative PCR amplification ability, Forensic Sci. Int. 287 (2018) 176–182.
[716] M. Fett, et al., 13-loci STR multiplex system for Brazilian seized samples of marijuana: individualization and origin differentiation, Int. J. Leg. Med. 133 (2) (2019) 373–384.
[717] M. Hadener, et al., Cannabinoid concentrations in confiscated cannabis samples and in whole blood and urine after smoking CBD-rich cannabis as a "tobacco substitute". International Journal of Legal Medicine 133 (3) (2019) 821–832.
[718] D. Vincent, S. Rochfort, G. Spangenberg, Optimisation of protein extraction from medicinal cannabis mature buds for bottom-up proteomics, Molecules (4) (2019) 24.
[719] M. Bartelme, Food safety for marijuana-infused edibles, Food Technol. 70 (3) (2016) 13–14.
[720] D. Benjamin, M. Fossler, Edible cannabis products: it is time for FDA oversight, J. Clin. Pharmacol. 56 (9) (2016) 1045–1047.
[721] M. Boidi, R. Queirolo, J. Cruz, Cannabis consumption patterns among frequent consumers in Uruguay, Int. J. Drug Pol. 34 (2016) 34–40.
[722] J. Borodovsky, et al., Smoking, vaping, eating: Is legalization impacting the way people use cannabis? Int. J. Drug Pol. 36 (2016) 141–147.
[723] D. Buller, et al., Pseudo-underage Assessment of compliance with identification Regulations at retail marijuana Outlets in Colorado, J. Stud. Alcohol Drugs 77 (6) (2016) 868–872.
[724] D. Cao, et al., Characterization of edible marijuana product exposures reported to United States poison centers, Clin. Toxicol. 54 (9) (2016) 840–846.
[725] J. Caulkins, B. Kilmer, The US as an example OF HOW not to legalize marijuana? Addiction 111 (12) (2016) 2095–2096.
[726] J. Caulkins, B. Kilmer, Considering marijuana legalization carefully: insights for other jurisdictions from analysis for Vermont, Addiction 111 (12) (2016) 2082–2089.
[727] P. Cavazos-Rehg, et al., A content analysis of tweets about high-potency marijuana, Drug Alcohol Depend. 166 (2016) 100–108.
[728] J. Cruz, R. Queirolo, M. Boidi, Determinants of public support for marijuana legalization in Uruguay, the United States, and El Salvador, J. Drug Issues 46 (4) (2016) 308–325.
[729] R. Cuchetto, Regulation of agrochemical use on medical/recreational marijuana in Oregon, Abstr. Pap. Am. Chem. Soc. (2016) 252.
[730] B. Erickson, Is it time to relax marijuana's legal status? Chem. Eng. News 94 (25) (2016) 28–32.
[731] B. Friese, et al., Teen use of marijuana edibles: a focus group study of an emerging issue, J. Prim. Prev. 37 (3) (2016) 303–309.
[732] W. Hall, M. Lynskey, Evaluating the public health impacts of legalizing recreational cannabis use in the United States, Addiction 111 (10) (2016) 1764–1773.
[733] R. Johnson, et al., Usual modes of marijuana consumption among high school students in Colorado, J. Stud. Alcohol Drugs 77 (4) (2016) 580–588.
[734] A. Lamonica, M. Boeri, T. Anderson, Gaps in medical marijuana policy implementation: real-time perspectives from marijuana dispensary entrepreneurs, health care professionals and medical marijuana patients, Drugs Educ. Prev. Pol. 23 (5) (2016) 422–434.
[735] F. Lamy, et al., Those edibles hit hard": exploration of Twitter data on cannabis edibles in the U.S, Drug Alcohol Depend. 164 (2016) 64–70.
[736] D. Lee, et al., Online survey characterizing vaporizer use among cannabis users, Drug Alcohol Depend. 159 (2016) 227–233.
[737] E. McDonald, L. Popova, P. Ling, Traversing the triangulum: the intersection of tobacco, legalised marijuana and electronic vaporisers in Denver, Colorado, Tobac. Contr. 25 (2016) i96–i102.
[738] G. Miller, Regulation of agrochemicals use on medical marijuana in Nevada, Abstr. Pap. Am. Chem. Soc. (2016) 252.
[739] B. Moosmann, N. Roth, V. Auwarter, Hair analysis for Delta(9)-tetrahydrocannabinolic acid A (THCA-A) and Delta(9)-tetrahydrocannabinol (THC) after handling cannabis plant material, Drug Test. Anal. 8 (1) (2016) 129–133.
[740] Q. Tian, et al., Finding needles of interested tweets in the haystack of twitter network, in: Proceedings of the 2016 Ieee/acm International Conference on Advances in Social Networks Analysis and Mining Asonam 2016, 2016, pp. 447–452.
[741] Z. Zhang, et al., Tracking dabbing using search query surveillance: a case study in the United States, J. Med. Internet Res. (9) (2016) 18.
[742] A. Alvarez, J. Gamella, I. Parra, Cannabis cultivation in Spain: a profile of plantations, growers and production systems, Int. J. Drug Pol. 37 (2016) 70–81.
[743] A. Perez-Parada, et al., Evaluation of three multiresidue methods for the determination of pesticides in marijuana (cannabis sativa L.) with liquid chromatography-tandem mass spectrometry, Chromatographia 79 (17–18) (2016) 1069–1083.
[744] J. Fike, Industrial hemp: renewed Opportunities for an ancient crop, Crit. Rev. Plant Sci. 35 (5–6) (2016) 406–424.
[745] I. Galasso, et al., Variability in seed traits in a collection of cannabis sativa L. Genotypes, Front. Plant Sci. (2016) 7.
[746] Z. Jankauskiene, et al., Investigation OF hemp (cannabis sativa L.) morphological parameters as influenced BY seed rate and genotype, in: 15th International Scientific Conference: Engineering for Rural Development, 2016, pp. 893–897.
[747] K. Tang, et al., Comparing hemp (Cannabis sativa L.) cultivars for dual-purpose production under contrasting environments, Ind. Crop. Prod. 87 (2016) 33–44.
[748] X. Yan, et al., Diketopiperazine indole alkaloids from hemp seed, Phytochem. Lett. 18 (2016) 77–82.
[749] J. Allen, et al., New product trial, use of edibles, and unexpected highs among marijuana and hashish users in Colorado, Drug Alcohol Depend. 176 (2017) 44–47.
[750] J. Angermann, J. Strull, States as cannabis laboratories: the far-reaching implications of federal non-recognition in the regulation of marijuana contaminants, Abstr. Pap. Am. Chem. Soc. (2017) 253.
[751] J. Antoine, C. Grant, The determination of the inhalable fraction of K-40 activity in marijuana (Cannabis sativa L.) buds by instrumental neutron activation analysis and the effective dose to the body, J. Rad. Res. Appl. Sci. 10 (3) (2017) 289–294.
[752] S. Banerji, C. Hoyte, Does one affect the other? A 5-year characterization of US Poison Center data comparing human marijuana and synthetic cannabinoid exposures, Clin. Toxicol. 55 (5) (2017) 446–447.
[753] J. Borodovsky, A. Budney, Legal cannabis laws, home cultivation, and use of edible cannabis products: a growing, relationship? Int. J. Drug Pol. 50 (2017) 102–110.
[754] J. Borodovsky, et al., US cannabis legalization and use of vaping and edible products among youth, Drug Alcohol Depend. 177 (2017) 299–306.
[755] V. Cortes, J. Velasquez, C. Ibanez, Twitter for marijuana infodemiology, in: 2017 Ieee/wic/acm International Conference on Web Intelligence (Wi 2017), 2017, pp. 730–736.
[756] G. Doran, et al., Work place drug testing of police officers after THC exposure during large volume cannabis seizures, Forensic Sci. Int. 275 (2017) 224–233.
[757] B. Friese, M. Slater, R. Battle, Use of marijuana edibles by adolescents in California, J. Prim. Prev. 38 (3) (2017) 279–294.
[758] C. Gourdet, et al., How four US states are regulating recreational marijuana edibles, Int. J. Drug Pol. 43 (2017) 83–90.
[759] P. Hunt, R. Pacula, Early impacts of marijuana legalization: an evaluation of prices in Colorado and Washington, J. Prim. Prev. 38 (3) (2017) 221–248.
[760] K. Kosa, et al., Consumer use and understanding of labelling information on edible marijuana products sold for recreational use in the states of Colorado and Washington, Int. J. Drug Pol. 43 (2017) 57–66.
[761] M. Krauss, et al., It takes longer, but when it hits you it hits you!": videos about marijuana Edibles on YouTube, Subst. Use Misuse 52 (6) (2017) 709–716.
[762] A. Mackie, Y. Park, G. Gagnon, Chlorination kinetics of 11-Nor-9-carboxy-Delta(9)-tetrahydrocannabinol: effects of pH and humic acid, Environ. Sci. Technol. 51 (18) (2017) 10711–10717.
[763] Y. Park, A. Mackie, G. Gagnon, A critical review of the occurrence, detection, and treatment of Delta(9)-tetrahydrocannabinol in aquatic environments, Environ. Rev. 25 (3) (2017) 255–268.
[764] T. Subritzky, S. Pettigrew, S. Lenton, Into the void: regulating pesticide use in Colorado's commercial cannabis markets, Int. J. Drug Pol. 42 (2017) 86–96.
[765] W. Troutt, M. DiDonato, Carbonyl compounds produced by vaporizing cannabis oil thinning agents, J. Alternative Compl. Med. 23 (11) (2017) 879–884.
[766] F. Ahmad, et al., HIGH-THROUGHPUT phytochemical characterization OF NON-cannabinoid compounds OF cannabis plant and seed, from Pakistan, Pakistan J. Bot. 50 (2) (2018) 639–643.
[767] S. Charlebois, S. Somogyi, B. Sterling, Cannabis-infused food and Canadian consumers' willingness to consider "recreational" cannabis as a food ingredient, Trends Food Sci. Technol. 74 (2018) 112–118.
[768] M. Davidson, et al., Occupational health and safety in cannabis production: an Australian perspective, Int. J. Occup. Environ. Health 24 (3–4) (2018) 75–85.
[769] B. Green, et al., Microbial hazards during harvesting and processing at an

outdoor United States cannabis farm, J. Occup. Environ. Hyg. 15 (5) (2018) 430–440.
[770] N. Jikomes, M. Zoorob, The cannabinoid content of legal cannabis in Washington state varies systematically across testing facilities and popular consumer products, Sci. Rep. (2018) 8.
[771] M. Meacham, M. Paul, D. Ramo, Understanding emerging forms of cannabis use through an online cannabis community: an analysis of relative post volume and subjective highness ratings, Drug Alcohol Depend. 188 (2018) 364–369.
[772] M. Vitiello, R. Deck, Legalizing marijuana: a View from Among the weeds, Hastings Law J. 69 (3) (2018) 961–984.
[773] K. Walters, G. Fisher, L. Tenney, An overview of health and safety in the Colorado cannabis industry, Am. J. Ind. Med. 61 (6) (2018) 451–461.
[774] W. Zhang, et al., Characterization of an acidic alpha-galactosidase from hemp (Cannabis sativa L.) seeds and its application in removal of raffinose family oligosaccharides (RFOs), Acta Biochim. Pol. 65 (3) (2018) 383–389.
[775] R. Abuhasira, L. Shbiro, Y. Landschaft, Medical use of cannabis and cannabinoids containing products - regulations in Europe and North America, Eur. J. Intern. Med. 49 (2018) 2–6.
[776] X. Yu, et al., Comparison study on the pyrolysis of two kinds of ancient plant seeds of the 1st century BCE, Thermochim. Acta 659 (2018) 176–182.
[777] R. Barry, S. Glantz, Marijuana regulatory frameworks in four US states: an analysis against a public health standard, Am. J. Publ. Health 108 (7) (2018) 914–923.
[778] V. Belackova, M. Shanahan, A. Ritter, Mapping regulatory models for medicinal cannabis: a matrix of options, Aust. Health Rev. 42 (4) (2018) 403–411.
[779] A. Janatova, et al., Yield and cannabinoids contents in different cannabis (Cannabis sativa L.) genotypes for medical use, Ind. Crop. Prod. 112 (2018) 363–367.
[780] P. Neu, Discussing possible new regulations in German cannabis policy with special regard to the experiences in The Netherlands and Colorado, Fortschr. Neurol. Psychiatr. 86 (7) (2018) 428–433.
[781] G. Zhu, et al., (+/-)-Sativamides A and B, two Pairs of racemic norlignanamide Enantiomers from the Fruits of Cannabis sativa, J. Org. Chem. 83 (4) (2018) 2376–2381.
[782] K. Ward, P. Lucas, A. Murphy, The impact of marijuana legalization on law enforcement in states surrounding Colorado, Police Q. 22 (2) (2019) 217–242.
[783] D. Malinovsky, N. Kashulin, Vanadium isotope ratio measurements in fruitbodies of Amanita muscaria, Anal. Methods 8 (30) (2016) 5921–5929.
[784] S. Parnmen, et al., Molecular identification of poisonous mushrooms using nuclear ITS region and peptide toxins: a retrospective study on fatal cases in Thailand, J. Toxicol. Sci. 41 (1) (2016) 65–76.
[785] V. Gambaro, et al., DNA-based taxonomic identification of basidiospores in hallucinogenic mushrooms cultivated in "grow-kits" seized by the police: LC-UV quali-quantitative determination of psilocybin and psilocin, J. Pharmaceut. Biomed. Anal. 125 (2016) 427–432.
[786] A. Cowan, K. Elkins, Identification and quantitation of Psilocybe cubensis DNA using a quantitative realtime polymerase chain reaction high resolution melt (qPCR-HRM) assay, Abstr. Pap. Am. Chem. Soc. (2017) 254.
[787] R. Dinis-Oliveira, Metabolism of psilocybin and psilocin: clinical and forensic toxicological relevance, Drug Metabol. Rev. 49 (1) (2017) 84–91.
[788] J. Fricke, F. Blei, D. Hoffmeister, Enzymatic synthesis of psilocybin, Angew. Chem. Int. Ed. 56 (40) (2017) 12352–12355.
[789] C. Lenz, J. Wick, D. Hoffmeister, Identification of omega-N-Methyl-4-hydroxytryptamine (norpsilocin) as a psilocybe natural product, J. Nat. Prod. 80 (10) (2017) 2835–2838.
[790] N. Yang, et al., Chemical study of the fungus Psilocybe merdaria, J. Asian Nat. Prod. Res. 19 (4) (2017) 333–338.
[791] A. Cowan, K. Elkins, Detection and identification of psilocybe cubensis DNA using a real-time polymerase chain reaction high resolution melt assay, J. Forensic Sci. 63 (5) (2018) 1500–1505.
[792] F. Blei, et al., Biocatalytic production of psilocybin and derivatives in tryptophan synthase-enhanced reactions, Chem.-A Eur. J. 24 (40) (2018) 10028–10031.
[793] H. Geiger, M. Wurst, R. Daniels, DARK Classics in chemical neuroscience: psilocybin, ACS Chem. Neurosci. 9 (10) (2018) 2438–2447.
[794] J. Fricke, et al., Production options for psilocybin: making of the magic, Chem.-A Eur. J. 25 (4) (2019) 897–903.
[795] J. Solano, et al., Psychedelic fungus (Psilocybe sp.) authentication in a case of illegal drug traffic: sporological, molecular analysis and identification of the psychoactive substance, Sci. Justice 59 (1) (2019) 102–108.
[796] J. Poklis, et al., The blue Lotus flower (nymphea caerulea) resin used in a new type of electronic cigarette, the Re-buildable dripping atomizer, J. Psychoact. Drugs 49 (3) (2017) 175–181.
[797] C. Liu, Z. Hua, Y. Bai, Classification of opium by UPLC-Q-TOF analysis of principal and minor alkaloids, J. Forensic Sci. 61 (6) (2016) 1615–1621.
[798] V. Micianova, et al., Forensic application of EST-derived STR markers in opium poppy, Biologia 72 (6) (2017) 587–594.
[799] A. Rychla, et al., Influence of year to morphine content in poppy straw (papaver somniferum L.), Seed Seedlings Xiii (2017) 159–163.
[800] Y. Zhang, et al., Evaluation of the quality consistency of powdered poppy capsule extractive by an averagely linear-quantified fingerprint method in combination with antioxidant activities and two compounds analyses, J. Separ. Sci. 40 (23) (2017) 4511–4520.
[801] A. Meos, L. Saks, A. Raal, Content of alkaloids in ornamental Papaver somniferum L. cultivars growing in Estonia, Proc. Est. Acad. Sci. 66 (1) (2017) 34–39.
[802] R. Mirsafavi, et al., Detection of papaverine for the possible identification of illicit opium cultivation, Anal. Chem. 89 (3) (2017) 1684–1688.
[803] R. Purwanto, et al., Unraveling additional O-methylation Steps in benzylisoquinoline alkaloid Biosynthesis in California poppy (Eschscholzia californica), Plant Cell Physiol. 58 (9) (2017) 1528–1540.
[804] M. Tajik, et al., Supercritical fluid extraction of papaverine and noscapine from poppy capsules followed by preconcentration with magnetic nano Fe3O4@Cu@diphenylthiocarbazone particles, New J. Chem. 41 (15) (2017) 7028–7037.
[805] N. Kara, H. Baydar, Examining of relationships among traits using correlation, path and principal components analysis methods in Turkish opium poppy (papaver somniferum L.) cultivars, Tarim Bilimleri Dergisi-J. Agric. Sci. 24 (2) (2018) 286–295.
[806] P. Lopez, et al., Straightforward analytical method to determine opium alkaloids in poppy seeds and bakery products, Food Chem. 242 (2018) 443–450.
[807] D. Powers, S. Erickson, M. Swortwood, Quantification of morphine, codeine, and Thebaine in home-brewed poppy seed Tea by LC-MS/MS, J. Forensic Sci. 63 (4) (2018) 1229–1235.
[808] F. Labanca, J. Ovesna, L. Milella, Papaver somniferum L. taxonomy, uses and new insight in poppy alkaloid pathways, Phytochemistry Rev. 17 (4) (2018) 853–871.
[809] X. Liu, et al., Opium poppy detection using deep learning, Rem. Sens. 10 (12) (2018).
[810] L. Megutnishvili, et al., Gas chromatographic-mass spectrometric characterization of thebaol, an opium constituent, and its structural analogs, J. Pharmaceut. Biomed. Anal. 157 (2018) 116–121.
[811] R. Smith, et al., Detection of opium alkaloids in a Cypriot base-ring juglet, Analyst 143 (21) (2018) 5127–5136.
[812] P. Alam, et al., DARK Classics in chemical neuroscience: opium, a Friend or foe, ACS Chem. Neurosci. 10 (1) (2019) 182–189.
[813] X. Hu, et al., Rapid detection of Pericarpium papaveris in hot pot condiments using thin-layer chromatography and surface enhanced Raman spectroscopy combined with a support vector machine, Anal. Methods 9 (14) (2017) 2177–2182.
[814] J. Oh, et al., Identification and metabolite profiling of alkaloids in aerial parts of Papaver rhoeas by liquid chromatography coupled with quadrupole time-of-flight tandem mass spectrometry, J. Separ. Sci. 41 (12) (2018) 2517–2527.
[815] J. Oh, et al., Transcriptome profiling of two ornamental and medicinal papaver herbs, Int. J. Mol. Sci. (10) (2018) 19.
[816] P. Agarwal, et al., Comparative analysis of transcription factor gene families from Papaver somniferum: identification of regulatory factors involved in benzylisoquinoline alkaloid biosynthesis, Protoplasma 253 (3) (2016) 857–871.
[817] I. Celik, et al., Molecular genetic diversity and association mapping of morphine content and agronomic traits in Turkish opium poppy (Papaver somniferum) germplasm, Mol. Breed. (4) (2016) 36.
[818] Y. Alagoz, et al., Identification and sequence analysis of alkaloid biosynthesis genes in Papaver section Oxytona, Turkish J. Biol. 40 (1) (2016) 174–183.
[819] F. Mastakani, et al., Identification and expression analysis of a microRNA cluster derived from pre-ribosomal RNA in Papaver somniferum L. and Papaver bracteatum L, PloS One (8) (2018) 13.
[820] S. Sohrabi, A. Ismaili, F. Nazarian-Firouzabadi, Simultaneous over-expression and silencing of some benzylisoquinoline alkaloid biosynthetic genes in opium poppy, Ind. Crop. Prod. 123 (2018) 581–590.
[821] J. Zahradnik, et al., Agrobacterium bohemicum sp nov isolated from poppy seed wastes in central Bohemia. Systematic and Applied Microbiology 41 (3) (2018) 184–190.
[822] L. Guo, et al., The opium poppy genome and morphinan production, Science 362 (6412) (2018) 343.
[823] T. Ray, et al., Endophytic consortium with diverse gene-regulating capabilities of benzylisoquinoline alkaloids biosynthetic pathway can enhance endogenous morphine biosynthesis in papaver somniferum, Front. Microbiol. (2019) 10.
[824] T. Herraiz, et al., Identification, occurrence and activity of quinazoline alkaloids in Peganum harmala, Food Chem. Toxicol. 103 (2017) 261–269.
[825] M. Tascon, et al., A rapid and simple method for the determination of psychoactive alkaloids by CE-UV: application to Peganum Harmala seed infusions, Drug Test. Anal. 9 (4) (2017) 596–602.
[826] M. Tascon, L. Gagliardi, F. Benavente, Parts-per-trillion detection of harmala alkaloids in Undaria pinnatifida algae by on-line solid phase extraction capillary electrophoresis mass spectrometry, Anal. Chim. Acta 954 (2017) 60–67.
[827] Z. Wang, et al., Analysis of alkaloids from Peganum harmala L. sequential extracts by liquid chromatography coupled to ion mobility spectrometry, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1096 (2018) 73–79.
[828] M. Canamares, F. Pozzi, J. Lombardi, Raman, SERS, and DFT Analysis of the main alkaloids Contained in Syrian rue, J. Phys. Chem. C 123 (14) (2019) 9262–9271.
[829] N. Kadam, et al., High-performance thin-layer chromatography Method for simultaneous Determination of Antipsychotic and medicinally important

Five beta-carboline alkaloids, J. Chromatogr. Sci. 57 (4) (2019) 312–322.
[830] A. Seilkhan, et al., Anatomical and morphological structure OF peganum harmala OF almaty region and its therapeutic properties, Pakistan J. Bot. 51 (2) (2019) 649–655.
[831] G. Zhang, X. Chi, The complete chloroplast genome of Peganum harmala, Mitochondrial DNA Part B-Resources 4 (1) (2019) 1784–1785.
[832] A. Ng, E. Sandoval, T. Murphy, Identification and individualization of Lophophora using DNA analysis of the trnL/trnF region and rbcL gene, J. Forensic Sci. 61 (2016) S226–S229.
[833] Y. Chen, G. Morlock, Layer-induced sensitivity Enhancement in planar chromatography-bioluminescence-mass spectrometry: Application to alkaloids, Chromatographia 79 (1–2) (2016) 89–96.
[834] A. Lesiak, R. Musah, Rapid high-throughput species identification of botanical material using direct analysis in real time high resolution mass spectrometry, Jove-J. Vis. Exp. (116) (2016).
[835] J. Nowak, et al., Development of advance extraction methods for the extraction of myristicin from myristica fragrans, Food Anal. Methods 9 (5) (2016) 1246–1253.
[836] J. Calahan, et al., Chemical adulterants in herbal medicinal products: a review, Planta Med. 82 (6) (2016) 505–515.
[837] K. Elkins, A. Perez, A. Quinn, Simultaneous identification of four "legal high" plant species in a multiplex PCR high-resolution melt assay(,), J. Forensic Sci. 62 (3) (2017) 593–601.
[838] Y. Jiang, et al., Spectrum-effect relationships between high performance liquid chromatography fingerprint and analgesic property of Anisodus tanguticus (Maxim) Pascher (Solanaceae) roots, Trop. J. Pharmaceut. Res. 16 (2) (2017) 379–386.
[839] I. Abd Hamid, N. Ismail, N. Abd Rahman, Supercritical carbon dioxide extraction of selected herbal leaves: an overview, in: 3rd International Conference on Global Sustainability and Chemical Engineering (Icgsce), 2018, p. 358.
[840] O. Yeter, Identification of the synthetic cannabinoid 1-(4-cyanobutyl)-N-(2-phenylpropan-2-yl)-1H-indazole-3-carboxamide (CUMYL-4CN-BINACA) in plant material and quantification in post-mortem blood samples, J. Anal. Toxicol. 41 (9) (2017) 720–728.
[841] M. Khan, et al., Anti-nociceptive mechanisms of flavonoids-rich methanolic extract from Terminalia coriacea (Roxb.) Wight & Arn. leaves, Food Chem. Toxicol. 115 (2018) 523–531.
[842] A. Romera-Torres, et al., Simultaneous analysis of tropane alkaloids in teas and herbal teas by liquid chromatography coupled to high-resolution mass spectrometry (Orbitrap), J. Separ. Sci. 41 (9) (2018) 1938–1946.
[843] A. Moreno-Pedraza, et al., Elucidating the distribution of plant metabolites from native tissues with laser desorption low-temperature plasma mass spectrometry imaging, Anal. Chem. 91 (4) (2019) 2734–2743.
[844] A. Hariri, et al., Herbal medicines in Iran advertised as opioid withdrawal drugs - analysis by gas chromatography-mass spectrometry. European Journal of Integrative Medicine 25 (2019) 55–59.
[845] J. Marin-Saez, R. Romero-Gonzalez, A. Frenich, Effect of tea making and boiling processes on the degradation of tropane alkaloids in tea and pasta samples contaminated with Solanaceae seeds and coca leaf, Food Chem. 287 (2019) 265–272.
[846] D. Soares, et al., *Psychotria viridis: Chemical constituents from leaves and biological properties.* Anais da Academia Brasileira de Ciências 89 (2) (2017) 927–938.
[847] S. Hatipoglu, et al., Screening of hallucinogenic compounds and genomic characterisation of 40 anatolian Salvia species, Phytochem. Anal. 28 (6) (2017) 541–549.
[848] U. Coffeen, F. Pellicer, Salvia divinorum: from recreational hallucinogenic use to analgesic and anti-inflammatory action, J. Pain Res. 12 (2019) 1069–1076.
[849] J. Zjawiony, et al., Cutting-edge Search for safer opioid pain relief: retrospective Review of salvinorin A and its analogs, Frontiers in psychiatry (2019) 10.
[850] N. Du, et al., Characterization of tropane and cinnamamide alkaloids from Scopolia tangutica by high-performance liquid chromatography with quadrupole time-of-flight tandem mass spectrometry, J. Separ. Sci. 42 (6) (2019) 1163–1173.
[851] N. Du, et al., Strong electrostatic repulsive interaction used for fast and effective alkaloid enrichment from plants, J. Chromatogr. B Anal. Technol. Biomed. Life Sci. 1105 (2019) 148–155.
[852] G. Volpin, et al., Enantioselective synthesis and racemization of (-)-Sinoracutine, Angew. Chem. Int. Ed. 56 (3) (2017) 897–901.
[853] J. Tang, et al., A systematic Review on the sinomenine derivatives, Mini Rev. Med. Chem. 18 (11) (2018) 906–917.
[854] H. Lyu, et al., Alkaloids from the stems and rhizomes of sinomenium acutum from the qinling mountains, China, Phytochemistry 156 (2018) 241–249.
[855] J. Shan, et al., Liquid chromatography coupled with linear ion trap hybrid OrbitrapMass spectrometry for determination of alkaloids in sinomeniumacutum, Molecules 23 (7) (2018).
[856] M. Ciechomska, et al., Development of a microwave-assisted extraction of atropine and scopolamine from Solanaceae family plants followed by a QuEChERS cleanup procedure, J. Liq. Chromatogr. Relat. Technol. 39 (11) (2016) 538–548.
[857] S. Ullrich, et al., Discrimination of wild types and hybrids of Duboisia myoporoides and Duboisia leichhardtii at different growth stages using H-1 NMR-based metabolite profiling and tropane alkaloids-targeted HPLC-MS analysis, Phytochemistry 131 (2016) 44–56.
[858] J. Marin-Saez, R. Romero-Gonzalez, A. Frenich, Multi-analysis determination of tropane alkaloids in cereals and solanaceaes seeds by liquid chromatography coupled to single stage Exactive-Orbitrap, J. Chromatogr. A 1518 (2017) 46–58.
[859] H. John, et al., Simultaneous quantification of atropine and scopolamine in infusions of herbal tea and Solanaceae plant material by matrix-assisted laser desorption/ionization time-of-flight (tandem) mass spectrometry, Rapid Commun. Mass Spectrom. 32 (22) (2018) 1911–1921.
[860] E. Sanchez-Montoya, et al., High resolution UHPLC-MS Metabolomics and sedative-anxiolytic Effects of Latua pubiflora: a mystic Plant used by mapuche amerindians, Front. Pharmacol. (2017) 8.
[861] S. Kayani, et al., Scanning electron microscopy (SEM) and Light microscopy (LM)-based palyno-morphological views of solanaceae in western himalaya, Microsc. Res. Tech. (2) (2019) 82.
[862] A. Xin, et al., Development of an HPLC-DAD method for the determination of five alkaloids in Stephania yunnanensis Lo and in rat plasma after oral dose of Stephania yunnanensis Lo extracts, Biomed. Chromatogr. 32 (10) (2018).
[863] A. Argente-Garcia, et al., A solid colorimetric sensor for the analysis of amphetamine-like street samples, Anal. Chim. Acta 943 (2016) 123–130.
[864] P. Chen, et al., Modifier-assisted differential mobility-tandem mass spectrometry method for detection and quantification of amphetamine-type stimulants in urine, Anal. Chim. Acta 946 (2016) 1–8.
[865] P. Ondra, et al., Analysis of amphetamine-derived designer Drugs by gas Chromatography with mass spectrometry(aEuro), J. Anal. Toxicol. 40 (1) (2016) 78–85.
[866] M.A. Bodnar Willard, V.L. McGuffin, R.W. Smith, Statistical comparison of mass spectra for identification of amphetamine-type stimulants, Forensic Sci. Int. 270 (2017) 111–120.
[867] J.A. Weiss, K. Kadkhodaei, M.G. Schmid, Indirect chiral separation of 8 novel amphetamine derivatives as potential new psychoactive compounds by GC-MS and HPLC, Sci. Justice 57 (1) (2017) 6–12.
[868] T.S. Alkhuraiji, A.W. Ajlouni, Destruction of amphetamine in aqueous solution using gamma irradiation, Radiat. Phys. Chem. 139 (2017) 17–21.
[869] Y. Jang, et al., Point-of-Use Detection of amphetamine-type Stimulants with host-molecule-functionalized organic transistors, Inside Chem. 3 (4) (2017) 641–651.
[870] M.A.B. Willard, V.L. McGuffin, R.W. Smith, Statistical comparison of mass spectra for identification of amphetamine-type stimulants, Forensic Sci. Int. 270 (2017) 111–120.
[871] H. Segawa, et al., Differentiation of ring-substituted regioisomers of amphetamine and methamphetamine by supercritical fluid chromatography, Drug Test. Anal. 9 (3) (2017) 389–398.
[872] C. Liu, et al., Identification of five substituted phenethylamine derivatives 5-MAPDB, 5-AEDB, MDMA methylene homolog, 6-Br-MDMA, and 5-APB-NBOMe, Drug Test. Anal. 9 (2) (2017) 199–207.
[873] M. McGonigal, et al., Analysis of synthetic phenethylamine street drugs using direct sample analysis coupled to accurate mass time of flight mass spectrometry, Forensic Sci. Int. 275 (2017) 83–89.
[874] D. Wasserberg, P. Jonkheijm, Supramolecular wearable sensors, Inside Chem. 3 (4) (2017) 531–533.
[875] M. Ristic, M. Petkovic, M. Etinski, Quantum chemical study on phenethylamines reveals new cation structures, Comput. Theor. Chem. 1114 (2017) 47–54.
[876] Z. Wang, et al., Comparison of three S-beta-CDs with different degrees of substitution for the chiral separation of 12 drugs in capillary electrophoresis, Chirality 29 (9) (2017) 558–565.
[877] B. Chen, et al., Comparison of the characteristic mass fragmentations of phenethylamines and tryptamines by electron ionization gas chromatography mass spectrometry, electrospray and matrix-assisted laser desorption ionization mass spectrometry, Appl. Sci.-Basel (7) (2018) 8.
[878] F. Accioni, et al., SUPRAS extraction approach for matrix-independent determination of amphetamine-type stimulants by LC-MS/MS, Talanta 182 (2018) 574–582.
[879] X. Cui, et al., Simultaneous chiral analysis of amphetamine-type stimulants and ephedrine by capillary electrophoresis coupled to time-of-flight mass spectrometry, Chirality 30 (9) (2018) 1079–1087.
[880] K. Sugie, et al., Rapid detection of tert-butoxycarbonyl-methamphetamine by direct analysis in real time time-of-flight mass spectrometry, Forensic Toxicol. 36 (2) (2018) 261–269.
[881] D. Doughty, et al., Detailed investigations into the Akabori-Momotani reaction for the synthesis of amphetamine type stimulants: Part 2, Forensic Sci. Int. 287 (2018) 207–216.
[882] J. Zhao, et al., Detection and quantification of phenethylamines in sports dietary supplements by NMR approach, J. Pharmaceut. Biomed. Anal. 151 (2018) 347–355.
[883] H. Li, et al., A label-free impedimetric sensor for the detection of an amphetamine-type derivative based on cucurbit[7]uril-mediated three-dimensional AuNPs, Electrochem. Commun. 100 (2019) 126–133.
[884] H. Garcia, et al., Vibrational and structural properties of barbiturate anions in supramolecular compounds, Vib. Spectrosc. 86 (2016) 134–142.
[885] E. Giziroglu, et al., Barbiturate bearing aroylhydrazine derivatives: synthesis, NMR investigations, single crystal X-ray studies and biological activity, J. Mol. Struct. 1108 (2016) 325–333.
[886] H. Tian, et al., Simultaneous determination of phenobarbital, pentobarbital,

amobarbital and secobarbital in raw milk via liquid chromatography with electron spray ionization tandem mass spectrometry, Korean J. Food Sci. Anim. Resour. 37 (6) (2017) 847–854.
[887] Y. Borisova, G. Raskil'dina, S. Zlotskii, Synthesis of novel spirocyclopropylmalonates and barbiturates, Dokl. Chem. 476 (2017) 201–205.
[888] J. Buchweitz, et al., Development of a quantitative gas chromatography-tandem mass spectrometry method for the determination of pentobarbital in dog food, J. Agric. Food Chem. 66 (42) (2018) 11166–11169.
[889] S. Apostolov, et al., Chromatographic descriptors in QSAR study of barbiturates, J. Liq. Chromatogr. Relat. Technol. 42 (7–8) (2019) 194–203.
[890] A. Rad, A. Mirabi, S. Ahmadizadeh, Graphene oxide enhances SBA-15 ability towards preconcentration as well as determination of barbiturate drug in real samples, Kuwait J. Sci. 46 (1) (2019) 49–57.
[891] X. Yan, et al., Chemoselective syntheses of spirodihydrofuryl and spirocyclopropyl barbiturates via cascade reactions of barbiturate-based olefins and acetylacetone, Org. Biomol. Chem. 17 (10) (2019) 2684–2690.
[892] M. Ghambarian, et al., Dispersive liquid-liquid microextraction with back extraction using an immiscible organic solvent for determination of benzodiazepines in water, urine, and plasma samples, RSC Adv. 6 (115) (2016) 114198–114207.
[893] K. Soltaninejad, et al., Simultaneous determination of six benzodiazepines in spiked soft drinks by high performance liquid chromatography with ultra violet detection (HPLC-UV), Iran. J. Pharm. Res. (IJPR) 15 (2) (2016) 457–463.
[894] F. Zhou, et al., Thermal-assisted gasification injector for analyzing high-salt solution samples: a novel device developed for online coupling of liquid chromatography with direct analysis in real time mass spectrometry, RSC Adv. 6 (101) (2016) 98927–98934.
[895] P. Samiec, Z. Navratilova, Electrochemical behaviour of bromazepam and alprazolam and their determination in the pharmaceutical tablets Lexaurin and Xanax on carbon paste electrode, Monatshefte Fur Chemie 148 (3) (2017) 449–455.
[896] P. Samiec, et al., Mercury-free and modification-free electroanalytical approach towards bromazepam and alprazolam sensing: a facile and efficient assay for their quantification in pharmaceuticals using boron-doped diamond electrodes, Sensor. Actuator. B Chem. 245 (2017) 963–971.
[897] P. Mondal, S. Sobharani, R. Ramakrishna, A novel simultaneous quantification Method for Escitalopram and Etizolam in human plasma using liquid chromatography-ESI-tandem mass spectrophotometry-Application to pharmacokinetic study, Curr. Pharmaceut. Anal. 13 (3) (2017) 279–288.
[898] J. Tomkova, et al., Analysis of selected designer benzodiazepines by ultra high performance liquid chromatography with high-resolution time-of-flight mass spectrometry and the estimation of their partition coefficients by micellar electrokinetic chromatography, J. Separ. Sci. 40 (9) (2017) 2037–2044.
[899] M. Bergstrand, et al., Detectability of designer benzodiazepines in CEDIA, EMIT II Plus, HEIA, and KIMS II immunochemical screening assays, Drug Test. Anal. 9 (4) (2017) 640–645.
[900] R. Abouchedid, et al., Assessment of the availability, cost, and motivations for use over time of the new psychoactive substances-benzodiazepines diclazepam, flubromazepam, and pyrazolam-in the UK, J. Med. Toxicol. 14 (2) (2018) 134–143.
[901] S. Zhang, et al., Fabrication of magnetic zinc adeninate metal-organic frameworks for the extraction of benzodiazepines from urine and wastewater, J. Separ. Sci. 41 (8) (2018) 1864–1870.
[902] C. de Paula, et al., Recognizing drug-facilitated crimes: detection and quantification of benzodiazepines in beverages using fast liquid-liquid extraction with low temperature partitioning and paper spray mass spectrometry, Drug Test. Anal. 10 (9) (2018) 1348–1357.
[903] M. Piergiovanni, et al., Determination of benzodiazepines in beverages using green extraction methods and capillary HPLC-UV detection, J. Pharmaceut. Biomed. Anal. 154 (2018) 492–500.
[904] T. Kuruvilla, et al., Vibrational spectroscopic (FT-IR, FT-Raman) and quantum mechanical study of 4-(2-chlorophenyl)-2-ethyl-9-methyl-6H-thieno[3,2-f][1,2,4] triazolo[4,3-a][1,4] diazepine, J. Mol. Struct. 1157 (2018) 519–529.
[905] H. Ashrafi, et al., Sensitive detection and determination of benzodiazepines using silver nanoparticles-N-GQDs ink modified electrode: a new platform for modern pharmaceutical analysis, Microchem. J. 145 (2019) 1050–1057.
[906] H. Ashrafi, et al., Monitoring of five benzodiazepines using a novel polymeric interface prepared by layer by layer strategy, Microchem. J. 146 (2019) 121–125.
[907] H. Elmansi, F. Belal, Development of an Eco-friendly HPLC method for the simultaneous determination of three benzodiazepines using green mobile phase, Microchem. J. 145 (2019) 330–336.
[908] V. Shevyrin, Y. Shafran, Distinguishing of 2-MAPB and 6-MAPB: Solution of the problem, J. Mass Spectrom. 52 (10) (2017) 633–637.
[909] S. Hiremath, et al., Molecular structure, vibrational spectra, NMR, UV, NBO, NLO, HOMO-LUMO and molecular docking of 2-(4, 6-dimethy1-1-benzofuran-3-yl) acetic acid (2DBAA): Experimental and theoretical approach, J. Mol. Struct. 1171 (2018) 362–374.
[910] S. Hiremath, et al., Synthesis of 5-(5-methyl-benzofuran-3-ylmethyl)-3H-[1,3,4] oxadiazole-2-thione and investigation of its spectroscopic, reactivity, optoelectronic and drug likeness properties by combined computational and experimental approach, Spectrochim. Acta Mol. Biomol. Spectrosc. 205 (2018) 95–110.
[911] P. Murthy, et al., Structural and spectroscopic characterization, reactivity study and charge transfer analysis of the newly synthetized 2-(6-hydroxy-1-benzofuran-3-yl) acetic acid, J. Mol. Struct. 1162 (2018) 81–95.
[912] G. Deng, et al., Synthesis of benzofuran derivatives through cascade radical cyclization/intermolecular coupling of 2-azaallyls, Angew. Chem. Int. Ed. 58 (9) (2019) 2826–2830.
[913] W. Huang, et al., Lewis acid-catalyzed Synthesis of Benzofurans and 4,5,6,7-Tetrahydrobenzofurans from acrolein Dinner and 1,3-dicarbonyl compounds, J. Org. Chem. 84 (5) (2019) 2941–2950.
[914] S. Mikhalyonok, et al., The efficient synthesis of substituted 2-methylbenzofurans, Chem. Heterocycl. Compd. 55 (3) (2019) 205–211.
[915] S. Rashid, B. Bhat, G. Mehta, A vicarious, one-pot synthesis of benzo- and naphthofurans: Applications to the syntheses of stereumene B and paeoveitols, Tetrahedron Lett. 60 (16) (2019) 1122–1125.
[916] Y. Chen, J. Liu, D. Pan, Discrimination of fluoroamphetamine regioisomers by Raman spectroscopy, J. Chin. Chem. Soc. 63 (2) (2016) 219–221.
[917] H. Inoue, et al., Differentiation of ring-substituted bromoamphetamine analogs by gas chromatography-tandem mass spectrometry, Forensic Toxicol. 34 (1) (2016) 125–132.
[918] P. Blanckaert, et al., Identification and characterization of 4-chloromethamphetamine (4-CMA) in seized ecstacy - a risk to public health, Forensic Sci. Int. 288 (2018) 173–180.
[919] A. Yanini, et al., Identification and characterization of the new psychoactive substance 3-fluoroethamphetamine in seized material, Forensic Toxicol. 36 (2) (2018) 404–414.
[920] M. Blankers, D. van der Gouwe, M. van Laar, 4-Fluoramphetamine in The Netherlands: text-mining and sentiment analysis of internet forums, Int. J. Drug Pol. 64 (2019) 34–39.
[921] K.M. Mohamed, et al., A GC-MS Method for Detection and Quantification of cathine, cathinone, Methcathinone and Ephedrine in oral fluid, J. Chromatogr. Sci. 54 (8) (2016) 1271–1276.
[922] I. Gonzalez-Marino, et al., Wastewater-based epidemiology to monitor synthetic cathinones Use in different European countries, Environ. Sci. Technol. 50 (18) (2016) 10089–10096.
[923] S. Kerrigan, et al., Thermal degradation of synthetic cathinones: implications for forensic toxicology, J. Anal. Toxicol. 40 (1) (2016) 1–11.
[924] B. Molnar, et al., Structure-related related new approach in the gas chromatography/mass spectrometry analysis of cathinone type synthetic drugs, J. Chromatogr. A 1477 (2016) 70–75.
[925] W. Hong, et al., Determination of synthetic cathinones in urine using gas chromatography-mass spectrometry techniques, J. Anal. Toxicol. 40 (1) (2016) 12–16.
[926] B. Silva, et al., Chiral enantioresolution of cathinone derivatives present in "legal highs", and enantioselectivity evaluation on cytotoxicity of 3,4-methylenedioxypyrovalerone (MDPV), Forensic Toxicol. 34 (2) (2016) 372–385.
[927] Y. Abiedalla, J. DeRuiter, C. Clark, Product ion tandem mass spectrometric differentiation of regioisomeric side-chain groups in cathinone derivatives, Rapid Commun. Mass Spectrom. 30 (14) (2016) 1713–1721.
[928] K. Ellefsen, M. Concheiro, M. Huestis, Synthetic cathinone pharmacokinetics, analytical methods, and toxicological findings from human performance and postmortem cases, Drug Metabol. Rev. 48 (2) (2016) 237–265.
[929] M. Majchrzak, et al., Identification and characterization of new designer drug 4-fluoro-PV9 and alpha-PHP in the seized materials, Forensic Toxicol. 34 (1) (2016) 115–124.
[930] L. Bijlsma, et al., Identification and characterization of a novel cathinone derivative 1-(2,3-dihydro-1H-inden-5-yl)-2-phenyl-2-(pyrrolidin-1-yl)-ethanone seized by customs in Jersey, Forensic Toxicol. 34 (1) (2016) 144–150.
[931] E. Kohyama, et al., Differentiation of the isomers of N-alkylated cathinones by GC-EI-MS-MS and LC-PDA, Anal. Sci. 32 (8) (2016) 831–837.
[932] K. Alsenedi, C. Morrison, Comparison of six derivatizing agents for the determination of nine synthetic cathinones using gas chromatography-mass spectrometry, Anal. Methods 9 (18) (2017) 2732–2743.
[933] Z. Qian, et al., Identification and analytical characterization of four synthetic cathinone derivatives iso-4-BMC, -TH-naphyrone, mexedrone, and 4-MDMC, Drug Test. Anal. 9 (2) (2017) 274–281.
[934] C. Liu, et al., Identification and analytical characterization of nine synthetic cathinone derivatives N-ethylhexedrone, 4-Cl-pentedrone, 4-Cl-alpha-EAPP, propylone, N-ethylnorpentylone, 6-MeO-bk-MDMA, alpha-PiHP, 4-Cl-alpha-PHP, and 4-F-alpha-PHP, Drug Test. Anal. 9 (8) (2017) 1162–1171.
[935] A. Maas, et al., Separation of ortho, meta and para isomers of methylmethcathinone (MMC) and methylethcathinone (MEC) using LC-ESI-MS/MS: Application to forensic serum samples, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1051 (2017) 118–125.
[936] A. Blazewicz, et al., Identification and structural characterization of four novel synthetic cathinones: alpha-methylaminohexanophenone (hexedrone, HEX), 4-bromoethcathinone (4-BEC), 4-chloro-alpha-pyrrolidinopropiophenone (4-Cl-PPP), and 4-bromo-alpha-pyrrolidinopentiophenone (4-Br-PVP) after their seizures, Forensic Toxicol. 35 (2) (2017) 317–332.
[937] J. Zawilska, J. Wojcieszak, alpha-Pyrrolidinophenones: a new wave of designer cathinones, Forensic Toxicol. 35 (2) (2017) 201–216.
[938] Z. Qian, et al., Identification of five pyrrolidinyl substituted cathinones and the collision-induced dissociation of electrospray-generated pyrrolidinyl substituted cathinones, Drug Test. Anal. 9 (5) (2017) 778–787.
[939] Y. Abiedalla, J. DeRuiter, C. Clark, GC-MS, GC-MS/MS and GC-IR

differentiation of desoxy cathinone derivatives: Cyclic tertiary amines related to MDPV, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1048 (2017) 38–48.
[940] Y. Abiedalla, et al., Differentiation of the six dimethoxypyrovalerone regioisomers: GC-MS, GC-MS/MS and GC-IR, Talanta 171 (2017) 220–228.
[941] S. Tai, C. Morrison, Chiral and stable isotope analysis of synthetic cathinones, Trac. Trends Anal. Chem. 86 (2017) 251–262.
[942] M. Rojkiewicz, et al., Spectroscopic and crystallographic characterization of two cathinone derivatives: 1-(4-fluorophenyl)-2-(methylamino)pentan-1-one (4-FPD) hydrochloride and 1-(4-methylphenyl)-2-(ethylamino)pentan-1-one (4-MEAP) hydrochloride, Forensic Toxicol. 36 (1) (2018) 141–150.
[943] K. Alsenedi, C. Morrison, Determination and long-term stability of twenty-nine cathinones and amphetamine-type stimulants (ATS) in urine using gas chromatography-mass spectrometry, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1076 (2018) 91–102.
[944] M. Majchrzak, et al., The newest cathinone derivatives as designer drugs: an analytical and toxicological review, Forensic Toxicol. 36 (1) (2018) 33–50.
[945] H. Gaspar, et al., Proactive response to tackle the threat of emerging drugs: synthesis and toxicity evaluation of new cathinones, Forensic Sci. Int. 290 (2018) 146–156.
[946] B. Silva, et al., Chiral resolution and enantioselectivity of synthetic cathinones: a brief review, J. Anal. Toxicol. 42 (1) (2018) 17–24.
[947] S. Zaami, et al., Synthetic cathinones related fatalities: an update, Eur. Rev. Med. Pharmacol. Sci. 22 (1) (2018) 268–274.
[948] O. Apirakkan, et al., Analytical characterization of three cathinone derivatives, 4-MPD, 4F-PHP and bk-EPDP, purchased as bulk powder from online vendors, Drug Test. Anal. 10 (2) (2018) 372–378.
[949] B. Silva, et al., Multi-milligram resolution and determination of absolute configuration of pentedrone and methylone enantiomers, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1100 (2018) 158–164.
[950] P. Nowak, et al., Thermodynamics of acid-base dissociation of several cathinones and 1-phenylethylamine, studied by an accurate capillary electrophoresis method free from the Joule heating impact, J. Chromatogr. A 1539 (2018) 78–86.
[951] M. Wozniakiewicz, et al., Acidity of substituted cathinones studied by capillary electrophoresis using the standard and fast alternative approaches, Talanta 180 (2018) 193–198.
[952] A. Carlsson, et al., Prediction of designer drugs: synthesis and spectroscopic analysis of synthetic cathinone analogs that may appear on the Swedish drug market, Drug Test. Anal. 10 (7) (2018) 1076–1098.
[953] R. Couto, et al., The analytical challenge in the determination of cathinones, key-players in the worldwide phenomenon of novel psychoactive substances, Crit. Rev. Anal. Chem. 48 (5) (2018) 372–390.
[954] L. Tremeau-Cayel, et al., A comparison of single quadrupole mass detection and diode array ultraviolet detection interfaced to ultra-high performance supercritical chromatography for the quantitative analysis of synthetic cathinones, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1091 (2018) 96–100.
[955] D. Fabregat-Safont, et al., Reporting the novel synthetic cathinone 5-PPDI through its analytical characterization by mass spectrometry and nuclear magnetic resonance, Forensic Toxicol. 36 (2) (2018) 447–457.
[956] S. Simmons, et al., DARK Classics in chemical neuroscience: cathinone-derived psychostimulants, ACS Chem. Neurosci. 9 (10) (2018) 2379–2394.
[957] D. Fabregat-Safont, et al., Rapid tentative identification of synthetic cathinones in seized products taking advantage of the full capabilities of triple quadrupole analyzer, Forensic Toxicol. 37 (1) (2019) 34–44.
[958] Y. Zou, et al., Synthesis of mesoporous-silica coated multi-branched gold nanoparticles for surface enhanced Raman scattering evaluation of 4-bromomethcathinone, J. Saudi Chem. Soc. 23 (3) (2019) 378–383.
[959] R. Moreira, et al., Accessing the chemical profile of ecstasy tablets seized in Sao Paulo (Brazil) by FT-Raman Spectroscopy, Vib. Spectrosc. 87 (2016) 104–110.
[960] A. Jalali, et al., Impact of pharmaceutical impurities in ecstasy tablets: gas chromatography-mass spectrometry study, Iran. J. Pharm. Res. (IJPR) 15 (1) (2016) 221–229.
[961] J. Palamar, There's something about Molly: The underresearched yet popular powder form of ecstasy in the United States, Subst. Abuse 38 (1) (2017) 15–17.
[962] N. Almeida, et al., A validated NMR Approach for MDMA Quantification in ecstasy tablets, J. Braz. Chem. Soc. 29 (9) (2018) 1944–1950.
[963] D. de la Fuente, et al., The emergence OF MDMA: super strength ecstasy pills, Basic Clin. Pharmacol. Toxicol. 123 (2018), 84–84.
[964] J. Neto, et al., Genuine sildenafil tablets sold in Brazil disguised as MDMA, Forensic Sci. Int. 283 (2018) E8–E12.
[965] L. Pereira, et al., Screening method for rapid classification of psychoactive substances in illicit tablets using mid infrared spectroscopy and PLS-DA, Forensic Sci. Int. 288 (2018) 227–235.
[966] T. Bora, H. Celikkan, Statistical assessment using chemical profiling of ecstasy samples seized in Turkey, J. Anal. Chem. 73 (10) (2018) 1020–1028.
[967] A. da Silva, et al., Bioanalytical methods for determining ecstasy components in biological matrices: a review, Trac. Trends Anal. Chem. 108 (2018) 323–346.
[968] C. Maione, et al., Establishing chemical profiling for ecstasy tablets based on trace element levels and support vector machine, Neural Comput. Appl. 30 (3) (2018) 947–955.
[969] E. Deconinck, et al., Combining attenuated total reflectance- infrared spectroscopy and chemometrics for the identification and the dosage estimation of MDMA tablets, Talanta 195 (2019) 142–151.
[970] A. Varriale, et al., On the possibility of ephedrine detection: time-resolved fluorescence resonance energy transfer (FRET)-based approach, Anal. Bioanal. Chem. 408 (23) (2016) 6329–6336.
[971] H. Bagheri, et al., Fabrication of a novel electrochemical sensing platform based on a core-shell nano-structured/molecularly imprinted polymer for sensitive and selective determination of ephedrine, RSC Adv. 6 (56) (2016) 51135–51145.
[972] K. Balamurugan, K. Gokulakrishnan, T. Prakasam, Preparation and evaluation of molecularly imprinted polymer liquid chromatography column for the separation of ephedrine enantiomers, Arab. J. Chem. 9 (2016) S528–S536.
[973] A. Hong, et al., Fluorescence-detected circular dichroism spectroscopy of jet-cooled ephedrine. Physical Chemistry Chemical Physics 18 (11) (2016) 7762–7767.
[974] M. Pavlacka, et al., A rapid differentiation of ephedrine and pseudoephedrine by differential mobility spectrometry, in: Proceedings of the 12th International Students Conference Modern Analytical Chemistry, 2016, pp. 12–16.
[975] J. Zhang, Y. Zhang, Y. Wang, Validated quantification method for five ephedrines in dietary supplements using LC-MS/MS: application to 503 cases, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1039 (2016) 1–7.
[976] M. Praisler, et al., Hunting for illicit psychoactive substances and precursors: a multivariate approach. 2017 21st international conference on system theory, Contr. Comput. (2017) 248–253.
[977] M. Praisler, S. Ciochina, C. Negoita, Improved selectivity in detecting controlled amphetamines and their main precursors based on laser infrared spectra, in: 2017 Ieee International Conference on E-Health and Bioengineering Conference (Ehb), 2017, pp. 233–236.
[978] L. Miao, et al., Two-dimensional correlation infrared spectroscopy applied to the identification of ephedrine and pseudoephedrine in illegally adulterated slimming herbal products, Drug Test. Anal. 9 (2) (2017) 221–229.
[979] B. Tircova, P. Kozlik, HILIC-MS/MS Method for Analysis of Ephedrine in internet-available drugs, Chromatographia 80 (4) (2017) 523–528.
[980] O. Aksu Donmez, et al., Simultaneous quantitative analysis of ephedrine HCl, guaifenesin, and some synthetic additives in syrups by RP-HPLC using box-behnken design, Lat. Am. J. Pharm. 37 (1) (2018) 85–94.
[981] G. Carneiro, et al., Fast ephedrine quantification by gas chromatography mass spectrometry, J. Braz. Chem. Soc. 29 (12) (2018) 2514–2521.
[982] A. Doddridge, M. Collins, H. Salouros, Profiling ephedrine prepared from N-methylalanine via the Akabori-Momotani reaction, Drug Test. Anal. 10 (3) (2018) 548–556.
[983] B. Georgescu, et al., Application of unusual on/off electrochemical properties of a molecularly imprinted polymer based on an EDOT-thiophene precursor for the detection of ephedrine, Electrochem. Commun. 94 (2018) 45–48.
[984] N. Jornet-Martinez, et al., Modifying the reactivity of copper (II) by its encapsulation into polydimethylsiloxane: a selective sensor for ephedrine-like compounds, Talanta 196 (2019) 300–308.
[985] Q. Guo, et al., Simultaneous determination of 25 ergot alkaloids in cereal samples by ultraperformance liquid chromatography-tandem mass spectrometry, J. Agric. Food Chem. 64 (37) (2016) 7033–7039.
[986] A. Jarmusch, et al., Comparison of electrospray ionization and atmospheric pressure photoionization liquid chromatography mass spectrometry methods for analysis of ergot alkaloids from endophyte-infected sleepygrass (Achnatherum robustum), J. Pharmaceut. Biomed. Anal. 117 (2016) 11–17.
[987] E. Kowalczyk, et al., Development and validation of an analytical method for determination of ergot alkaloids in animal feedingstuffs with high performance liquid chromatography-fluorescence detection, Pol. J. Vet. Sci. 19 (3) (2016) 559–565.
[988] N. Leon, A. Pastor, V. Yusa, Target analysis and retrospective screening of veterinary drugs, ergot alkaloids, plant toxins and other undesirable substances in feed using liquid chromatography-high resolution mass spectrometry, Talanta 149 (2016) 43–52.
[989] J. Liu, et al., Determination of alkaloids in Catharanthus roseus and Vinca minor by high-performance liquid chromatography-tandem mass spectrometry, Anal. Lett. 49 (8) (2016) 1143–1153.
[990] J. Chen, et al., Recent progress in ergot alkaloid research, RSC Adv. 7 (44) (2017) 27384–27396.
[991] J. Dopstadt, et al., Localization of ergot alkaloids in sclerotia of Claviceps purpurea by matrix-assisted laser desorption/ionization mass spectrometry imaging, Anal. Bioanal. Chem. 409 (5) (2017) 1221–1230.
[992] S. Florea, D. Panaccione, C. Schardl, Ergot alkaloids of the family clavicipitaceae, Phytopathology 107 (5) (2017) 504–518.
[993] D. Hu, M. Li, Three new ergot alkaloids from the fruiting bodies of xylaria nigripes (kl.) sacc, Chem. Biodivers. 14 (1) (2017).
[994] C. Oellig, Lysergic acid amide as chemical marker for the total ergot alkaloids in rye flour - determination by high-performance thin-layer chromatography-fluorescence detection, J. Chromatogr. A 1507 (2017) 124–131.
[995] M. Shahid, et al., Biosynthesis OF ergot alkaloids from penicillium commune using response surface methodology (RSM), Pakistan J. Bot. 49 (4) (2017) 1569–1578.
[996] J. Shimshoni, et al., Newly discovered ergot alkaloids in Sorghum ergot Claviceps africana occurring for the first time in Israel, Food Chem. 219 (2017) 459–467.

[997] V. Uka, et al., Unravelling the diversity of the cyclopiazonic acid family of mycotoxins in Aspergillus flavus by UHPLC triple-TOF HRMS, Toxins 9 (1) (2017).
[998] P. Vermeulen, et al., Online detection and quantification of particles of ergot bodies in cereal flour using near-infrared hyperspectral imaging, Food Addit. Contam. Part a-Chemistry Analysis Control Exposure & Risk Assessment 34 (8) (2017) 1312–1319.
[999] C. Bacon, et al., In situ ergot alkaloid detection in three Balansia epichloe-infected grass species, J. Appl. Microbiol. 125 (4) (2018) 976–985.
[1000] M. Bryla, et al., Occurrence of ergot and its alkaloids in winter rye harvested in Poland, World Mycotoxin J. 11 (4) (2018) 635–646.
[1001] M. Gross, V. Curtui, E. Usleber, Detection of total ergot alkaloids in cereal flour and in bread by a generic enzyme immunoassay method, J. AOAC Int. 101 (3) (2018) 618–626.
[1002] B. Kniel, et al., Studies on the applicability of HPLC-FLD and HPLC-MS/MS for the determination of ergot alkaloids in rye-containing breads, J. Consumer Protect. Food Saf. 13 (1) (2018) 69–78.
[1003] A. Romera-Torres, et al., Analytical methods, occurrence and trends of tropane alkaloids and calystegines: An update, J. Chromatogr. A 1564 (2018) 1–15.
[1004] C. Schummer, L. Brune, G. Moris, Development of a UHPLC-FLD method for the analysis of ergot alkaloids and application to different types of cereals from Luxembourg, Mycotoxin Res. 34 (4) (2018) 279–287.
[1005] M. Shahid, et al., Qualitative and quantitative analysis OF ergot alkaloids produced BY aspergillus Niger through surface culture fermentation process, Pakistan J. Bot. 50 (6) (2018) 2423–2428.
[1006] H. Shi, P. Yu, Exploring the potential of applying infrared vibrational (micro) spectroscopy in ergot alkaloids determination: techniques, current status, and challenges, Appl. Spectrosc. Rev. 53 (5) (2018) 395–419.
[1007] I. Holderied, M. Rychlik, P. Elsinghorst, Optimized analysis of ergot alkaloids in rye products by liquid chromatography-fluorescence detection applying lysergic acid diethylamide as an internal standard, Toxins 11 (4) (2019).
[1008] M. Kresse, et al., Simultaneous determination of pesticides, mycotoxins, and metabolites as well as other contaminants in cereals by LC-LC-MS/MS, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1117 (2019) 86–102.
[1009] H. Shi, et al., Major ergot alkaloids in naturally contaminated cool-season barley grain grown under a cold climate condition in western Canada, explored with near-infrared (NIR) and fourier transform mid-infrared (ATR-FT/MIR) spectroscopy, Food Contr. 102 (2019) 221–230.
[1010] P. Lipinski, et al., Conformation of six fentanyls revisited, Comput. Theor. Chem. 1086 (2016) 18–24.
[1011] T. Breindahl, et al., Identification of a new psychoactive substance in seized material: the synthetic opioid N-phenyl-N-[1-(2-phenethyl)piperidin-4-yl] prop-2-enamide (Acrylfentanyl), Drug Test. Anal. 9 (3) (2017) 415–422.
[1012] D. Guerrieri, et al., Acrylfentanyl: Another new psychoactive drug with fatal consequences, Forensic Sci. Int. 277 (2017) E21–E29.
[1013] I. Ujvary, et al., Acryloylfentanyl, a recently emerged new psychoactive substance: a comprehensive review, Forensic Toxicol. 35 (2) (2017) 232–243.
[1014] T. Kanamori, et al., Characterization and differentiation of geometric isomers of 3-methylfentanyl analogs by gas chromatography/mass spectrometry, liquid chromatography/mass spectrometry, and nuclear magnetic resonance spectroscopy, J. Forensic Sci. 62 (6) (2017) 1472–1478.
[1015] P. Quintana, et al., The hidden web and the fentanyl problem: detection of ocfentanil as an adulterant in heroin, Int. J. Drug Pol. 40 (2017) 78–83.
[1016] N. Misailidi, et al., Fentanyls continue to replace heroin in the drug arena: the cases of ocfentanil and carfentanil, Forensic Toxicol. 36 (1) (2018) 12–32.
[1017] C. Liu, et al., The identification and analytical characterization of 2,2 '-difluorofentanyl, Drug Test. Anal. 10 (4) (2018) 774–780.
[1018] M. Zawadzki, K. Nowak, Fentanyl and its derivatives as a group of new psychoactive substances (designer drugs), Postępy Higieny Medycyny Doświadczalnej 72 (2018) 547–556.
[1019] V. Ziesenitz, et al., Pharmacokinetics of fentanyl and its derivatives in children: a comprehensive review (vol 57, pg 125, 2018), Clin. Pharmacokinet. 57 (3) (2018) 393–417.
[1020] G. McLaughlin, et al., Test purchase, synthesis and characterization of 3-fluorophenmetrazine (3-FPM) and differentiation from its ortho- and para-substituted isomers, Drug Test. Anal. 9 (3) (2017) 369–377.
[1021] S. Botch-Jones, et al., The detection of NBOMe designer drugs on blotter paper by high resolution time-of-flight mass spectrometry (TOFMS) with and without chromatography, Forensic Sci. Int. 267 (2016) 89–95.
[1022] P. Gee, et al., Case series: toxicity from 25B-NBOMe–a cluster of N-bomb cases, Clin. Toxicol. 54 (2) (2016) 141–146.
[1023] B. Duffau, et al., Analysis of 25 C NBOMe in seized Blotters by HPTLC and GC-MS, J. Chromatogr. Sci. 54 (7) (2016) 1153–1158.
[1024] J.J. Kristofic, et al., Detection of 25C-NBOMe in three related cases, J. Anal. Toxicol. 40 (6) (2016) 466–472.
[1025] V. Shevyrin, et al., Mass spectrometric properties of N-(2-methoxybenzyl)-2-(2,4,6-trimethoxyphenyl)ethanamine (2,4,6-TMPEA-NBOMe), a new representative of designer drugs of NBOMe series and derivatives thereof, J. Mass Spectrom. 51 (10) (2016) 969–979.
[1026] F. Westphal, U. Girreser, D. Waldmuller, Analytical characterization of four new ortho-methoxybenzylated amphetamine-type designer drugs, Drug Test. Anal. 8 (9) (2016) 910–919.
[1027] P. dos Santos, et al., 2-(4-IODINE-2,5-DIMETHOXYPHENYL)-N-[(2-METHOXYPHENYL)METHYL]ETAMINE OR 25I-NBOMe: chemical CHRACTERIZATION OF a designer drug, Quim. Nova 39 (2) (2016) 229–237.
[1028] B. Lum, J. Brophy, D. Hibbert, Identification of 4-substituted 2-(4-x-2,5-dimethoxyphenyl)-N-[(2-methoxyphenyl)methyl]ethanamine (25X-NBOMe) and analogues by gas chromatography-mass spectrometry analysis of heptafluorobutyric anhydride (HFBA) derivatives, Aust. J. Forensic Sci. 48 (1) (2016) 59–73.
[1029] A.F. Andrade, S.K. Mamo, J. Gonzalez-Rodriguez, Rapid screening method for new psychoactive substances of forensic interest: electrochemistry and analytical determination of phenethylamines derivatives (NBOMe) via cyclic and differential pulse voltammetry, Anal. Chem. 89 (3) (2017) 1445–1452.
[1030] A.T. Caspar, et al., Metabolic fate and detectability of the new psychoactive substances 2-(4-bromo-2,5-dimethoxyphenyl)-N-[(2-methoxyphenyl) methyl]ethanamine (25B-NBOMe) and 2-(4-chloro-2,5-dimethoxyphenyl)-N-[(2-methoxyphenyl)methyl]ethanamine (25C-NBOMe) in human and rat urine by GC-MS, LC-MS(n), and LC-HR-MS/MS approaches, J. Pharmaceut. Biomed. Anal. 134 (2017) 158–169.
[1031] L. Morini, et al., Death after 25C-NBOMe and 25H-NBOMe consumption, Forensic Sci. Int. 279 (2017) e1–e6.
[1032] X. Wu, et al., Synthesis and identification of metabolite biomarkers of 25C-NBOMe and 25I-NBOMe, Tetrahedron 73 (45) (2017) 6393–6400.
[1033] D. Pasin, et al., Characterization of hallucinogenic phenethylamines using high-resolution mass spectrometry for non-targeted screening purposes, Drug Test. Anal. 9 (10) (2017) 1620–1629.
[1034] G. Souza, et al., Voltammetric signatures of 2,5-dimethoxy-N-(2-methoxybenzyl) phenethylamines on boron-doped diamond electrodes: detection in blotting paper samples, Electrochem. Commun. 82 (2017) 121–124.
[1035] J. Neto, et al., Preventing misidentification of 25I-NBOH as 2C-I on routine GC-MS analyses, Forensic Toxicol. 35 (2) (2017) 415–420.
[1036] M. Preve, et al., 25c-nbome: Case report and literature review, Eur. Psychiatr. 41 (2017) S874–S875.
[1037] A. Caspar, et al., Nano liquid chromatography-high-resolution mass spectrometry for the identification of metabolites of the two new psychoactive substances N-(ortho-methoxybenzyl)-3,4-dimethoxyamphetamine and N-(ortho-methoxybenzyl)-4-methylmethamphetamine, Talanta 188 (2018) 111–123.
[1038] G. Souza, et al., Electrochemical sensing of NBOMes and other new psychoactive substances in blotting paper by square-wave voltammetry on a boron-doped diamond electrode, Anal. Methods 10 (20) (2018) 2411–2418.
[1039] R. Edmunds, R. Donovan, D. Reynolds, The analysis of illicit 25X-NBOMe seizures in Western Australia, Drug Test. Anal. 10 (4) (2018) 786–790.
[1040] A. Caspar, et al., LC-high resolution-MS/MS for identification of 69 metabolites of the new psychoactive substance 1-(4-ethylphenyl-)-N-[(2-methoxyphenyl)methyl] propane-2-amine (4-EA-NBOMe) in rat urine and human liver S9 incubates and comparison of its screening power with further MS techniques, Anal. Bioanal. Chem. 410 (3) (2018) 897–912.
[1041] W. Waldman, et al., Severe clinical toxicity caused by 251-NBOMe confirmed analytically using LC-MS-MS method, Acta Biochim. Pol. 65 (4) (2018) 567–571.
[1042] L. Magalhaes, L. Arantes, J. Braga, Identification of NBOMe and NBOH in blotter papers using a handheld NIR spectrometer and chemometric methods, Microchem. J. 144 (2019) 151–158.
[1043] A. de Andrade, J. Gonzalez-Rodriguez, Electroanalytical identification of 25I-NBOH and 2C-I via differential pulse voltammetry: a rapid and sensitive screening method to avoid misidentification, Analyst 144 (9) (2019) 2965–2972.
[1044] N. Marchi, et al., Clinical and toxicological profile of NBOMes: a systematic review, Psychosomatics 60 (2) (2019) 129–138.
[1045] A. Moreira, et al., NBOMe compounds: An overview about analytical methodologies aiming their determination in biological matrices, Trac. Trends Anal. Chem. 114 (2019) 260–277.
[1046] J. Sang, et al., MS-based molecular Networking of designer Drugs as an Approach for the Detection of unknown Derivatives for Forensic and doping applications: a Case of NBOMe derivatives, Anal. Chem. 91 (9) (2019) 5483–5488.
[1047] S. Hosztafi, J. Marton, Synthesis of 1-fluoro-substituted codeine derivatives, Chem. Pap. 70 (7) (2016) 973–982.
[1048] V. Pervukhin, D. Sheven', A mass-spectrometric study of the aqueous solutions of opiates with their ionization in a collison nebulizer, J. Anal. Chem. 71 (9) (2016) 878–887.
[1049] P. Sitasuwan, et al., Degradation of opioids and opiates during acid hydrolysis leads to reduced recovery compared to enzymatic hydrolysis, J. Anal. Toxicol. 40 (8) (2016) 601–607.
[1050] A. Machara, et al., Direct synthesis of noroxymorphone from thebaine: unusual Ce-IV oxidation of a methoxydiene-iron complex to an enone-gamma-nitrate, Eur. J. Org Chem. (8) (2016) 1500–1503.
[1051] A. Machara, et al., Synthesis of nororipavine and noroxymorphone via N- and O-demethylation of iron tricarbonyl complex of thebaine, Synthesis-Stuttgart 48 (12) (2016) 1803–1813.
[1052] M. Carlin, et al., Investigation of the acid/base behaviour of the opium alkaloid thebaine in LC-ESI-MS mobile phase by NMR spectroscopy, R. Soc.

Open Sci. 4 (10) (2017).
[1053] M. Hinrichs, A. Weyland, C. Bantel, Piritramide. A critical review, Schmerz 31 (4) (2017) 345–352.
[1054] P. Koukal, et al., Model studies toward the total synthesis of thebaine by an intramolecular cycloaddition strategy, Chemistryselect 2 (26) (2017) 7783–7786.
[1055] K. Mazak, et al., Physico-chemical profiling of semisynthetic opioids, J. Pharmaceut. Biomed. Anal. 135 (2017) 97–105.
[1056] A. Mata, D. Cantillo, C. Kappe, An integrated continuous-flow Synthesis of a key oxazolidine Intermediate to Noroxymorphone from naturally occurring opioids, Eur. J. Org Chem. (44) (2017) 6505–6510.
[1057] N. Mohseni, M. Bahram, T. Baheri, Chemical nose for discrimination of opioids based on unmodified gold nanoparticles, Sensor. Actuator. B Chem. 250 (2017) 509–517.
[1058] L. De Lima, et al., Opioid medications in expensive formulations are sold at a lower price than immediate-release morphine in countries throughout the world: third phase of opioid price watch cross-sectional study, J. Palliat. Med. 21 (10) (2018) 1458–1465.
[1059] F. Dehnavi, et al., Dispersive liquid-liquid microextraction Based on Solidification of floating organic Drop for Isolation and Determination of opium alkaloids, J. Anal. Chem. 73 (8) (2018) 765–770.
[1060] N. Kutsumura, et al., Acetic anhydride mediated retro-ene reaction via a [4.4.3]Propellane skeleton intermediate containing a quaternary ammonium linkage, Synthesis-Stuttgart 50 (21) (2018) 4263–4269.
[1061] C. Perez-Mana, et al., Drug interactions with new synthetic opioids, Front. Pharmacol. (2018) 9.
[1062] A. Kluza, et al., Crystal structure of thebaine 6-O-demethylase from the morphine biosynthesis pathway, J. Struct. Biol. 202 (3) (2018) 229–235.
[1063] M. Abramowicz, G. Zuccotti, J. Pflomm, Abuse-deterrent opioids, Jama-J. Am. Med. Assoc. 319 (19) (2018) 2036–2037.
[1064] T. Lilius, et al., Ketamine and norketamine attenuate oxycodone tolerance markedly less than that of morphine: from behaviour to drug availability, Br. J. Anaesth. 120 (4) (2018) 818–826.
[1065] R. Litman, O. Pagan, T. Cicero, Abuse-deterrent opioid formulations, Anesthesiology 128 (5) (2018) 1015–1026.
[1066] A. Munoz-Munoz, et al., Identification of novel opioid interferences using high-resolution mass spectrometry, J. Anal. Toxicol. 42 (1) (2018) 6–16.
[1067] A. Ponizovsky, et al., Changes in consumption of opioid analgesics in Israel 2009 to 2016: an update focusing on oxycodone and fentanyl formulations, Pharmacoepidemiol. Drug Saf. 27 (5) (2018) 535–540.
[1068] S. Rege, et al., Trends and characteristics of oxycodone exposures reported to the US Poison Centers, 2011-2017, Clin. Toxicol. 56 (10) (2018) 997–998.
[1069] B. Rookey, Drugged driving in the opioid era: spatial patterns of oxycodone use in fatal traffic crashes, 2001-2016, Subst. Use Misuse 53 (8) (2018) 1288–1298.
[1070] A. Schaffer, et al., Person-level changes in oxycodone use after the introduction of a tamper-resistant formulation in Australia. Canadian Medical Association Journal 190 (12) (2018) E355–E362.
[1071] L. Ventura, F. Carvalho, R. Dinis-Oliveira, Opioids in the frame of new psychoactive substances network: a complex pharmacological and toxicological issue, Curr. Mol. Pharmacol. 11 (2) (2018) 97–108.
[1072] M. Baumann, et al., Pharmacological characterization of novel synthetic opioids (NSO) found in the recreational drug marketplace, Neuropharmacology 134 (2018) 101–107.
[1073] C. McKenzie, et al., Chemical synthesis, characterisation and in vitro and in vivo metabolism of the synthetic opioid MT-45 and its newly identified fluorinated analogue 2F-MT-45 with metabolite confirmation in urine samples from known drug users, Forensic Toxicol. 36 (2) (2018) 359–374.
[1074] A. Haddad, et al., Detection and quantitation of trace fentanyl in heroin by surface-enhanced Raman spectroscopy, Anal. Chem. 90 (21) (2018) 12678–12685.
[1075] M. Campos-Manas, et al., Identification of opioids in surface and wastewaters by LC/QTOF-MS using retrospective data analysis, Sci. Total Environ. 664 (2019) 874–884.
[1076] K. Sharma, et al., The search for the "next" euphoric non-fentanil novel synthetic opioids on the illicit drugs market: current status and horizon scanning, Forensic Toxicol. 37 (1) (2019) 1–16.
[1077] S. Kishimoto, et al., Evaluation of biosynthetic pathway and engineered biosynthesis of alkaloids, Molecules 21 (8) (2016).
[1078] L. Narcross, et al., Microbial factories for the production of benzylisoquinoline alkaloids, Trends Biotechnol. 34 (3) (2016) 228–241.
[1079] M. Pyne, et al., Reconstituting plant secondary metabolism in Saccharomyces cerevisiae for production of high-value benzylisoquinoline alkaloids 575 (2016) 195–224. Synthetic Biology and Metabolic Engineering in Plants and Microbes, Pt a: Metabolism in Microbes.
[1080] M. Dastmalchi, et al., Codeinone reductase isoforms with differential stability, efficiency and product selectivity in opium poppy, Plant J. 95 (4) (2018) 631–647.
[1081] X. Chen, et al., A pathogenesis-related 10 protein catalyzes the final step in thebaine biosynthesis, Nat. Chem. Biol. 14 (7) (2018), 738-+.
[1082] M. Dastmalchi, et al., Neopinone isomerase is involved in codeine and morphine biosynthesis in opium poppy, Nat. Chem. Biol. 15 (4) (2019) 384.
[1083] J. Wallach, et al., Syntheses and analytical characterizations of N-alkylarylcyclohexylamines, Drug Test. Anal. 8 (8) (2016) 801–815.
[1084] S. Thornton, et al., Beyond ketamine and phencyclidine: analytically confirmed use of multiple novel arylcyclohexylamines, J. Psychoact. Drugs 49 (4) (2017) 289–293.
[1085] A. Johansson, et al., A non-fatal intoxication and seven deaths involving the dissociative drug 3-MeO-PCP, Forensic Sci. Int. 275 (2017) 76–82.
[1086] J. Kim, et al., Analytical method for fast screening and confirmation of multi-class veterinary drug residues in fish and shrimp by LC-MS/MS, Food Addit. Contam. Part a-Chemistry Analysis Control Exposure & Risk Assessment 33 (3) (2016) 420–432.
[1087] F. Shi, et al., Development of an enzyme linked immunosorbent assay for the determination of phenothiazine drugs in meat and animal feeds, J. Environ. Sci. Health - Part B Pesticides, Food Contam. Agric. Wastes 51 (10) (2016) 715–721.
[1088] K. Vengaian, et al., Phenothiazine-diaminomalenonitrile based colorimetric and fluorescence "Turn-off-on" sensing of Hg2+ and S2-, Sensor. Actuator. B Chem. 235 (2016) 232–240.
[1089] Z. Yin, et al., Multi-residue determination of 210 drugs in pork by ultra-high-performance liquid chromatography-tandem mass spectrometry, J. Chromatogr. A 1463 (2016) 49–59.
[1090] B. Petkovic, et al., Novel strategy for electroanalytical detection of antipsychotic drugs chlorpromazine and thioridazine; possibilities for simultaneous determination, Int. J. Electrochem. Sci. 12 (5) (2017) 3709–3720.
[1091] F. Shi, et al., Production and evolution of a ScFv antibody for immunoassay of residual phenothiazine drugs in meat based on computational simulation, Anal. Methods 9 (30) (2017) 4455–4463.
[1092] Y. Song, et al., Dummy template molecularly imprinted polymer for solid phase extraction of phenothiazines in meat based on computational simulation, Food Chem. 233 (2017) 422–428.
[1093] J. Wang, et al., Preparation of a generic monoclonal antibody and development of a highly sensitive indirect competitive ELISA for the detection of phenothiazines in animal feed, Food Chem. 221 (2017) 1004–1013.
[1094] D. Zhang, et al., Simple extraction method for quantification of phenothiazine residues in pork muscle using liquid chromatography-triple quadrupole tandem mass spectrometry, Biomed. Chromatogr. (6) (2017) 31.
[1095] C. Campbell, H. Cornthwaite, J. Watterson, Oxidation of selected phenothiazine drugs during sample preparation: effects of varying extraction conditions on the extent of oxidation, J. Anal. Toxicol. 42 (2) (2018) 99–114.
[1096] W. Tseng, et al., Enantioseparation of phenothiazines through capillary electrophoresis with solid phase extraction and polymer based stacking, J. Food Drug Anal. 26 (3) (2018) 1171–1179.
[1097] W. Xia, et al., Application of dual-template molecularly imprinted polymer-based solid phase extraction for determination of phenothiazines and benzodiazepines in swine feed, Anal. Methods 10 (25) (2018) 3001–3010.
[1098] W. Xia, et al., Molecularly imprinted polymer based microtiter chemiluminescence array for determination of phenothiazines and benzodiazepines in pork, Anal. Biochem. 554 (2018) 9–15.
[1099] W. Xia, et al., A molecularly imprinted polymer based chemiluminescence array sensor for one-step determination of phenothiazines and benzodiazepines in pig urine, Luminescence 34 (1) (2019) 98–105.
[1100] M. Movsisyan, et al., Continuous-flow Synthesis of phenothiazine antipsychotics: a feasibility study, Eur. J. Org Chem. (6) (2019) 1350–1354.
[1101] E. Onoabedje, et al., Highlights of molecular structures and applications of phenothiazine & phenoxazine polycycles, J. Mol. Struct. 1175 (2019) 956–962.
[1102] M. Abu El-Enin, et al., Validated spectrofluorimetric method for determination of two phosphodiesterase inhibitors tadalafil and vardenafil in pharmaceutical preparations and spiked human plasma, Luminescence 31 (1) (2016) 173–178.
[1103] M. Baker, et al., High-performance liquid chromatography with diode array detection method for the simultaneous determination of seven selected phosphodiesterase-5 inhibitors and serotonin reuptake inhibitors used as male sexual enhancers, J. Separ. Sci. 39 (9) (2016) 1656–1665.
[1104] D. Custers, et al., Testing of complementarity of PDA and MS detectors using chromatographic fingerprinting of genuine and counterfeit samples containing sildenafil citrate, Anal. Bioanal. Chem. 408 (6) (2016) 1643–1656.
[1105] J. Guo, et al., Development and evaluation of an immunochromatographic strip for rapid screening of sildenafil-type compounds as illegal additives in functional foods, Food Addit. Contam. Part a-Chemistry Analysis Control Exposure & Risk Assessment 33 (7) (2016) 1095–1104.
[1106] J. Jeong, et al., LC-ESI-MS/MS analysis of phosphodiesterase-5 inhibitors and their analogues in foods and dietary supplements in Korea, Food Addit. Contam. Part B-Surveillance 9 (1) (2016) 1–8.
[1107] S. Kern, et al., Isolation and structural characterization of a new tadalafil analog (chloropropanoylpretadalafil) found in a dietary supplement, J. Pharmaceut. Biomed. Anal. 128 (2016) 360–366.
[1108] J. Lee, et al., Identification and structural elucidation of three new tadalafil analogues found in a dietary supplement, J. Pharmaceut. Biomed. Anal. 123 (2016) 1–9.
[1109] S. Mokhtar, et al., Rapid determination of sildenafil and its analogues in dietary supplements using gas chromatography-triple quadrupole mass spectrometry, J. Pharmaceut. Biomed. Anal. 121 (2016) 188–196.
[1110] L. Ochiai, et al., Disposable potentiometric citrate sensor based on polypyrrole-doped films for indirect determination of sildenafil in pharmaceuticals formulations, J. Appl. Polym. Sci. 133 (32) (2016).
[1111] V. Tambe, M. Deodhar, V. Prakya, *Stability-indicating UPLC-MS/UV Method for simultaneous Determination of sildenafil Citrate and dapoxetine*

Hydrochloride from Bulk and formulation. Indian journal of pharmaceutical sciences 78 (5) (2016) 663–672.
[1112] T. Al Hagbani, et al., Can the surface color of pharmaceutical tablets be used as a unique product identifier? J. Drug Deliv. Sci. Technol. 37 (2017) 141–146.
[1113] A. Asfaram, M. Ghaedi, M. Purkait, Novel synthesis of nanocomposite for the extraction of Sildenafil Citrate (Viagra) from water and urine samples: process screening and optimization, Ultrason. Sonochem. 38 (2017) 463–472.
[1114] Z. Aydin, et al., Anodic stripping voltammetric determination of vardenafil hydrochloride at pencil graphite electrode, J. Iran. Chem. Soc. 14 (4) (2017) 803–810.
[1115] R. Backes, et al., Fast and simple determination OF sildenafil citrate (viagra (R) and generics) using carbon screen-printed electrode IN FIA and BIA systems with amperometric detection, Quim. Nova 40 (7) (2017) 752–759.
[1116] N. Campillo, et al., Determination of synthetic phosphodiesterase-5 inhibitors by LC-MS2 in waters and human urine submitted to dispersive liquid -liquid microextraction, Talanta 174 (2017) 638–644.
[1117] C. Cardozo, et al., Batch injection analysis-multiple pulse amperometric fingerprint: a simple Approach for fast on-site Screening of drugs, Electroanalysis 29 (12) (2017) 2847–2854.
[1118] A. Dogan, N. Basci, Green bioanalytical and pharmaceutical analysis of Voriconazole and tadalafil by HPLC, Curr. Pharmaceut. Anal. 13 (6) (2017) 495–504.
[1119] J. Guo, et al., Development and evaluation of a broad-specific immunochromatographic assay for screening of both tadalafil and its analogues in functional foods, Food Agric. Immunol. 28 (4) (2017) 652–667.
[1120] X. Hu, et al., Rapid detection of six phosphodiesterase type 5 enzyme inhibitors in healthcare products using thin-layer chromatography and surface enhanced Raman spectroscopy combined with BP neural network, J. Separ. Sci. 40 (11) (2017) 2506–2514.
[1121] J. Li, et al., Solid-phase extraction assisted dispersive liquid-liquid microextraction based on solidification of floating organic droplet to determine sildenafil and its analogues in dietary supplements, J. Separ. Sci. 40 (15) (2017) 3120–3129.
[1122] E. Sartori, et al., Sensitive square-wave voltammetric determination of tadalafil (Cialis (R)) in pharmaceutical samples using a cathodically pretreated boron-doped diamond electrode, Diam. Relat. Mater. 77 (2017) 153–158.
[1123] L. Schreiber, R. Halko, M. Hutta, Fast ultra-high-performance liquid chromatography with diode array and mass spectrometry method for determination of tadalafil drug substance and its impurities, Biomed. Chromatogr. 31 (12) (2017).
[1124] H. Wang, et al., Application of surface-enhanced Raman spectroscopy in the fast screening of phosphodiesterase type 5 inhibitors, Chem. J. Chin. Univ.-Chin. 38 (6) (2017) 1040–1045.
[1125] L. Wang, et al., Nickel(II)-assisted enantiomeric differentiation and quantitation of tadalafil by direct electrospray ionization mass spectrometry, J. Mass Spectrom. 52 (7) (2017) 411–416.
[1126] H. Zhao, et al., Rapid detection of sildenafil drugs in liquid nutraceuticals based on surface-enhanced Raman spectroscopy technology, Chin. J. Chem. 35 (10) (2017) 1522–1528.
[1127] H. Zhao, et al., A comparison study of macrocyclic hosts functionalized reduced graphene oxide for electrochemical recognition of tadalafil, Biosens. Bioelectron. 89 (2017) 361–369.
[1128] C. Kee, et al., A review of synthetic phosphodiesterase type 5 inhibitors (PDE-5i) found as adulterants in dietary supplements, J. Pharmaceut. Biomed. Anal. 147 (2018) 250–277.
[1129] D. Lv, et al., Simulation strategies for characterizing phosphodiesterase-5 inhibitors in botanical dietary supplements, Anal. Chem. 90 (18) (2018) 10765–10770.
[1130] A. Salah, et al., Pt nanoparticles supported on nitrogen-doped porous graphene for sensitive detection of Tadalafil, J. Colloid Interface Sci. 512 (2018) 379–388.
[1131] Y. Tao, et al., Fabrication and evaluation of magnetic phosphodiesterase-5 linked nanoparticles as adsorbent for magnetic dispersive solid-phase extraction of inhibitors from Chinese herbal medicine prior to ultra-high performance liquid chromatography-quadrupole time-of-flight mass spectrometry analysis, J. Chromatogr. A 1532 (2018) 58–67.
[1132] J. Wu, et al., Determination of the illegal adulteration of natural healthcare products with chemical drugs using surface-enhanced Raman scattering, Analyst 143 (21) (2018) 5202–5209.
[1133] E. Yilmaz, et al., A new magnetic nanodiamond/graphene oxide hybrid (Fe3O4@ND@GO) material for pre-concentration and sensitive determination of sildenafil in alleged herbal aphrodisiacs by HPLC-DAD system, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1084 (2018) 113–121.
[1134] S. Yu, et al., Disperse magnetic solid phase microextraction and surface enhanced Raman scattering (Dis-MSPME-SERS) for the rapid detection of trace illegally chemicals, Talanta 178 (2018) 498–506.
[1135] E. Er, B. Ozbek, S. Bakirdere, Accurate and sensitive determination of sildenafil, tadalafil, vardenafil, and avanafil in illicit erectile dysfunction medications and human urine by LC with quadrupole-TOF-MS/MS and their behaviors in simulated gastric conditions, J. Separ. Sci. 42 (2) (2019) 475–483.
[1136] M. Jiru, et al., Analysis of phosphodiesterase type 5 inhibitors as possible adulterants of botanical-based dietary supplements: extensive survey of preparations available at the Czech market, J. Pharmaceut. Biomed. Anal. 164 (2019) 713–724.
[1137] C. Xin, et al., Direct electrodeposition to fabricate 3D graphene network modified glassy carbon electrode for sensitive determination of tadalafil, Nano (1) (2019) 14.
[1138] M. dos Santos, et al., Comparison between counterfeit and authentic medicines: a novel approach using differential scanning calorimetry and hierarchical cluster analysis, J. Pharmaceut. Biomed. Anal. 166 (2019) 304–309.
[1139] F. He, et al., Development of a skeleton-specific antibody and Au nanoparticle-based immunochromatographic sensor for simultaneous detection of various tadalafil adulterants in health food, Food Agric. Immunol. 30 (1) (2019) 349–368.
[1140] J. Lee, et al., Screening of illegal sexual enhancement supplements and counterfeit drugs sold in the online and offline markets between 2014 and 2017, Forensic Sci. Int. 298 (2019) 10–19.
[1141] S. Dong, Z. Yan, H. Yang, A sensitive precolumn derivatization Method for Determination of Piperazine in vortioxetine hydrobromide Using a C8 Column and high-performance liquid chromatography-mass spectrometry, Anal. Sci. 32 (12) (2016) 1333–1338.
[1142] L. Liu, et al., Stability-indicating reversed-phase HPLC method development and characterization of impurities in vortioxetine utilizing LC-MS, IR and NMR, J. Pharmaceut. Biomed. Anal. 117 (2016) 325–332.
[1143] J. Park, et al., Development of a high-performance liquid chromatography with fluorescence detection method for quantification of piperazine in animal products by using precolumn derivatization, Food Chem. 196 (2016) 1331–1337.
[1144] A. Shah, et al., Synthesis and electrochemical investigations of piperazines, Electrochim. Acta 220 (2016) 705–711.
[1145] B. Wang, et al., Quantification of piperazine in chicken and pig tissues by gas chromatography-electron ionization tandem mass spectrometry employing pre-column derivatization with acetic anhydride, J. Chromatogr. A 1519 (2017) 9–18.
[1146] K. Xie, et al., Quantification of piperazine in chicken muscle by ultra-performance liquid chromatography-electrospray ionization tandem mass spectrometry, Food Anal. Methods 10 (6) (2017) 1736–1744.
[1147] M. Vekariya, et al., Novel N-thioamide analogues of pyrazolylpyrimidine based piperazine: design, synthesis, characterization, in-silico molecular docking study and biological evaluation, J. Mol. Struct. 1175 (2019) 551–565.
[1148] E. Attalah, et al., Optimisation and validation of a new analytical method for the determination of four natural and synthetic hormones using LC-ESI-MS/MS, Food Addit. Contam. Part a-Chemistry Analysis Control Exposure & Risk Assessment 33 (10) (2016) 1545–1556.
[1149] A. Boggs, et al., Development of a multi-class steroid hormone screening method using Liquid Chromatography/Tandem Mass Spectrometry (LC-MS/MS), Anal. Bioanal. Chem. 408 (15) (2016) 4179–4190.
[1150] A. Cawley, et al., Detection and metabolic investigations of a novel designer steroid: 3-chloro-17 alpha-methyl-5 alpha-androstan-17 beta-ol, Drug Test. Anal. 8 (7) (2016) 621–632.
[1151] P. Gimeno, et al., HPLC-UV Method for the Identification and Screening of hydroquinone, Ethers of Hydroquinone and corticosteroids possibly Used as skin-whitening Agents in illicit cosmetic products, J. Chromatogr. Sci. 54 (3) (2016) 343–352.
[1152] S. Goh, et al., Online solid phase extraction with liquid chromatography-tandem mass spectrometry for determination of estrogens and glucocorticoids in water, J. Chromatogr. A 1465 (2016) 9–19.
[1153] R. Guedes-Alonso, et al., Determination of androgens and progestogens in environmental and biological samples using fabric phase sorptive extraction coupled to ultra-high performance liquid chromatography tandem mass spectrometry, J. Chromatogr. A 1437 (2016) 116–126.
[1154] R. Guedes-Alonso, et al., Application of microwave-assisted extraction and ultra-high performance liquid chromatography-tandem mass spectrometry for the analysis of sex hormones and corticosteroids in sewage sludge samples, Anal. Bioanal. Chem. 408 (24) (2016) 6833–6844.
[1155] N. Guo, et al., Stable isotope labeling - liquid chromatography/mass spectrometry for quantitative analysis of androgenic and progestagenic steroids, Anal. Chim. Acta 905 (2016) 106–114.
[1156] I. Karapinar, et al., LC-MS/MS signal enhancement for estrogenic hormones in water samples using experimental design, RSC Adv. 6 (45) (2016) 39188–39197.
[1157] Y. Moon, S. Myung, Determination of estrogens in environmental aqueous samples using dispersive liquid-liquid microextraction and HPLC/UV-vis system, Bull. Kor. Chem. Soc. 37 (12) (2016) 2009–2014.
[1158] M. Polet, et al., Gas chromatography/chemical ionization triple quadrupole mass spectrometry analysis of anabolic steroids: ionization and collision-induced dissociation behavior, Rapid Commun. Mass Spectrom. 30 (4) (2016) 511–522.
[1159] I. Popovic, et al., Testing the best matrix/analyte combination for MALDI TOF mass spectrometric detection of steroid hormones, amino acids, vitamins and carbohydrates, FEBS J. 283 (2016), p. 166–166.
[1160] H. Siren, S. El Fellah, Steroids contents in waters of wastewater purification plants: determination with partial-filling micellar electrokinetic capillary chromatography and UV detection, Int. J. Environ. Anal. Chem. 96 (11)

(2016) 1003–1021.
[1161] I. Fulop, et al., LC-MS/MS ESI methods for the determination OF oestrogens and androgens IN biological matrix - a minireview, FARMACIA 65 (4) (2017) 485–493.
[1162] V. Giaccone, et al., Determination of ten corticosteroids in illegal cosmetic products by a simple, rapid, and high-performance LC-MS/MS method, Int. J. Anal. Chem. (2017), 3531649.
[1163] Z. Jaukovic, et al., Determination of sterols and steroid hormones in surface water and wastewater using liquid chromatography-atmospheric pressure chemical ionization-mass spectrometry, Microchem. J. 135 (2017) 39–47.
[1164] M. Kanwar, et al., Analysis of brassinosteroids in plants, J. Plant Growth Regul. 36 (4) (2017) 1002–1030.
[1165] C. Liu, et al., Effects of solvent and ion source pressure on the analysis of anabolic steroids by low pressure photoionization mass spectrometry, J. Am. Soc. Mass Spectrom. 28 (4) (2017) 724–728.
[1166] D. Tsvetkova, et al., Evaluation of the separation of steroids in combined forms by RP HPLC with UV-detection and gas chromatography, Bulgarian Chem. Commun. 49 (2) (2017) 377–383.
[1167] R. Zhang, et al., Comparison of two ionic liquid-based pretreatment methods for three steroids' separation and determination in water samples by HPLC, Chromatographia 80 (2) (2017) 237–246.
[1168] H. Dahmani, et al., Development of an extraction method for anabolic androgenic steroids in dietary supplements and analysis by gas chromatography-mass spectrometry: application for doping-control, Steroids 138 (2018) 134–160.
[1169] A. Das, M. Sangaranarayanan, A sensitive electrochemical detection of progesterone using tin-nanorods modified glassy carbon electrodes: Voltammetric and computational studies, Sensor. Actuator. B Chem. 256 (2018) 775–789.
[1170] C. Hess, et al., Considerations regarding the validation of chromatographic mass spectrometric methods for the quantification of endogenous substances in forensics, Forensic Sci. Int. 283 (2018) 150–155.
[1171] J. McBride, C. Carson, R. Coward, The availability and acquisition of illicit anabolic androgenic steroids and testosterone preparations on the internet, Am. J. Men's Health 12 (5) (2018) 1352–1357.
[1172] H. Park, et al., Development and validation of rapid and simultaneous method for determination of 12 hair-growth compounds in adulterated products by UHPLC-MS/MS, Forensic Sci. Int. 284 (2018) 129–135.
[1173] M. Ribeiro, et al., Authenticity assessment of anabolic androgenic steroids in counterfeit drugs by H-1 NMR, Anal. Methods 10 (10) (2018) 1140–1150.
[1174] K. Zhang, K. Fent, Determination of two progestinmetabolites (17 alpha-hydroxypregnanolone and pregnanediol) and different classes of steroids (androgens, estrogens, corticosteroids, progestins) in rivers and wastewaters by high-performance liquid chromatography-tandem mass spectrometry (HPLC-MS/MS), Sci. Total Environ. 610 (2018) 1164–1172.
[1175] L. Berneira, et al., Application of differential scanning calorimetry in the analysis of apprehended formulations of anabolic androgenic steroids, Forensic Sci. Int. 296 (2019) 15–21.
[1176] M. Dolowy, A. Pyka-Pajak, J. Jampilek, Simple and accurate HPTLC-densitometric method for assay of nandrolone decanoate in pharmaceutical formulation, Molecules 24 (3) (2019).
[1177] S. Voelker, L. Lorenz, J. Litzau, Semi-quantitative determination of designer steroids by high-performance liquid chromatography with ultraviolet detection in the absence of reference material, Drug Test. Anal. 11 (3) (2019) 428–434.
[1178] W. Zhao, et al., Direct and rapid analysis of trace levels steroids in water by thermal desorption atmospheric pressure photoionization mass spectrometry, Anal. Methods 11 (10) (2019) 1304–1311.
[1179] W. Zheng, et al., Residual detection of naproxen, methyltestosterone and 17 alpha-hydroxyprogesterone caproate in aquatic products by simple liquid-liquid extraction method coupled with liquid chromatography-tandem mass spectrometry, Biomed. Chromatogr. 33 (1) (2019).
[1180] X. Li, et al., Rapid detection of adulteration of dehydroepiandrosterone in slimming products by competitive indirect enzyme-linked immunosorbent assay and lateral flow immunochromatography, Food Agric. Immunol. 30 (1) (2019) 123–139.
[1181] D. Costa, et al., Determination of tryptamine in foods using square wave adsorptive stripping voltammetry, Talanta 154 (2016) 134–140.
[1182] N. Devi, et al., Novel synthesis of tryptamine derived 4-Hydroxy-4-arylthiazolidine-2-thiones and 4-arylthiazole-2(3H)-thiones by multicomponent reactions, Bull. Kor. Chem. Soc. 37 (9) (2016) 1472–1477.
[1183] Y. Jiang, C. Yan, Three-Component Reaction for the Convenient Synthesis of Functionalized 3-{1-[2-(1H-Indol-3-yl) ethyl]-4,5,6,7-tetrahydro-1H-indol-3-yl} indolin-2-ones, Synthesis-Stuttgart 48 (18) (2016) 3057–3064.
[1184] Q. Pan, et al., A simple and rapid HPLC-DAD method for simultaneously monitoring the accumulation of alkaloids and precursors in different parts and different developmental stages of Catharanthus roseus plants, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1014 (2016) 10–16.
[1185] T. Ramon-Marquez, et al., Novel optical sensing film based on a functional nonwoven nanofibre mat for an easy, fast and highly selective and sensitive detection of tryptamine in beer, Biosens. Bioelectron. 79 (2016) 600–607.
[1186] K. Tasev, V. Ivanova-Petropulos, M. Stefova, Optimization and validation OF a derivatization method for analysis OF biogenic amines IN wines using RP-HPLC-DAD, Macedonian J. Chem. Chem. Eng. 35 (1) (2016) 19–28.
[1187] S. Brandt, et al., Analytical characterization of N,N-diallyltryptamine (DALT) and 16 ring-substituted derivatives, Drug Test. Anal. 9 (1) (2017) 115–126.
[1188] H. Guo, et al., Twins labeling-liquid chromatography/mass spectrometry based metabolomics for absolute quantification of tryptophan and its key metabolites, J. Chromatogr. A 1504 (2017) 83–90.
[1189] J. Michely, et al., Biotransformation and detectability of the new psychoactive substances N,N-diallyltryptamine (DALT) derivatives 5-fluoro-DALT, 7-methyl-DALT, and 5,6-methylenedioxy-DALT in urine using GC-MS, LC-MSn, and LC-HR-MS/MS, Anal. Bioanal. Chem. 409 (6) (2017) 1681–1695.
[1190] A. Palma-Conesa, et al., Something new about something old: a 10-year follow-up on classical and new psychoactive tryptamines and results of analysis, J. Psychoact. Drugs 49 (4) (2017) 297–305.
[1191] M. Slyundina, et al., Tryptamine: a reactive matrix for MALDI mass spectrometry, J. Anal. Chem. 72 (13) (2017) 1295–1299.
[1192] K. Tasev, V. Ivanova-Petropulos, M. Stefova, Ultra-performance liquid chromatography-triple quadruple mass spectrometry (UPLC-TQ/MS) for Evaluation of biogenic Amines in wine, Food Anal. Methods 10 (12) (2017) 4038–4048.
[1193] A. Caspar, et al., Metabolism of the tryptamine-derived new psychoactive substances 5-MeO-2-Me-DALT, 5-MeO-2-Me-ALCHT, and 5-MeO-2-Me-DIPT and their detectability in urine studied by GC-MS, LC-MSn, and LC-HR-MS/MS, Drug Test. Anal. 10 (1) (2018) 184–195.
[1194] J. Palamar, A. Le, Trends in DMT and other tryptamine use among young Adults in the United States, Am. J. Addict. 27 (7) (2018) 578–585.
[1195] V. Angerer, et al., Separation and structural characterization of the new synthetic cannabinoid JWH-018 cyclohexyl methyl derivative "NE-CHMIMO' using flash chromatography, GC-MS, IR and NMR spectroscopy, Forensic Sci. Int. 266 (2016) E93–E98.
[1196] V. Gambaro, et al., Identification and characterization of a new designer drug thiothinone in seized products, Forensic Toxicol. 34 (1) (2016) 174–178.
[1197] G. McLaughlin, et al., The synthesis and characterization of the 'research chemical' N-(1-amino-3-methyl-1oxobutan-2-yl)-1-(cyclohexylmethyl)-3-(4-fluorophenyl)-1H-pyrazole-5-carboxamide(3,5-AB-CHMFUPPYCA) and differentiation from its 5,3-regioisomer, Drug Test. Anal. 8 (9) (2016) 920–929.
[1198] N. Racz, et al., Separation of isomers of JWH-122 on porous graphitic carbon stationary phase with non-aqueous mobile phase using intelligent software, J. Chromatogr. Sci. 54 (10) (2016) 1735–1742.
[1199] V. Shevyrin, et al., *Synthetic cannabinoid 3-benzyl-5-[1-(2-pyrrolidin-1-ylethyl)-1H-indol-3-yl]-1,2,4-oxadiazole*. The first detection in illicit market of new psychoactive substances, Foren. Sci. Int. 259 (2016) 95–100.
[1200] C. Weber, et al., Characterization of the synthetic cannabinoid MDMB-CHMCZCA, Beilstein J. Org. Chem. 12 (2016) 2808–2815.
[1201] M. Mascini, et al., Selective solid phase extraction of JWH synthetic cannabinoids by using computationally designed peptides, Talanta 167 (2017) 126–133.
[1202] P. Adamowicz, et al., The effects of synthetic cannabinoid UR-144 on the human body-A review of 39 cases, Forensic Sci. Int. 273 (2017) E18–E21.
[1203] A. Tang, et al., Differentiation and identification of 5F-PB-22 and its isomers, Forensic Sci. Int. 279 (2017) 53–59.
[1204] D. Fabregat-Safont, et al., Identification and characterization of a putative new psychoactive substance, 2-(2-(4-chlorophenyl)acetamido)-3-methylbutanamide, in Spain, Drug Test. Anal. 9 (7) (2017) 1073–1080.
[1205] Y. Ichikawa, et al., Identification of (1H-indol-3-yl)(2,2,3,3-tetramethylcyclopropyl)methanone (DP-UR-144) in a herbal drug product that was commercially available in the Tokyo metropolitan area, Forensic Toxicol. 35 (1) (2017) 146–152.
[1206] S. Materazzi, et al., High-throughput prediction of AKB48 in emerging illicit products by NIR spectroscopy and chemometrics, Microchem. J. 134 (2017) 277–283.
[1207] A. Thaxton-Weissenfluh, et al., GC-MS and GC-IR Analyses of the methoxy-1-n-pentyl-3-(1-naphthoyl)-indoles: regioisomeric designer cannabinoids, J. Chromatogr. Sci. 56 (9) (2018) 779–788.
[1208] V. Angerer, et al., Structural characterization and pharmacological evaluation of the new synthetic cannabinoid CUMYL-PEGACLONE, Drug Test. Anal. 10 (3) (2018) 597–603.
[1209] S. Banister, et al., The chemistry and pharmacology of synthetic cannabinoid SDB-006 and its regioisomeric fluorinated and methoxylated analogs, Drug Test. Anal. 10 (7) (2018) 1099–1109.
[1210] J. Lee, et al., Identification and characterization of an indazole-3-carboxamide class synthetic cannabinoid: 2-[1-(cyclohexylmethyl)-1H-indazole-3-carboxamido]-3,3-dimethylbutanoic acid (DMBA-CHMINACA), Forensic Sci. Int. 291 (2018) 167–174.
[1211] L. Mogler, et al., Detection of the recently emerged synthetic cannabinoid 5F-MDMB-PICA in "legal high' products and human urine samples, Drug Test. Anal. 10 (1) (2018) 196–205.
[1212] M. Noestheden, et al., Chromatographic characterisation of 11 phyto-cannabinoids: quantitative and fit-to-purpose performance as a function of extra-column variance, Phytochem. Anal. 29 (5) (2018) 507–515.
[1213] T. Sengel, et al., A functional Platform for the Detection of JWH-073 as a Model for synthetic cannabinoids, Chemelectrochem 5 (9) (2018) 1253–1258.
[1214] V. Angerer, et al., 5F-Cumyl-PINACA in "e-liquids' for electronic cigarettes: comprehensive characterization of a new type of synthetic cannabinoid in a

trendy product including investigations on the in vitro and in vivo phase I metabolism of 5F-Cumyl-PINACA and its non-fluorinated analog Cumyl-PINACA, Forensic Toxicol. 37 (1) (2019) 186–196.
[1215] S. Banister, et al., Synthesis and pharmacology of new psychoactive substance 5F-CUMYL-P7AICA, a scaffold- hopping analog of synthetic cannabinoid receptor agonists 5F-CUMYL-PICA and 5F-CUMYL-PINACA, Drug Test. Anal. 11 (2) (2019) 279–291.
[1216] S. Breitenbach, et al., Assessment of ultra high performance supercritical fluid chromatography as a separation technique for the analysis of seized drugs: applicability to synthetic cannabinoids, J. Chromatogr. A 1440 (2016) 201–211.
[1217] A. Carlsson, et al., Prediction of designer drugs: synthesis and spectroscopic analysis of synthetic cannabinoid analogues of 1H-indol-3-yl(2,2,3,3-tetramethylcyclopropyl) methanone and 1H-indol-3-yl(adamantan-1-yl) methanone, Drug Test. Anal. 8 (10) (2016) 1015–1029.
[1218] T. Doi, et al., Enantioseparation of the carboxamide-type synthetic cannabinoids N-(1-amino-3-methyl-1-oxobutan-2-yl)-1-(5-fluoropentyl)-1H-indazole-3-carboxamide and methyl [1-(5-fluoropentyl)-1H-indazole-3-carbonyl]-valinate in illicit herbal products, J. Chromatogr. A 1473 (2016) 83–89.
[1219] T. Doi, et al., Identification and characterization of alpha-PVT, alpha-PBT, and their bromothienyl analogs found in illicit drug products, Forensic Toxicol. 34 (1) (2016) 76–93.
[1220] S. Banister, et al., Pharmacology of valinate and tert-leucinate synthetic cannabinoids 5F-AMBICA, 5F-AMB, 5F-ADB, AMB-FUBINACA, MDMB-FUBINACA, MDMB-CHMICA, and their analogues, ACS Chem. Neurosci. 7 (9) (2016) 1241–1254.
[1221] N. Langer, et al., Identification and quantification of synthetic cannabinoids in "spice-like" herbal mixtures: update of the German situation for the spring of 2016, Forensic Sci. Int. 269 (2016) 31–41.
[1222] O. Bilgrei, From "herbal highs" to the "heroin of cannabis": Exploring the evolving discourse on synthetic cannabinoid use in a Norwegian Internet drug forum, Int. J. Drug Pol. 29 (2016) 1–8.
[1223] P. Gateva, et al., Synthetic cannabimimetics detected in smoking blends on the Bulgarian territory - toxicological significance, Bulgarian Chem. Commun. 48 (3) (2016) 461–468.
[1224] U. Girreser, P. Rosner, A. Vasilev, Structure elucidation of the designer drug N-(1-amino-3,3-dimethyl-1-oxobutan-2-yl)-1-(5-fluoropentyl)-3-(4-fluorophenyl)-pyrazole5-carboxamide and the relevance of predicted C-13 NMR shifts - a case study, Drug Test. Anal. 8 (7) (2016) 668–675.
[1225] J. Kill, et al., Chemical characterization of synthetic cannabinoids by electrospray ionization FT-ICR mass spectrometry, Forensic Sci. Int. 266 (2016) 474–487.
[1226] C. Morselli, et al., It came from the north: assessing the claim of Canada's rising role as a global supplier of synthetic drugs, Crime Law Soc. Change 66 (3) (2016) 247–270.
[1227] K. Abdel-Hay, et al., GC-MS differentiation of the six regioisomeric dimethoxybenzoyl-1-pentylindoles: Isomeric cannabinoid substances, J. Pharmaceut. Biomed. Anal. 125 (2016) 360–368.
[1228] M. Dronova, E. Smolianitski, O. Lev, Electrooxidation of new synthetic cannabinoids: voltammetric determination of drugs in seized street samples and artificial saliva, Anal. Chem. 88 (8) (2016) 4487–4494.
[1229] S. Heo, et al., Simultaneous analysis of cannabinoid and synthetic cannabinoids in dietary supplements using UPLC with UV and UPLC-MS-MS, J. Anal. Toxicol. 40 (5) (2016) 350–359.
[1230] N. Langer, et al., Identification and quantification of synthetic cannabinoids in "spice-like' herbal mixtures: update of the German situation for the spring of 2015, Forensic Toxicol. 34 (1) (2016) 94–107.
[1231] M. Longworth, et al., The 2-alkyl-2H-indazole regioisomers of synthetic cannabinoids AB-CHMINACA, AB-FUBINACA, AB-PINACA, and 5F-AB-PINACA are possible manufacturing impurities with cannabimimetic activities, Forensic Toxicol. 34 (2) (2016) 286–303.
[1232] M. Marino, et al., Rapid identification of synthetic cannabinoids in herbal incenses with DART-MS and NMR, J. Forensic Sci. 61 (2016) S82–S91.
[1233] M. Svidrnoch, A. Pribylka, V. Maier, Determination of selected synthetic cannabinoids and their metabolites by micellar electrokinetic chromatography - mass spectrometry employing perfluoroheptanoic acid-based micellar phase, Talanta 150 (2016) 568–576.
[1234] J. Vicente, et al., Systematic analytical characterization of new psychoactive substances: a case study, Forensic Sci. Int. 265 (2016) 107–115.
[1235] B. Fodor, I. Molnar-Perl, The role of derivatization techniques in the analysis of plant cannabinoids by gas chromatography mass spectrometry, Trac. Trends Anal. Chem. 95 (2017) 149–158.
[1236] D. Borg, A. Tverdovsky, R. Stripp, A Fast and comprehensive Analysis of 32 synthetic cannabinoids using agilent triple quadrupole LC-MS-MS, J. Anal. Toxicol. 41 (1) (2017) 6–16.
[1237] S. Dunne, J. Rosengren-Holmberg, Quantification of synthetic cannabinoids in herbal smoking blends using NMR, Drug Test. Anal. 9 (5) (2017) 734–743.
[1238] B. Ford, et al., Synthetic pot: not your grandfather's marijuana, Trends Pharmacol. Sci. 38 (3) (2017) 257–276.
[1239] K. Moore, et al., Identification of eight synthetic cannabinoids, including 5F-AKB48 in seized herbal products using DART-TOF-MS and LC-QTOF-MS as nontargeted screening methods, J. Forensic Sci. 62 (5) (2017) 1151–1158.
[1240] A. Asada, et al., Isomeric discrimination of synthetic cannabinoids by GC-EI-MS: 1-adamantyl and 2-adamantyl isomers of N-adamantyl carboxamides, Drug Test. Anal. 9 (3) (2017) 378–388.
[1241] G. Assemat, et al., Screening of "spice" herbal mixtures: From high-field to low-field proton NMR, Forensic Sci. Int. 279 (2017) 88–95.
[1242] L. Bijlsma, et al., Mass spectrometric identification and structural analysis of the third-generation synthetic cannabinoids on the UK market since the 2013 legislative ban, Forensic Toxicol. 35 (2) (2017) 376–388.
[1243] M. Bovens, et al., Structural characterization of the new synthetic cannabinoids CUMYL-PINACA, 5F-CUMYL-PINACA, CUMYL-4CN-BINACA, 5F-CUMYL-P7AICA and CUMYL-4CN-B7AICA, Forensic Sci. Int. 281 (2017) 98–105.
[1244] L. Ernst, et al., Identification and quantification of synthetic cannabinoids in 'spicelike' herbal mixtures: update of the German situation in early 2017, Forensic Sci. Int. 277 (2017) 51–58.
[1245] C. Hess, et al., Simultaneous detection of 93 synthetic cannabinoids by liquid chromatography-tandem mass spectrometry and retrospective application to real forensic samples, Drug Test. Anal. 9 (5) (2017) 721–733.
[1246] W. Jia, et al., Identification of three cannabimimetic indazole and pyrazole derivatives, APINACA 2H-indazole analogue, AMPPPCA, and 5F-AMPPPCA, Drug Test. Anal. 9 (2) (2017) 248–255.
[1247] N. Langer, et al., Determination of cross-reactivity of poly- and monoclonal antibodies for synthetic cannabinoids by direct SPR and ELISA, Forensic Sci. Int. 280 (2017) 25–34.
[1248] J. Lee, et al., Identification of new synthetic cannabinoid analogue APINAC (adamantan-1-yl 1-pentyl-1H-indazole-3-carboxylate) with other synthetic cannabinoid MDMB(N)-Bz-F in illegal products, Forensic Toxicol. 35 (1) (2017) 45–55.
[1249] C. Liu, et al., Identification and analytical characterization of six synthetic cannabinoids NNL-3, 5F-NPB-22-7N, 5F-AKB-48-7N, 5F-EDMB-PINACA, EMB-FUBINACA, and EG-018, Drug Test. Anal. 9 (8) (2017) 1251–1261.
[1250] G. Martinotti, et al., Synthetic cannabinoids: psychopharmacology, clinical aspects, psychotic onset, CNS Neurol. Disord. - Drug Targets 16 (5) (2017) 567–575.
[1251] Z. Qian, et al., Identification and analytical characterization of four synthetic cannabinoids ADB-BICA, NNL-1, NNL-2, and PPA(N)-2201, Drug Test. Anal. 9 (1) (2017) 51–60.
[1252] L. Smith, et al., Correlation of vapor phase infrared spectra and regioisomeric structure in synthetic cannabinoids, Spectrochim. Acta Mol. Biomol. Spectrosc. 196 (2018) 375–384.
[1253] S. Munster-Muller, R. Zimmermann, M. Putz, A novel impurity-profiling Workflow with the Combination of flash-chromatography, UHPLC-MS, and multivariate data Analysis for highly pure drugs: a Study on the synthetic cannabinoid MDMB-CHMICA, Anal. Chem. 90 (17) (2018) 10559–10567.
[1254] S. Islam, et al., Rapid and sensitive detection of synthetic cannabinoids AMB-FUBINACA and alpha-PVP using surface enhanced Raman scattering (SERS), Chem. Phys. 506 (2018) 31–35.
[1255] A. Asada, et al., Cannabimimetic activities of cumyl carboxamide-type synthetic cannabinoids, Forensic Toxicol. 36 (1) (2018) 170–177.
[1256] H. Durmus, et al., Colorimetric determination of (Aminoalkyl)indole-containing synthetic cannabimimetics, Anal. Sci. 34 (12) (2018) 1419–1425.
[1257] M. Poplawska, et al., Application of high-performance liquid chromatography with charged aerosol detection (LC-CAD) for unified quantification of synthetic cannabinoids in herbal blends and comparison with quantitative NMR results, Forensic Toxicol. 36 (1) (2018) 122–140.
[1258] L. Ernst, et al., Identification and quantification of synthetic cannabinoids in 'spice-like' herbal mixtures: update of the German situation in summer 2018, Forensic Sci. Int. 294 (2019) 96–102.
[1259] K. Abdel-Hay, et al., Gas chromatography-mass spectrometry (GC-MS) and gas chromatography-infrared (GC-IR) Analyses of the chloro-1-n-pentyl-3-(1-naphthoyl)-indoles: regioisomeric cannabinoids, Appl. Spectrosc. 73 (4) (2019) 433–443.
[1260] W. Cheng, W. Wong, Forensic drug analysis of chloro-N,N-dimethylcathinone (CDC) and chloroethcathinone (CEC): identification of 4-CDC and 4-CEC in drug seizures and differentiation from their ring-substituted positional isomers, Forensic Sci. Int. 298 (2019) 268–277.
[1261] T. Chikumoto, et al., Liquid chromatography-mass spectrometry studies on the isomeric 1-fluorobenzyl-3-naphthoyl-indoles:FUB-JWH-018 and five isomers, Forensic Toxicol. 37 (1) (2019) 113–120.
[1262] M. Eckberg, et al., Separation and identification of isomeric and structurally related synthetic cannabinoids using 2D liquid chromatography and high resolution mass spectrometry, J. Anal. Toxicol. 43 (3) (2019) 170–178.
[1263] R. Kevin, et al., Toxic by design? Formation of thermal degradants and cyanide from carboxamide-type synthetic cannabinoids CUMYL-PICA, 5F-CUMYL-PICA, AMB-FUBINACA, MDMB-FUBINACA, NNEI, and MN-18 during exposure to high temperatures, Forensic Toxicol. 37 (1) (2019) 17–26.
[1264] M. Lupu, et al., Cannabinoids: chemical structure, Mechanisms of action, Toxicity and Implications in everyday life, Rev. Chem. 70 (2) (2019) 627–629.
[1265] H. Nie, et al., Rapid screening and determination of 11 new psychoactive substances by direct analysis in real time mass spectrometry and liquid chromatography/quadrupole time-of-flight mass spectrometry, Rapid Commun. Mass Spectrom. 30 (2016) 141–146.
[1266] B. Waters, et al., GC-PCI-MS/MS and LC-ESI-MS/MS databases for the detection of 104 psychotropic compounds (synthetic cannabinoids,

synthetic cathinones, phenethylamine derivatives), Leg. Med. 20 (2016) 1–7.
[1267] I. Lurie, L. Tremeau-Cayel, W. Rowe, Recent advances in comprehensive chromatographic analysis of emerging drugs, LC-GC Eur. 31 (12) (2018) 652–657.
[1268] J. Poklis, H. Mulder, M. Peace, The unexpected identification of the cannabimimetic, 5F-ADB, and dextromethorphan in commercially available cannabidiol e-liquids, Forensic Sci. Int. 294 (2019) E25–E27.
[1269] P. Ciegis, et al., Investigation of a mixture containing alprazolam, codeine and paracetamol using thin-layer and high performance liquid chromatography methods, Acta Pol. Pharm. 73 (3) (2016) 613–619.
[1270] D. Albals, et al., Chiral separations of cathinone and amphetamine-derivatives: comparative study between capillary electrochromatography, supercritical fluid chromatography and three liquid chromatographic modes, J. Pharmaceut. Biomed. Anal. 121 (2016) 232–243.
[1271] J. Broseus, N. Gentile, P. Esseiva, The cutting of cocaine and heroin: a critical review, Forensic Sci. Int. 262 (2016) 73–83.
[1272] A. Mokhtari, et al., Multiway analysis applied to time-resolved chemiluminescence for simultaneous determination of paracetamol and codeine in pharmaceuticals, Luminescence 31 (6) (2016) 1267–1276.
[1273] M. Taei, et al., Simultaneous determination of ascorbic acid, acetaminophen and codeine based on multi-walled carbon nanotubes modified with magnetic nanoparticles paste electrode, Mater. Sci. Eng. C: Mater. Biol. Appl. 69 (2016) 1–11.
[1274] J. Broseus, et al., Chemical profiling: a tool to decipher the structure and organisation of illicit drug markets: an 8-year study in Western Switzerland, Forensic Sci. Int. 266 (2016) 18–28.
[1275] P. Cabarcos, et al., Solid phase microextraction and gas chromatography-mass spectrometry methods for residual solvent assessment in seized cocaine and heroin, Anal. Bioanal. Chem. 408 (23) (2016) 6393–6402.
[1276] K.M. Mohamed, et al., A GC-MS Method for Detection and Quantification of cathine, cathinone, Methcathinone and Ephedrine in oral fluid, J. Chromatogr. Sci. 54 (8) (2016) 1271–1276.
[1277] J. Poklis, et al., Identification of drugs in parenteral pharmaceutical preparations from a quality assurance and a diversion program by direct analysis in real-time AccuTOF(TM)-Mass spectrometry (DART-MS), J. Anal. Toxicol. 40 (8) (2016) 608–616.
[1278] G. Liu, et al., Simultaneous determination of 18 chemical constituents in traditional Chinese medicine of antitussive by UPLC-MS-MS, J. Chromatogr. Sci. 54 (9) (2016) 1540–1552.
[1279] N. Mohseni, M. Bahram, Mean centering of ratio spectra for colorimetric determination of morphine and codeine in pharmaceuticals and biological samples using melamine modified gold nanoparticles, Anal. Methods 8 (37) (2016) 6739–6747.
[1280] M. Balbino, et al., Use of screen-printed electrodes for quantification of cocaine and Delta(9)-THC: adaptions to portable systems for forensic purposes, J. Solid State Electrochem. 20 (9) (2016) 2435–2443.
[1281] A. Kaizaki-Mitsumoto, et al., Three 25-NBOMe-type drugs, three other phenethylamine-type drugs (25I-NBMD, RH34, and escaline), eight cathinone derivatives, and a phencyclidine analog MMXE, newly identified in ingredients of drug products before they were sold on the drug market, Forensic Toxicol. 34 (1) (2016) 108–114.
[1282] C. Liu, et al., Identification of five substituted phenethylamine derivatives 5-MAPDB, 5-AEDB, MDMA methylene homolog, 6-Br-MDMA, and 5-APB-NBOMe, Drug Test. Anal. 9 (2) (2017) 199–207.
[1283] H. Michelot, et al., The analysis of cutting agents in Australian seizures of cocaine and heroin over six years, Forensic Sci. Int. 277 (2017), p. 227–227.
[1284] D.S. Nakhla, et al., Precise simultaneous quantification of methadone and cocaine in rat serum and brain tissue samples following their successive i.p. administration, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1048 (2017) 19–29.
[1285] R.R. Cunha, et al., Fast determination of codeine, orphenadrine, promethazine, scopolamine, tramadol, and paracetamol in pharmaceutical formulations by capillary electrophoresis, J. Separ. Sci. 40 (8) (2017) 1815–1823.
[1286] P. Armenian, et al., Fentanyl and a novel synthetic opioid U-47700 masquerading as street "Norco" in central California: a case report, Ann. Emerg. Med. 69 (1) (2017) 87–90.
[1287] Z.H. Qian, L.S. Gao, C.M. Liu, Identification and analytical characterization of U-47700-Et and 4-F-pentedrone, Forensic Sci. Int. 277 (2017), p. 235–235.
[1288] J. Leonard, et al., SERS, Raman, and DFT analyses of fentanyl and carfentanil: Toward detection of trace samples, J. Raman Spectrosc. 48 (10) (2017) 1323–1329.
[1289] J. Leonards, et al., Sers, Raman and Dft of fentanyl carfentanyl: toward Detection of trace samples, Forensic Sci. Int. 277 (2017), p. 73–73.
[1290] A. Amirav, Fast Heroin, Cocaine Analysis, By GC-MS with cold EI: the important role of flow programming, Chromatographia 80 (2) (2017) 295–300.
[1291] M.F. de Oliveira, et al., Determination of lsd and 25h-nbome by square wave voltammetry, Forensic Sci. Int. 277 (2017), p. 2–2.
[1292] A.M. Dowgiallo, SERS methods detect trace Levels of cocaine, heroin, methamphetamine, and THC, Spectroscopy 32 (9) (2017), p. 58–58.
[1293] K. Mao, et al., A novel colorimetric biosensor based on non-aggregated Au@Ag core-shell nanoparticles for methamphetamine and cocaine detection, Talanta 175 (2017) 338–346.
[1294] A. Babaei, M. Afrasiabi, M. Shabanian, Application of multivariate optimization method in nanomolar simultaneous determination of morphine and codeine in the presence of uric acid using a glassy carbon electrode modified with a hydroxyapatite-Fe3O4 nanoparticle/multiwalled carbon nanotubes composite, J. Iran. Chem. Soc. 14 (11) (2017) 2305–2317.
[1295] D. Lee, N. Watson, T. Whittem, Chemical stability of morphine and methadone, and of methadone in combination with acepromazine, medetomidine or xylazine, during prolonged storage in syringes, Aust. Vet. J. 95 (8) (2017) 289–293.
[1296] K. Vo, et al., Synthetic agents off the darknet: a case of U-47700 and phenazepam abuse, Clin. Toxicol. 55 (1) (2017) 71–72.
[1297] J. Lee, et al., Simultaneous analysis by Quadrupole-Orbitrap mass spectrometry and UHPLC-MS/MS for the determination of sedative-hypnotics and sleep inducers in adulterated products, J. Separ. Sci. 40 (24) (2017) 4677–4688.
[1298] L. Karila, et al., MDPV and alpha-PVP use in humans: The twisted sisters, Neuropharmacology 134 (2018) 65–72.
[1299] A. Maas, M. Losacker, C. Hess, Chromatographic separation of R/S-enantiomers of amphetamine and methamphetamine: pathways of methamphetamine synthesis and detection in blood samples by qualitative enantioselective LC-MS/MS analysis, Forensic Sci. Int. 291 (2018) 138–143.
[1300] H. Zhang, et al., A rapid detection method for policy-sensitive amines real-time supervision, Talanta 178 (2018) 636–643.
[1301] B. Anilanmert, et al., Fast chromatographic screening method for 7 drugs of potential threat in drug facilitated crimes, Pak. J. Pharm. Sci. 31 (1) (2018) 231–235.
[1302] L. Ford, J. Berg, Analytical evidence to show letters impregnated with novel psychoactive substances are a means of getting drugs to inmates within the UK prison service, Ann. Clin. Biochem. 55 (6) (2018) 673–678.
[1303] A. Skriba, V. Havlicek, Mass spectrometry imaging of illicit drugs in latent fingerprints by matrix-free and matrix-assisted desorption/ionization techniques, Eur. J. Mass Spectrom. 24 (1) (2018) 124–128.
[1304] H. Elbardisy, et al., Analytical determination of heroin, fentanyl and fentalogues using high-performance liquid chromatography with diode array and amperometric detection, Anal. Methods 11 (8) (2019) 1053–1063.
[1305] C. Hess, M. Losacker, A. Maas, Chromatographic separation of R-(-)/S-(+)-enantiomers of amphetamine and methamphetamine: differentiation between single methamphetamine consumption and co-consumption with amphetamine using enantioselective quantitative LC-MS/MS analysis, Int. J. Leg. Med. 133 (2) (2019) 467–473.
[1306] M. Hudson, et al., Drug screening using the sweat of a fingerprint: lateral flow detection of (9)-tetrahydrocannabinol, cocaine, opiates and amphetamine, J. Anal. Toxicol. 43 (2) (2019) 88–95.
[1307] J. Zhou, et al., Nanocarrier-based biological fluorescent Probes for simultaneous Detection of Ketamine and Amphetamine in latent fingermarks, Nano 14 (2) (2019).
[1308] C. Liu, et al., Rapid qualitative and quantitative analysis of methamphetamine, ketamine, heroin, and cocaine by near-infrared spectroscopy, Forensic Sci. Int. 290 (2018) 162–168.
[1309] R. Salemmilani, et al., Quantitative surface-enhanced Raman spectroscopy chemical analysis using citrate as an in situ calibrant, Analyst 144 (5) (2019) 1818–1824.
[1310] Z. An, et al., Widely applicable AIE Chemosensor for on-site fast Detection of drugs Based on the POSS-core Dendrimer with the controlled self-assembly mechanism, Langmuir 35 (7) (2019) 2649–2654.
[1311] M. Masteri-Farahani, F. Askari, Design and photophysical insights on graphene quantum dots for use as nanosensor in differentiating methamphetamine and morphine in solution, Spectrochim. Acta Mol. Biomol. Spectrosc. 206 (2019) 448–453.
[1312] A.T. Bruni, P.O.M. de Carvalho, V.B.P. Leite, Forensic in silico: simulated Ir spectra of nps amphetamines and cathinones, Forensic Sci. Int. 277 (2017), 72–72.
[1313] H. Ketha, et al., Gas chromatography mass spectrometry (GC-MS) for identification of designer stimulants including 2C amines, NBOMe compounds, and cathinones in urine, Curr. Protocols Toxicol. 74 (2017) 4 43 1–4 43 10.
[1314] D. Martins, et al., The detection and prevention of unintentional consumption of DOx and 25x-NBOMe at Portugal's Boom Festival, Hum. Psychopharmacol. 32 (3) (2017).
[1315] A.T. Bruni, et al., Forensic in silico: theoretical study of fitc and cb[6] to detect amphetamine and cathinone, Forensic Sci. Int. 277 (2017) 255–256.
[1316] T. Yempala, B. Cassels, Synthesis, scope, H-1 and C-13 spectral assignments of isomeric dibenzofuran carboxaldehydes, Res. Chem. Intermed. 43 (3) (2017) 1291–1299.
[1317] Z. Mahmood, et al., The screening errors of cocaine presence in heroin samples & pharmaceuticals, Forensic Sci. Int. 277 (2017), p. 63–63.
[1318] E. Strickland, et al., Development and validation of a novel all-inclusive LC-MS-MS designer drug method, J. Anal. Toxicol. 43 (3) (2019) 161–169.
[1319] V. dos Santos, et al., Amphetamine and derivatives in natural weight loss pills and dietary supplements by capillary electrophoresis-tandem mass spectrometry, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1038 (2016) 19–25.
[1320] S. Garg, K. Nurgali, V. Mishra, Food proteins as source of opioid peptides-A review, Curr. Med. Chem. 23 (9) (2016) 893–910.
[1321] R. Hachem, et al., Proton NMR for detection, identification and

quantification of adulterants in 160 herbal food supplements marketed for weight loss, J. Pharmaceut. Biomed. Anal. 124 (2016) 34–47.
[1322] J. Kim, et al., Development and validation of UPLC and LC-MS/MS methods for the simultaneous determination of anti-obesity drugs in foods and dietary supplements, Arch Pharm. Res. (Seoul) 39 (1) (2016) 103–114.
[1323] C. Nnaji, et al., Analysis of trace amounts of adulterants found in powders/supplements utilizing Raman spectroscopy coupled to direct analyte-probed nanoextraction-nanospray ionization-mass spectrometry, Anal. Methods 8 (24) (2016) 4798–4807.
[1324] P. Wilson, C. Masse, Detection of synthetic rugs as adulterants in natural and herbal slimming products by LC-ESI-MS/MS with polarity switching, J. AOAC Int. 99 (4) (2016) 929–940.
[1325] Y. Zeng, et al., Analysis of 40 weight loss compounds adulterated in health supplements by liquid chromatography quadrupole linear ion trap mass spectrometry, Drug Test. Anal. 8 (3–4) (2016) 351–356.
[1326] S. Eichner, et al., Banned and discouraged-use ingredients found in weight loss supplements, J. Am. Pharmaceut. Assoc. 56 (5) (2016) 538–543.
[1327] F. Fang, et al., Highly sensitive on-site detection of drugs adulterated in botanical dietary supplements using thin layer chromatography combined with dynamic surface enhanced Raman spectroscopy, Talanta 146 (2016) 351–357.
[1328] Q. Sun, et al., Qualitative and quantitative analysis of the chemical constituents in Mahuang-Fuzi-Xixin decoction based on high performance liquid chromatography combined with time-of-flight mass spectrometry and triple quadrupole mass spectrometers, Biomed. Chromatogr. 30 (11) (2016) 1820–1834.
[1329] A. Tero-Vescan, et al., Comparative analysis BY HPLC-UV and capillary electrophoresis OF dietary supplements for weight loss, FARMACIA 64 (5) (2016) 699–705.
[1330] A. Yehia, H. Essam, Development and validation of a generic high-performance liquid chromatography for the simultaneous separation and determination of six cough ingredients: robustness study on core-shell particles, J. Separ. Sci. 39 (17) (2016) 3357–3367.
[1331] Q. Ma, et al., Direct identification of prohibited substances in cosmetics and foodstuffs using ambient ionization on a miniature mass spectrometry system, Anal. Chim. Acta 912 (2016) 65–73.
[1332] T. Rocha, J. Amaral, M. Oliveira, Adulteration of dietary supplements by the illegal addition of synthetic drugs: a review, Compr. Rev. Food Sci. Food Saf. 15 (1) (2016) 43–62.
[1333] P.A. Cohen, et al., Four experimental stimulants found in sports and weight loss supplements: 2-amino-6-methylheptane (octodrine), 1,4-dimethylamylamine (1,4-DMAA), 1,3-dimethylamylamine (1,3-DMAA) and 1,3-dimethylbutylamine (1,3-DMBA), Clin. Toxicol. (2017) 1–6.
[1334] H. Song, et al., Label-free pharmacological profiling based on dynamic mass redistribution for characterization and authentication of hazardous natural products, J. Hazard Mater. 333 (2017) 265–274.
[1335] Z. Xun, et al., Simultaneous determination of eight alkaloids and oleandrin in herbal cosmetics by dispersive solid-phase extraction coupled with ultra high performance liquid chromatography and tandem mass spectrometry, J. Separ. Sci. 40 (9) (2017) 1966–1973.
[1336] Q. Cheng, et al., Application of ultra-high-performance liquid chromatography coupled with LTQ-Orbitrap mass spectrometry for identification, confirmation and quantitation of illegal adulterated weight-loss drugs in plant dietary supplements, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1064 (2017) 92–99.
[1337] D. Custers, et al., Clustering and diagnostic modelling of slimming aids based on chromatographic and mass spectrometric fingerprints, Drug Test. Anal. 9 (2) (2017) 230–242.
[1338] R. Jin, et al., A graphene tip coupled with liquid chromatography tandem mass spectrometry for the determination of four synthetic adulterants in slimming supplements, Food Chem. 224 (2017) 329–334.
[1339] D. Neves, E. Caldas, Determination of of caffeine and identification of undeclared substances in dietary supplements and caffeine dietary exposure assessment, Food Chem. Toxicol. 105 (2017) 194–202.
[1340] R. Pawar, E. Grundel, Overview of regulation of dietary supplements in the USA and issues of adulteration with phenethylamines (PEAs), Drug Test. Anal. 9 (3) (2017) 500–517.
[1341] Y. Zhong, et al., Simultaneous determination of eight adulterants in weight management supplements and herbs by HPLC-DAD and LC-MS/MS, J. Liq. Chromatogr. Relat. Technol. 40 (12) (2017) 640–648.
[1342] M. Martinello, et al., Development and validation of a QuEChERS method coupled to liquid chromatography and high resolution mass spectrometry to determine pyrrolizidine and tropane alkaloids in honey, Food Chem. 234 (2017) 295–302.
[1343] E. Kim, et al., Reliable screening and confirmation of 156 multi-class illegal adulterants in dietary supplements based on extracted common ion chromatograms by ultra-high-performance liquid chromatography-quadrupole/time of flight-mass spectrometry, J. Chromatogr. A 1491 (2017) 43–56.
[1344] Y. Liu, F. Lu, Adulterated pharmaceutical chemicals in botanical dietary supplements: novel screening approaches, Rev. Anal. Chem. (3) (2017) 36.
[1345] D. Muratt, et al., Pulsed amperometric detection of pharmacologic adulterants in dietary supplements using a gold electrode coupled to HPLC separation, Anal. Methods 10 (19) (2018) 2226–2233.
[1346] A. Dastjerdi, et al., Principal component analysis of synthetic adulterants in herbal supplements advertised as weight loss drugs, Compl. Ther. Clin. Pract. 31 (2018) 236–241.
[1347] E. Deconinck, et al., Detection and identification of multiple adulterants in plant food supplements using attenuated total reflectance-Infrared spectroscopy, J. Pharmaceut. Biomed. Anal. 152 (2018) 111–119.
[1348] A. Hemdan, S. Tawakol, HPLC-UV chromatographic Methods for Detection and Quantification of undeclared withdrawn synthetic Medications in counterfeit herbal Medicines with Confirmation by HPLC-PDA and mass spectrometry, Chromatographia 81 (5) (2018) 777–783.
[1349] Y. Lin, et al., Detection of adulterated drugs in traditional Chinese medicine and dietary supplements using hydrogen as a carrier gas, PloS One (10) (2018) 13.
[1350] J. Ma, R. Pawar, E. Grundel, Validation of an LC-MS/MS method for analysis of anti-diabetic drugs in botanical dietary supplements labeled for blood sugar management, Drug Test. Anal. 10 (3) (2018) 609–617.
[1351] J. Pascali, et al., Application of HRAM screening and LC-MS/MS confirmation of active pharmaceutical ingredient in "natural" herbal supplements, Forensic Sci. Int. 286 (2018) E28–E31.
[1352] N. Shekari, M. Vosough, K. Heidar, Chromatographic fingerprinting through chemometric techniques for herbal slimming pills: a way of adulterant identification, Forensic Sci. Int. 286 (2018) 213–222.
[1353] N. Saberi, et al., Determination of synthetic pharmaceutical adulterants in herbal weight gain supplements sold in herb shops, Tehran, Iran, Daru 26 (2) (2018) 117–127.
[1354] A. Hudson, et al., A Review of the Toxicity of compounds Found in herbal dietary supplements, Planta Med. 84 (9–10) (2018).
[1355] A. Rocco, et al., Miniaturized separation techniques as analytical methods to ensure quality and safety of dietary supplements, Trac. Trends Anal. Chem. 103 (2018) 156–183.
[1356] Y. Shi, et al., Validation of a rapid and simple high-performance liquid chromatography-electrospray ionization-mass spectrometry method for simultaneous analysis of 15 key chemicals in slimming foods and herbal products, J. Chromatogr. Sci. 56 (10) (2018) 912–919.
[1357] X. Wang, et al., Simultaneous analysis of 23 illegal adulterated aphrodisiac chemical ingredients in health foods and Chinese traditional patent medicines by ultrahigh performance liquid chromatography coupled with quadrupole time-of-flight mass spectrometry, J. Food Drug Anal. 26 (3) (2018) 1138–1153.
[1358] Y. Zhang, B. Jiao, Simultaneous determination of six protoalkaloids in Chinese local varieties of loose-skin mandarins and sweet oranges by strong cation exchange-high performance liquid chromatography, Food Anal. Methods 12 (3) (2019) 677–686.
[1359] J. Marin-Saez, R. Romero-Gonzalez, A. Frenich, Reliable determination of tropane alkaloids in cereal based baby foods coupling on-line spe to mass spectrometry avoiding chromatographic step, Food Chem. 275 (2019) 746–753.
[1360] M. Urban, S. Hann, H. Rost, Simultaneous determination of pesticides, mycotoxins, tropane alkaloids, growth regulators, and pyrrolizidine alkaloids in oats and whole wheat grains after online clean-up via two-dimensional liquid chromatography tandem mass spectrometry, J. Environ. Sci. Health - Part B Pesticides, Food Contam. Agric. Wastes 54 (2) (2019) 98–111.
[1361] K. Wang, et al., A hierarchical screening method for detection of illegal adulterants in Fur seal ginseng pills by profiling analysis of HPLC multi-dimensional fingerprints, J. Separ. Sci. 42 (8) (2019) 1509–1519.
[1362] N. Ahmed, et al., Over-the-Counter herbal weight loss Supplements in Egypt: label claim, Microbiological and pharmaceutical quality, and safety assessments, Med. Princ. Pract. 28 (2) (2019) 167–177.
[1363] E. Jouney, Phenibut (-Phenyl–Aminobutyric acid): an easily obtainable "dietary supplement" with Propensities for physical Dependence and addiction, Curr. Psychiatr. Rep. (4) (2019) 21.
[1364] T.H. Boles, M.J. Wells, Analysis of amphetamine and methamphetamine in municipal wastewater influent and effluent using weak cation-exchange SPE and LC-MS/MS, Electrophoresis 37 (23–24) (2016) 3101–3108.
[1365] S.S. Lee, et al., Occurrence and potential biological effects of amphetamine on stream communities, Environ. Sci. Technol. 50 (17) (2016) 9727–9735.
[1366] C. Balducci, et al., Cocaine and cannabinoids in the atmosphere of Northern Europe cities, comparison with Southern Europe and wastewater analysis, Environ. Int. 97 (2016) 187–194.
[1367] C. Balducci, et al., Cocaine and cannabinoids in the atmosphere of Northern Europe cities, comparison with Southern Europe and wastewater analysis, Environ. Int. 97 (2016) 187–194.
[1368] Lai, F.Y., et al., Cocaine, MDMA and methamphetamine residues in wastewater: consumption trends (2009-2015) in South East Queensland, Australia. Sci. Total Environ., 2016. 568: p. 803–809.
[1369] C.D.S. Pereira, et al., Occurrence of pharmaceuticals and cocaine in a Brazilian coastal zone, Sci. Total Environ. 548 (2016) 148–154.
[1370] Z.G. Yang, et al., Community sewage sensors towards evaluation of drug use trends: detection of cocaine in wastewater with DNA-directed immobilization aptamer sensors, Sci. Rep. (2016) 6.
[1371] P.K. Thai, et al., Refining the excretion factors of methadone and codeine for wastewater analysis - combining data from pharmacokinetic and wastewater studies, Environ. Int. 94 (2016) 307–314.
[1372] S. Sulaiman, et al., Diazepam stability in wastewater and removal by advanced membrane technology, activated carbon, and micelle-clay

complex, Desal. Water Treat. 57 (7) (2016) 3098–3106.
[1373] F. Been, et al., Assessing geographical differences in illicit drug consumption–A comparison of results from epidemiological and wastewater data in Germany and Switzerland, Drug Alcohol Depend. 161 (2016) 189–199.
[1374] F. Been, P. Esseiva, O. Delemont, Analysis of illicit drugs in wastewater - is there an added value for law enforcement? Forensic Sci. Int. 266 (2016) 215–221.
[1375] L. Bijlsma, et al., Estimation of illicit drug use in the main cities of Colombia by means of urban wastewater analysis, Sci. Total Environ. 565 (2016) 984–993.
[1376] M.A. Humphries, et al., Evaluation of monitoring schemes for wastewater-based epidemiology to identify drug use trends using cocaine, methamphetamine, MDMA and methadone, Environ. Sci. Technol. 50 (9) (2016) 4760–4768.
[1377] B. Tscharke, et al., Temporal trends in drug use in Adelaide, South Australia by wastewater analysis, Sci. Total Environ. 565 (2016) 384–391.
[1378] A. McCall, et al., Influence of different sewer biofilms on transformation rates of drugs, Environ. Sci. Technol. 50 (24) (2016) 13351–13360.
[1379] C. Banta-Green, et al., Using wastewater-based epidemiology to estimate drug consumption-Statistical analyses and data presentation, Sci. Total Environ. 568 (2016) 856–863.
[1380] J. Baz-Lomba, et al., Comparison of pharmaceutical, illicit drug, alcohol, nicotine and caffeine levels in wastewater with sale, seizure and consumption data for 8 European cities, BMC Publ. Health (2016) 16.
[1381] F. Been, et al., Profiles and changes in stimulant use in Belgium in the period of 2011-2015, Sci. Total Environ. 565 (2016) 1011–1019.
[1382] V. Brieudes, et al., Validation and uncertainties evaluation of an isotope dilution-SPE-LC-MS/MS for the quantification of drug residues in surface waters, Talanta 146 (2016) 138–147.
[1383] E. Castrignano, A. Lubben, B. Kasprzyk-Hordern, Enantiomeric profiling of chiral drug biomarkers in wastewater with the usage of chiral liquid chromatography coupled with tandem mass spectrometry, J. Chromatogr. A 1438 (2016) 84–99.
[1384] G. Gatidou, et al., Drugs of abuse and alcohol consumption among different groups of population on the Greek Island of Lesvos through sewage-based epidemiology, Sci. Total Environ. 563 (2016) 633–640.
[1385] E. Gracia-Lor, E. Zuccato, S. Castiglioni, Refining correction factors. for back-calculation of illicit drug use, Sci. Total Environ. 573 (2016) 1648–1659.
[1386] W. Gul, et al., LC-MS-MS Method for Stimulants in wastewater during football games, J. Anal. Toxicol. 40 (2) (2016) 124–132.
[1387] W. Gul, et al., LC-MS-MS Method for Analysis of Opiates in wastewater during football games II, J. Anal. Toxicol. 40 (5) (2016) 330–337.
[1388] B. Stamper, et al., LC-MS-MS Method for the Analysis of miscellaneous Drugs in wastewater during football games III, J. Anal. Toxicol. 40 (8) (2016) 694–699.
[1389] A. Kankaanpaa, et al., Current trends in Finnish drug abuse: wastewater based epidemiology combined with other national indicators, Sci. Total Environ. 568 (2016) 864–874.
[1390] I. Krizman, et al., Wastewater-based assessment of regional and temporal consumption patterns of illicit drugs and therapeutic opioids in Croatia, Sci. Total Environ. 566 (2016) 454–462.
[1391] F. Lai, et al., Spatial variations in the consumption of illicit stimulant drugs across Australia: a nationwide application of wastewater-based epidemiology, Sci. Total Environ. 568 (2016) 810–818.
[1392] N. Mastroianni, et al., Occurrence of drugs of abuse in surface water from four Spanish river basins: spatial and temporal variations and environmental risk assessment, J. Hazard Mater. 316 (2016) 134–142.
[1393] A. McCall, et al., Critical review on the stability of illicit drugs in sewers and wastewater samples, Water Res. 88 (2016) 933–947.
[1394] S. Salvatore, J. Bramness, J. Roislien, Exploring functional data analysis and wavelet principal component analysis on ecstasy (MDMA) wastewater data, BMC Med. Res. Methodol. (2016) 16.
[1395] K. Styszko, A. Dudarska, D. Zuba, The presence of stimulant drugs in wastewater from krakow (Poland): a snapshot. Bulletin of environmental contamination and toxicology 97 (3) (2016) 310–315.
[1396] P. Thai, et al., Monitoring temporal changes in use of two cathinones in a large urban catchment in Queensland, Australia, Sci. Total Environ. 545 (2016) 250–255.
[1397] N. Thomaidis, et al., Reflection of socioeconomic changes in wastewater: licit and illicit drug use patterns, Environ. Sci. Technol. 50 (18) (2016) 10065–10072.
[1398] J. van Wel, et al., A comparison between wastewater-based drug data and an illicit drug use survey in a selected community, Int. J. Drug Pol. 34 (2016) 20–26.
[1399] B. Yao, et al., Determination of illicit drugs in aqueous environmental samples by online solid-phase extraction coupled to liquid chromatography-tandem mass spectrometry, Chemosphere 160 (2016) 208–215.
[1400] E. Zuccato, et al., Population surveys compared with wastewater analysis for monitoring illicit drug consumption in Italy in 2010-2014, Drug Alcohol Depend. 161 (2016) 178–188.
[1401] T. Mackul'ak, et al., Wastewater analysis: the mean of the monitoring of frequently prescribed pharmaceuticals in Slovakia, Environ. Monit. Assess. 188 (1) (2016).
[1402] F. Mahmoudi, W. Carroll, Identification and measurment of morphine in wastewater by SPE and LC-MS and determination of the morphine structure in solution be NMR and RDC, Abstr. Pap. Am. Chem. Soc. (2016) 252.
[1403] A. Rodayan, et al., Linking drugs OF abuse IN wastewater to contamination OF surface and drinking water, Environ. Toxicol. Chem. 35 (4) (2016) 843–849.
[1404] E. Van Dyken, et al., Challenges and opportunities in using wastewater analysis to measure drug use in a small prison facility, Drug Alcohol Rev. 35 (2) (2016) 138–147.
[1405] A. Asimakopoulos, K. Kannan, Neuropsychiatric pharmaceuticals and illicit drugs in wastewater treatment plants: a review, Environ. Chem. 13 (4) (2016) 541–576.
[1406] T. Mackulak, et al., Zerovalent iron and iron(VI): effective means for the removal of psychoactive pharmaceuticals and illicit drugs from wastewaters, Sci. Total Environ. 539 (2016) 420–426.
[1407] A. Mendoza, et al., Drugs of abuse, cytostatic drugs and iodinated contrast media in tap water from the Madrid region (central Spain):A case study to analyse their occurrence and human health risk characterization, Environ. Int. 86 (2016) 107–118.
[1408] D. Wang, et al., Illicit drugs and their metabolites in 36 rivers that drain into the Bohai Sea and north Yellow Sea, north China, Environ. Sci. Pollut. Control Ser. 23 (16) (2016) 16495–16503.
[1409] H. Nham, et al., Long-term transport behavior of psychoactive compounds in sewage-affected groundwater, Grundwasser 21 (4) (2016) 321–332.
[1410] Y. Corrotea, et al., Determination of hormones in wastewater using rotating disk sorptive extraction and gas chromatography-mass spectrometry, Anal. Lett. 49 (9) (2016) 1344–1358.
[1411] J.J. Jimenez, et al., Persistence of alprazolam in river water according to forced and non-forced degradation assays: adsorption to sediment and long-term degradation products, Drug Test. Anal. 9 (8) (2017) 1204–1213.
[1412] N.L. Fincur, et al., Removal of alprazolam from aqueous solutions by heterogeneous photocatalysis: influencing factors, intermediates, and products, Chem. Eng. J. 307 (2017) 1105–1115.
[1413] Z. Xu, et al., Tracing methamphetamine and amphetamine sources in wastewater and receiving waters via concentration and enantiomeric profiling, Sci. Total Environ. 601–602 (2017) 159–166.
[1414] M. Mardal, et al., Screening for illicit drugs in pooled human urine and urinated soil samples and studies on the stability of urinary excretion products of cocaine, MDMA, and MDEA in wastewater by hyphenated mass spectrometry techniques, Drug Test. Anal. 9 (1) (2017) 106–114.
[1415] A.F. Martins, et al., Occurrence of cocaine and metabolites in hospital effluent - a risk evaluation and development of a HPLC method using DLLME, Chemosphere 170 (2017) 176–182.
[1416] I. Carpinteiro, et al., Reaction of diazepam and related benzodiazepines with chlorine. Kinetics, transformation products and in-silico toxicological assessment, Water Res. 120 (2017) 280–289.
[1417] C.C. Wang, et al., Occurrence of diazepam and its metabolites in wastewater and surface waters in Beijing, Environ. Sci. Pollut. Control Ser. 24 (18) (2017) 15379–15389.
[1418] P. Du, et al., Estimating heroin abuse in major Chinese cities through wastewater-based epidemiology, Sci. Total Environ. 605–606 (2017) 158–165.
[1419] P. Ramin, et al., A systematic model identification method for chemical transformation pathways - the case of heroin biomarkers in wastewater, Sci. Rep. (2017) 7.
[1420] Z.Q. Xu, et al., Tracing methamphetamine and amphetamine sources in wastewater and receiving waters via concentration and enantiomeric profiling, Sci. Total Environ. 601 (2017) 159–166.
[1421] S. Evans, J. Bagnall, B. Kasprzyk-Hordern, Enantiomeric profiling of a chemically diverse mixture of chiral pharmaceuticals in urban water, Environ. Pollut. 230 (2017) 368–377.
[1422] I. Gonzalez-Marino, et al., Monitoring MDMA metabolites in urban wastewater as novel biomarkers of consumption, Water Res. 115 (2017) 1–8.
[1423] M. Hanson, N. Lien, Investigation of 3,4-Methylenedioxymethampthetamine (MDMA) in Minnesota's natural waters by headspace solid-phase microextraction (HS-SPME) GC-MS, Abstr. Pap. Am. Chem. Soc. (2017) 253.
[1424] F. Lai, et al., An exploratory wastewater analysis study of drug use in Auckland, New Zealand, Drug Alcohol Rev. 36 (5) (2017) 597–601.
[1425] N. Mastroianni, et al., Five-yearmonitoring of 19 illicit and legal substances of abuse at the inlet of a wastewater treatment plant in Barcelona (NE Spain) and estimation of drug consumption patterns and trends, Sci. Total Environ. 609 (2017) 916–926.
[1426] S. Milione, et al., Drugs and psychoactive substances in the Tiber River, Aust. J. Forensic Sci. 49 (6) (2017) 679–686.
[1427] S. Salvatore, J. Bramness, J. Roislien, Exploring functional data analysis and wavelet principal component analysis on ecstasy (MDMA) wastewater data (vol. 16, 81, 2016), BMC Med. Res. Methodol. (2017) 17.
[1428] K. Grabicova, et al., Bioaccumulation of psychoactive pharmaceuticals in fish in an effluent dominated stream, Water Res. 124 (2017) 654–662.
[1429] D. Devault, et al., The removal of illicit drugs and morphine in two waste water treatment plants (WWTPs) under tropical conditions, Environ. Sci. Pollut. Control Ser. 24 (33) (2017) 25645–25655.
[1430] P. Du, et al., Estimating heroin abuse in major Chinese cities through wastewater-based epidemiology, Sci. Total Environ. 605 (2017) 158–165.

[1431] J. Gao, et al., Evaluation of in-sewer transformation of selected illicit drugs and pharmaceutical biomarkers, Sci. Total Environ. 609 (2017) 1172–1181.
[1432] E. Zuccato, et al., Illicit drug consumption in school populations measured by wastewater analysis, Drug Alcohol Depend. 178 (2017) 285–290.
[1433] N. Fontanals, R. Marce, F. Borrull, Solid-phase extraction followed by liquid chromatography-high resolution mass spectrometry to determine synthetic cathinones in different types of environmental water samples, J. Chromatogr. A 1524 (2017) 66–73.
[1434] A. Asimakopoulos, et al., Determination of 89 drugs and other micropollutants in unfiltered wastewater and freshwater by LC-MS/MS: an alternative sample preparation approach, Anal. Bioanal. Chem. 409 (26) (2017) 6205–6225.
[1435] R. Bade, et al., Liquid chromatography-tandem mass spectrometry determination of synthetic cathinones and phenethylamines in influent wastewater of eight European cities, Chemosphere 168 (2017) 1032–1041.
[1436] T. Gao, et al., Occurrence of new psychoactive substances in wastewater of major Chinese cities, Sci. Total Environ. 575 (2017) 963–969.
[1437] C. Maida, et al., Illicit drugs consumption evaluation by wastewater-based epidemiology in the urban area of Palermo city (Italy), Annali Dell Istituto Superiore Di Sanita 53 (3) (2017) 192–198.
[1438] M. Yadav, et al., Occurrence of illicit drugs in water and wastewater and their removal during wastewater treatment, Water Res. 124 (2017) 713–727.
[1439] Y. Zhang, et al., Drugs of abuse and their metabolites in the urban rivers of Beijing, China: occurrence, distribution, and potential environmental risk, Sci. Total Environ. 579 (2017) 305–313.
[1440] M. Basiuk, et al., Trace organic compounds in rivers, streams, and wastewater in southeastern Alberta, Canada, Inland Waters 7 (3) (2017) 283–296.
[1441] A. Causanilles, et al., Qualitative screening for new psychoactive substances in wastewater collected during a city festival using liquid chromatography coupled to high-resolution mass spectrometry, Chemosphere 184 (2017) 1186–1193.
[1442] Y. Zhang, et al., Development and application of the diffusive gradients in thin films technique for simultaneous measurement of methcathinone and ephedrine in surface river water, Sci. Total Environ. 618 (2018) 284–290.
[1443] E. Archer, et al., Wastewater-based epidemiology and enantiomeric profiling for drugs of abuse in South African wastewaters, Sci. Total Environ. 625 (2018) 792–800.
[1444] R. Bade, et al., Investigating the correlation between wastewater analysis and roadside drug testing in South Australia, Drug Alcohol Depend. 187 (2018) 123–126.
[1445] R. Bade, J. White, C. Gerber, Qualitative and quantitative temporal analysis of licit and illicit drugs in wastewater in Australia using liquid chromatography coupled to mass spectrometry, Anal. Bioanal. Chem. 410 (2) (2018) 529–542.
[1446] R. Bruno, et al., Association between purity of drug seizures and illicit drug loads measured in wastewater in a South East Queensland catchment over a six year period, Sci. Total Environ. 635 (2018) 779–783.
[1447] E. Castrignano, et al., Enantiomeric profiling of chiral illicit drugs in a pan-European study, Water Res. 130 (2018) 151–160.
[1448] A. Cosenza, et al., Occurrence of illicit drugs in two wastewater treatment plants in the South of Italy, Chemosphere 198 (2018) 377–385.
[1449] Q. Edwards, et al., Contaminants of emerging concern in wastewaters in Barbados, west indies, Bull. Environ. Contam. Toxicol. 101 (1) (2018) 1–6.
[1450] A. Love, et al., Analysis of stimulant drugs in the wastewater of five Nordic capitals, Sci. Total Environ. 627 (2018) 1039–1047.
[1451] J. Kinyua, et al., Investigating in-sewer transformation products formed from synthetic cathinones and phenethylamines using liquid chromatography coupled to quadrupole time-of-flight mass spectrometry, Sci. Total Environ. 634 (2018) 331–340.
[1452] I. Krizman-Matasic, et al., Simultaneous analysis analysis of opioid analgesics and their metabolites in municipal wastewaters and river water by liquid chromatography-tandem mass spectrometry, J. Chromatogr. A 1533 (2018) 102–111.
[1453] P. Ramin, et al., The impact of temperature on the transformation of illicit drug biomarkers in wastewater, Sci. Total Environ. 644 (2018) 1612–1616.
[1454] A. Gushgari, et al., Tracking narcotics consumption at a Southwestern US university campus by wastewater-based epidemiology, J. Hazard Mater. 359 (2018) 437–444.
[1455] E. Lopez-Garcia, et al., A fully automated approach for the analysis of 37 psychoactive substances in raw wastewater based on on-line solid phase extraction-liquid chromatography-tandem mass spectrometry, J. Chromatogr. A 1576 (2018) 80–89.
[1456] A. Skees, et al., Contamination profiles, mass loadings, and sewage epidemiology of neuropsychiatric and illicit drugs in wastewater and river waters from a community in the Midwestern United States, Sci. Total Environ. 631–632 (2018) 1457–1464.
[1457] W. Battaglin, et al., Pharmaceuticals, hormones, pesticides, and other bioactive contaminants in water, sediment, and tissue from Rocky Mountain National Park, 2012-2013, Sci. Total Environ. 643 (2018) 651–673.
[1458] D. Devault, et al., Wastewater-based epidemiology in low Human Development Index states: bias in consumption monitoring of illicit drugs, Environ. Sci. Pollut. Control Ser. 25 (28) (2018) 27819–27838.
[1459] I. Gonzalez-Marino, et al., Multi-residue determination of psychoactive pharmaceuticals, illicit drugs and related metabolites in wastewater by ultra-high performance liquid chromatography-tandem mass spectrometry, J. Chromatogr. A 1569 (2018) 91–100.
[1460] Y. Zhang, et al., Development and application of the diffusive gradients in thin films technique for simultaneous measurement of methcathinone and ephedrine in surface river water, Sci. Total Environ. 618 (2018) 284–290.
[1461] C. Gomez-Canela, et al., Analysis of 44 pharmaceuticals consumed by elderly using liquid chromatography coupled to tandem mass spectrometry, J. Pharmaceut. Biomed. Anal. 168 (2019) 55–63.
[1462] R. Bade, et al., Investigating the appearance of new psychoactive substances in South Australia using wastewater and forensic data, Drug Test. Anal. 11 (2) (2019) 250–256.
[1463] R. Bade, et al., LC-HRMS suspect screening to show spatial patterns of New Psychoactive Substances use in Australia, Sci. Total Environ. 650 (2019) 2181–2187.
[1464] J. Welter-Luedeke, H.H. Maurer, New psychoactive substances: chemistry, pharmacology, metabolism, and detectability of amphetamine derivatives with modified ring systems, Ther. Drug Monit. 38 (1) (2016) 4–11.
[1465] S. Beharry, S. Gibbons, An overview of emerging and new psychoactive substances in the United Kingdom, Forensic Sci. Int. 267 (2016) 25–34.
[1466] S. Odoardi, F. Romolo, S. Strano-Rossi, A snapshot on NPS in Italy: Distribution of drugs in seized materials analysed in an Italian forensic laboratory in the period 2013-2015, Forensic Sci. Int. 265 (2016) 116–120.
[1467] P. Geyer, et al., Guilty by dissociation-development of gas chromatography-mass spectrometry (GC-MS) and other rapid screening methods for the analysis of 13 diphenidine-derived new psychoactive substances (NPSs), Anal. Bioanal. Chem. 408 (29) (2016) 8467–8481.
[1468] F. Betzler, A. Heinz, S. Kohler, Synthetic drugs - an overview of important and newly emerging substances, Fortschr. Neurol. Psychiatr. 84 (11) (2016) 690–698.
[1469] M. Meyer, New psychoactive substances: an overview on recent publications on their toxicodynamics and toxicokinetics, Arch. Toxicol. 90 (10) (2016) 2421–2444.
[1470] P. Adamowicz, B. Tokarczyk, Simple and rapid screening procedure for 143 new psychoactive substances by liquid chromatography-tandem mass spectrometry, Drug Test. Anal. 8 (7) (2016) 652–667.
[1471] D. Robayo, et al., Analysis of blotter papers employed in the commercialization of new hallucinogenic substances of the 2,5-dimethoxy-N-(2-methoxybenzyl) phenethylamine series seized in the city of bogota by applying gas chromatography coupled to a selective mass ion trap detector, J. Braz. Chem. Soc. 27 (6) (2016) 992–997.
[1472] N. Uchiyama, R. Kikura-Hanajiri, T. Hakamatsuka, A phenethylamine derivative 2-(4-iodo-2,5-dimethoxyphenyl)-N-[(3,4-methylenedioxyphenyl) methyl]ethanamine (25I-NB34MD) and a piperazine derivative 1-(3,4-difluoromethylenedioxybenzyl)piperazine (DF-MDBP), newly detected in illicit products, Forensic Toxicol. 34 (1) (2016) 166–173.
[1473] D.K. Yonamine, et al., Forensic in silico study of nps: amphetamines and cathinones, Forensic Sci. Int. 277 (2017), p. 77–77.
[1474] L. Ford, J. Berg, Analysis of legal high materials by ultra-performance liquid chromatography with time of flight mass spectrometry as part of a toxicology vigilance system: what are the most popular novel psychoactive substances in the UK? Ann. Clin. Biochem. 54 (2) (2017) 219–229.
[1475] D. Tracy, D. Wood, D. Baumeister, CLINICAL UPDATES Novel psychoactive substances: types, mechanisms of action, and effects, BMJ Br. Med. J. (Clin. Res. Ed.) (2017) 356.
[1476] L. Vardal, et al., Parallel artificial liquid membrane extraction of new psychoactive substances in plasma and whole blood, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1048 (2017) 77–84.
[1477] E. Bertol, et al., Advances in new psychoactive substances identification: the URITo.N. Consortium, J. Enzym. Inhib. Med. Chem. 32 (1) (2017) 841–849.
[1478] M. Taschwer, J. Grascher, M. Schmid, Development of an enantioseparation method for novel psychoactive drugs by HPLC using a Lux (R) Cellulose-2 column in polar organic phase mode, Forensic Sci. Int. 270 (2017) 232–240.
[1479] T. Brunt, et al., Online test purchased new psychoactive substances in 5 different European countries: a snapshot study of chemical composition and price, Int. J. Drug Pol. 44 (2017) 105–114.
[1480] L. Pereira, et al., Direct classification of new psychoactive substances in seized blotter papers by ATR-FTIR and multivariate discriminant analysis, Microchem. J. 133 (2017) 96–103.
[1481] H. Dolengevich-Segal, et al., An approach to the new psychoactive drugs phenomenon, Salud Ment 40 (2) (2017) 71–82.
[1482] L. Feng, et al., New psychoactive substances of natural origin: a brief review, J. Food Drug Anal. 25 (3) (2017) 461–471.
[1483] L. Fojtikova, B. Holubova, M. Kuchar, New psycho-active substances, Chem. Listy 111 (4) (2017) 234–238.
[1484] D. de Morais, et al., EASI-IMS an expedite and secure technique to screen for 25I-NBOH in blotter papers, J. Mass Spectrom. 52 (10) (2017) 701–706.
[1485] R. Sutherland, et al., New psychoactive substances: purchasing and supply patterns in Australia, Hum. Psychopharmacol. Clin. Exp. (3) (2017) 32.
[1486] S. Chambers, et al., The DARK Side of total synthesis: Strategies and Tactics in psychoactive drug production, ACS Chem. Neurosci. 9 (10) (2018) 2307–2330.
[1487] K. Kadkhodaei, L. Forcher, M. Schmid, Separation of enantiomers of new psychoactive substances by high-performance liquid chromatography, J. Separ. Sci. 41 (6) (2018) 1274–1286.

[1488] F. Schifano, et al., Abuse of prescription drugs in the context of novel psychoactive substances (NPS): a systematic review, Brain Sci. 8 (4) (2018).
[1489] C. Chitescu, et al., New psychoactive substances (NPSs) abuse in Romania: analytical strategies for drug screening in biological samples using high resolution mass spectrometry, Rom. J. Leg. Med. 26 (2) (2018) 173–182.
[1490] K. Bae, N. Kwon, E. Han, A review on the abuse of three NPS (synthetic cannabinoids, kratom, poppers) among youths in Asia, Forensic Sci. Int. 292 (2018) 45–49.
[1491] J. Fox, et al., Drugs of abuse and novel psychoactive substances at outdoor music festivals in Colorado, Subst. Use Misuse 53 (7) (2018) 1203–1211.
[1492] A. Oiestad, et al., Separation of isomers of new psychoactive substances and isotope-labeled amphetamines using UHPSFC-MS/MS and UHPLC-MS/MS, J. Liq. Chromatogr. Relat. Technol. 41 (7) (2018) 391–400.
[1493] G. McLaughlin, et al., Synthesis, analytical characterization, and monoamine transporter activity of the new psychoactive substance 4-methylphenmetrazine (4-MPM), with differentiation from its ortho- and meta- positional isomers, Drug Test. Anal. 10 (9) (2018) 1404–1416.
[1494] J. Calvo-Castro, et al., Detection of newly emerging psychoactive substances using Raman spectroscopy and chemometrics, RSC Adv. 8 (56) (2018) 31924–31933.
[1495] A. Yanini, et al., Ion mobility spectrometry and high resolution mass-spectrometry as methodologies for rapid identification of the last generation of new psychoactive substances, J. Chromatogr. A 1574 (2018) 91–100.
[1496] J. Maier, et al., DARK Classics in chemical neuroscience: Aminorex analogues, ACS Chem. Neurosci. 9 (10) (2018) 2484–2502.
[1497] M. Backberg, et al., Investigation of drug products received for analysis in the Swedish STRIDA project on new psychoactive substances, Drug Test. Anal. 10 (2) (2018) 340–349.
[1498] J. Omar, et al., Identification of new psychoactive substances (NPS) by Raman spectroscopy, J. Raman Spectrosc. 50 (1) (2019) 41–51.
[1499] S. Graziano, et al., Screening methods for rapid determination of new psychoactive substances (NPS) in conventional and non-conventional biological matrices, J. Pharmaceut. Biomed. Anal. 163 (2019) 170–179.
[1500] B. Jurasek, et al., X-Ray powder diffraction - a non-destructive and versatile approach for the identification of new psychoactive substances, Talanta 195 (2019) 414–418.
[1501] K. Kelly, et al., Synthetic small molecule characterization and isomer discrimination using gas-phase hydrogen-deuterium exchange IMS-MS, Anal. Chem. 91 (9) (2019) 6259–6265.
[1502] H. Segawa, et al., Rapid detection of hypnotics using surface-enhanced Raman scattering based on gold nanoparticle co-aggregation in a wet system, Analyst 144 (6) (2019) 2158–2165.
[1503] H. Peltenburg, et al., Sorption of structurally different ionized pharmaceutical and illicit drugs to a mixed-mode coated microsampler, J. Chromatogr. A 1447 (2016) 1–8.
[1504] S. Sharma, S. Lahiri, Chemical characterization and quantitative estimation of narcotic drugs in the seized illicit samples by GC-MS and GC-FTIR, identification of source and possibility of isotopic substitution, J. Indian Chem. Soc. 93 (11) (2016) 1299–1312.
[1505] T. Chen, H. Hsu, S. Wu, The detection of multiple illicit street drugs in liquid samples by direct analysis in real time (DART) coupled to Q-orbitrap tandem mass spectrometry, Forensic Sci. Int. 267 (2016) 1–6.
[1506] E. Evans, et al., Determination of inorganic ion profiles of illicit drugs by capillary electrophoresis, J. Forensic Sci. 61 (6) (2016) 1610–1614.
[1507] L. Souza, et al., HR-MAS NMR for rapid Identification of illicit Substances in Tablets and blotter papers Seized by police department, J. Braz. Chem. Soc. 27 (11) (2016) 2141–2148.
[1508] R. Risoluti, et al., Early detection of emerging street drugs by near infrared spectroscopy and chemometrics, Talanta 153 (2016) 407–413.
[1509] C. Rollman, M. Moini, Ultrafast capillary electrophoresis/mass spectrometry of controlled substances with optical isomer separation in about a minute, Rapid Commun. Mass Spectrom. 30 (18) (2016) 2070–2076.
[1510] M. Bluth, M. Pincus, Narcotic analgesics and common drugs of abuse clinical correlations and laboratory assessment, Clin. Lab. Med. 36 (4) (2016) 603.
[1511] M. Andreae, et al., An ethical exploration of barriers to research on controlled drugs, Am. J. Bioeth. 16 (4) (2016) 36–47.
[1512] A. Cecinato, C. Balducci, M. Perilli, Illicit psychotropic substances in the air: the state-of-art, Sci. Total Environ. 539 (2016) 1–6.
[1513] T. Brunt, et al., Drug testing in Europe: monitoring results of the trans European drug information (TEDI) project, Drug Test. Anal. 9 (2) (2017) 188–198.
[1514] M. Collins, Illicit drug profiling: the Australian experience - revisited, Aust. J. Forensic Sci. 49 (6) (2017) 591–604.
[1515] E. Domingos, et al., Paper spray ionization mass spectrometry applied to forensic chemistry - drugs of abuse, inks and questioned documents, Anal. Methods 9 (30) (2017) 4400–4409.
[1516] K. Chan, H. Harun, Identification of illicit drugs in vapes by GC-MS, Aust. J. Forensic Sci. 49 (6) (2017) 650–659.
[1517] G. Doran, et al., The presence of licit and illicit drugs in police stations and their implications for workplace drug testing, Forensic Sci. Int. 278 (2017) 125–136.
[1518] A. Moorthy, et al., Combining fragment-Ion and neutral-loss Matching during mass spectral library searching: a new general purpose algorithm Applicable to illicit drug identification, Anal. Chem. 89 (24) (2017) 13261–13268.
[1519] E. Bertol, et al., Analysis of illicit drugs seized in the Province of Florence from 2006 to 2016, Forensic Sci. Int. 284 (2018) 194–203.
[1520] E. Lefrancois, M. Augsburger, P. Esseiva, Drug residues in used syringes in Switzerland: a comparative study, Drug Test. Anal. 10 (5) (2018) 874–879.
[1521] F. Akman, et al., Calculation of absorption parameters for selected narcotic drugs in the energy range from 1 keV to 100 GeV, Int. Conf. Adv. Nat. Appl. Sci. (2017) 1833.
[1522] H. Dies, et al., Rapid identification and quantification of illicit drugs on nanodendritic surface-enhanced Raman scattering substrates, Sensor. Actuator. B Chem. 257 (2018) 382–388.
[1523] K. Liu, et al., Non-contact identification and differentiation of illicit drugs using fluorescent films, Nat. Commun. (2018) 9.
[1524] M. Akhgari, F. Moradi, P. Ziarati, The texture of psychoactive illicit drugs in Iran: adulteration with lead and other active pharmaceutical ingredients, J. Psychoact. Drugs 50 (5) (2018) 451–459.
[1525] E. Garrido, et al., Chromogenic and fluorogenic probes for the detection of illicit drugs, Chemistryopen 7 (5) (2018) 401–428.
[1526] G. Fantuzzi, et al., Illicit drugs and pharmaceuticals in swimming pool waters, Sci. Total Environ. 635 (2018) 956–963.
[1527] A. Helou, et al., Analysis of illicit drugs and pharmaceuticals in edible seaweeds by liquid chromatography-tandem mass spectrometry, Anal. Methods 10 (38) (2018) 4702–4710.
[1528] B. Yu, et al., Sodium chloride crystal-induced SERS Platform for controlled highly sensitive Detection of illicit drugs, Chem.-A Eur. J. 24 (19) (2018) 4800–4804.
[1529] E. Gerace, et al., On-site identification of psychoactive drugs by portable Raman spectroscopy during drug-checking service in electronic music events, Drug Alcohol Rev. 38 (1) (2019) 50–56.
[1530] E. Seyyal, T. Evans-Nguyen, Online sol-gel capillary microextraction-mass spectrometry (CME-MS) analysis of illicit drugs, J. Am. Soc. Mass Spectrom. 30 (4) (2019) 595–604.
[1531] C. Chiang, et al., Using ambient mass spectrometry and LC-MS/MS for the rapid detection and identification of multiple illicit street drugs, J. Food Drug Anal. 27 (2) (2019) 439–450.
[1532] Y. Peng, L. Gautam, S. Hall, The detection of drugs of abuse and pharmaceuticals in drinking water using solid-phase extraction and liquid chromatography-mass spectrometry, Chemosphere 223 (2019) 438–447.
[1533] S. Wang, et al., Rapid on-site Detection of illegal Drugs in complex Matrix by thermal desorption acetone-assisted photoionization miniature ion trap mass spectrometer, Anal. Chem. 91 (6) (2019) 3845–3851.
[1534] M. Heinrich, S. Anagnostou, From pharmacognosia to DNA-based medicinal plant authentication - pharmacognosy through the centuries, Planta Med. 83 (14–15) (2017) 1110–1116.
[1535] U. Ozkay, et al., Synthesis and antinociceptive activities of some novel benzimidazole-piperidine derivatives, Turk. J. Chem. 41 (5) (2017) 672–684.
[1536] C. Ribeiro, et al., Chiral drug analysis in forensic chemistry: an overview, Molecules 23 (2) (2018).
[1537] M. Philp, S. Fu, A review of chemical "spot' tests: a presumptive illicit drug identification technique, Drug Test. Anal. 10 (1) (2018) 95–108.
[1538] H. Inoue, Forensic science and scientific investigation, Yakugaku Zasshi-J. Pharm. Soc. Jap. 139 (5) (2019) 685–691.
[1539] D. Nash, et al., A novel method for the presumptive identification of heterocyclic amines of forensic interest using photoluminescent copper(I) iodide cluster compounds, Anal. Methods 10 (19) (2018) 2217–2225.
[1540] S. Krauss, et al., Centrifugal microfluidic devices using low-volume reagent storage and inward fluid displacement for presumptive drug detection, Sensor. Actuator. B Chem. 284 (2019) 704–710.
[1541] N. Jornet-Martinez, R. Herraez-Hernandez, P. Campins-Falco, Stabilization of formaldehyde into polydimethylsiloxane composite: application to the in situ determination of illicit drugs, Anal. Bioanal. Chem. 411 (10) (2019) 2141–2148.
[1542] M. Pavlovich, B. Musselman, A. Hall, Direct analysis IN real time-mass spectrometry (DART-MS) IN forensic and security applications, Mass Spectrom. Rev. 37 (2) (2018) 171–187.
[1543] G. Slepchenko, T. Gindullina, S. Nekhoroshev, Capabilities of the electrochemical methods in the determination of narcotic and psychotropic drugs in forensic chemistry materials, J. Anal. Chem. 72 (7) (2017) 703–709.
[1544] I. Fejos, et al., Characterization of a single-isomer carboxymethyl-beta-cyclodextrin in chiral capillary electrophoresis, Electrophoresis 38 (15) (2017) 1869–1877.
[1545] P. Nowak, et al., Cyclodextrin-induced acidity modification of substituted cathinones studied by capillary electrophoresis supported by density functional theory calculations, J. Chromatogr. A 1580 (2018) 142–151.
[1546] C. Gobble, B. Walker, J. Chickos, The vaporization enthalpy and vapor pressure of Fenpropidin and phencyclidine (PCP) at T/K=298.15 by correlation gas chromatography, J. Chem. Eng. Data 61 (2) (2016) 896–902.
[1547] L. Skultety, et al., Resolution of isomeric new designer stimulants using gas chromatography - vacuum ultraviolet spectroscopy and theoretical computations, Anal. Chim. Acta 971 (2017) 55–67.
[1548] S. Ciochina, M. Praisler, C. Negoita, Cluster Analysis evaluating the automated detection of drugs of abuse with a new hollow fiber based quantum cascade laser infrared spectrometer, in: 2017 Ieee International Conference on E-Health and Bioengineering Conference (Ehb), 2017, pp. 237–240.
[1549] R. Correia, et al., Portable near infrared spectroscopy applied to abuse drugs

and medicine analyses, Anal. Methods 10 (6) (2018) 593–603.
[1550] T. Forbes, M. Najarro, Ion mobility spectrometry nuisance alarm threshold analysis for illicit narcotics based on environmental background and a ROC-curve approach, Analyst 141 (14) (2016) 4438–4446.
[1551] A. Kanu, A. Leal, Identity efficiency for high-performance ambient pressure ion mobility spectrometry, Anal. Chem. 88 (6) (2016) 3058–3066.
[1552] D. Usmanov, et al., Low-pressure barrier discharge ion source using air as a carrier gas and its application to the analysis of drugs and explosives, J. Mass Spectrom. 51 (2) (2016) 132–140.
[1553] T. Yonezawa, T. Asano, M. Matsubara, Surface-assisted laser desorption ionization mass spectrometry (SALDI-MS) of low-molecular-weight Medicines and toxic materials using commercial TiO2 nanoparticles, Bull. Chem. Soc. Jpn. 89 (3) (2016) 346–353.
[1554] T. Carvalho, et al., Qualitative analysis of designer drugs by paper spray ionisation mass spectrometry (PSI-MS), Anal. Methods 8 (3) (2016) 614–620.
[1555] R. Reiss, et al., Ambient pressure laser desorption-chemical ionization mass spectrometry for fast and reliable detection of explosives, drugs, and their precursors, Appl. Sci. -Basel (6) (2018) 8.
[1556] Z. Du, et al., Development of a plug-type IMS-MS instrument and its applications in resolving problems existing in in-situ detection of illicit drugs and explosives by IMS, Talanta 184 (2018) 65–72.
[1557] C. Tsai, C. Tipple, R. Yost, Integration of paper spray ionization high-field asymmetric waveform ion mobility spectrometry for forensic applications, Rapid Commun. Mass Spectrom. 32 (7) (2018) 552–560.
[1558] X. Kong, et al., Microfluidic diatomite analytical devices for illicit drug sensing with ppb-Level sensitivity, Sensor. Actuator. B Chem. 259 (2018) 587–595.
[1559] B. Anilanmert, et al., Simultaneous analysis method for GHB, ketamine, norketamine, phenobarbital, thiopental, zolpidem, zopiclone and phenytoin in urine, using C18 poroshell column, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1022 (2016) 230–241.
[1560] Y. Peng, Q. He, J. Cai, Enantioseparation of citalopram by RP-HPLC, using sulfobutyl ether-beta-cyclodextrin as a chiral mobile phase Additive, Int. J. Anal. Chem. (2016), 1231386.
[1561] M. Sinanian, et al., Multivariate curve resolution-alternating least squares Analysis of high-resolution liquid chromatography-mass spectrometry data, Anal. Chem. 88 (22) (2016) 11092–11099.
[1562] L. Fang, et al., Preparation of a beta-cyclodextrin-based open-tubular capillary electrochromatography column and application for enantioseparations of ten basic drugs, PloS One (1) (2016) 11.
[1563] M. Yoshikawa, et al., Rapid and simultaneous analysis of psychotropic drugs by ultra-high-speed HPLC, Bunseki Kagaku 65 (4) (2016) 173–179.
[1564] M. Taheri, et al., Response surface methodology based on central composite design accompanied by multivariate curve resolution to model gradient hydrophilic interaction liquid chromatography: prediction of separation for five major opium alkaloids, J. Separ. Sci. 40 (18) (2017) 3602–3611.
[1565] M. Thevis, et al., Expanding analytical options in sports drug testing: mass spectrometric detection of prohibited substances in exhaled breath, Rapid Commun. Mass Spectrom. 31 (15) (2017) 1290–1296.
[1566] L. Sharrenbroch, A. Tough, K. Matthews, Characterisation of illicit ecstasy and diazepam tablets by colorant identification, Anal. Methods 10 (17) (2018) 2048–2055.
[1567] A. Speltini, et al., Tuning retention and selectivity in reversed-phase liquid chromatography by using functionalized multi-walled carbon nanotubes, Arab. J. Chem. 12 (4) (2019) 541–548.
[1568] J. Almirall, T. Trejos, Applications of LA-ICP-MS to forensic science, Elements 12 (5) (2016) 335–340.
[1569] J. Saiz, C. Garcia-Ruiz, B. Gomara, Comparison of different GC-MS configurations for the determination of prevalent drugs and related metabolites, Anal. Methods 9 (19) (2017) 2897–2908.
[1570] A. Cecinato, et al., Psychotropic substances in house dusts: a preliminary assessment, Environ. Sci. Pollut. Control Ser. 24 (26) (2017) 21256–21261.
[1571] Z. Lawton, et al., Analytical validation of a portable mass spectrometer featuring interchangeable, ambient ionization sources for high throughput forensic evidence screening, J. Am. Soc. Mass Spectrom. 28 (6) (2017) 1048–1059.
[1572] D. Usmanov, et al., Remote sampling mass spectrometry for dry samples: sheath-flow probe electrospray ionization (PESI) using a gel-loading tip inserted with an acupuncture needle, Rapid Commun. Mass Spectrom. 32 (5) (2018) 407–413.
[1573] B. Brkic, et al., An optimised quadrupole mass spectrometer with a dual filter analyser for in-field chemical sniffing of volatile organic compounds, Analyst 143 (15) (2018) 3722–3728.
[1574] J. Hartman, G. Day, G. Beran, Enhanced NMR Discrimination of pharmaceutically relevant molecular crystal Forms through fragment-based Ab Initio chemical shift predictions, Cryst. Growth Des. 16 (11) (2016) 6479–6493.
[1575] Y. Zhong, et al., The application of a desktop NMR spectrometer in drug analysis, Int. J. Anal. Chem. (2018), 3104569.
[1576] L. Gabrielli, et al., Detection and identification of designer drugs by nanoparticle-based NMR chemosensing, Chem. Sci. 9 (21) (2018) 4777–4784.
[1577] A. Santos, et al., Forensic NMR spectroscopy: Just a beginning of a promising partnership, Trac. Trends Anal. Chem. 107 (2018) 31–42.
[1578] L. Antonides, et al., Rapid identification of novel psychoactive and other controlled substances using low-field(1)H NMR spectroscopy, ACS Omega 4 (4) (2019) 7103–7112.
[1579] C.A.F.D. Penido, et al., Raman spectroscopy in forensic analysis: identification of cocaine and other illegal drugs of abuse, J. Raman Spectrosc. 47 (1) (2016) 28–38.
[1580] N. Kline, et al., Optimization of surface-enhanced Raman spectroscopy Conditions for Implementation into a microfluidic Device for drug detection, Anal. Chem. 88 (21) (2016) 10513–10522.
[1581] I. Alessandri, et al., RaMassays": synergistic Enhancement of plasmon-free Raman Scattering and mass Spectrometry for multimodal Analysis of small molecules, Sci. Rep. (2016) 6.
[1582] S. Siddhanta, M. Wrobel, I. Barman, Integration of protein tethering in a rapid and label-free SERS screening platform for drugs of abuse, Chem. Commun. 52 (58) (2016) 9016–9019.
[1583] A. Hakonen, et al., Detecting forensic substances using commercially available SERS substrates and handheld Raman spectrometers, Talanta 189 (2018) 649–652.
[1584] V. Trofimov, et al., High effective THz-TDS method for the detection and identification of substances in real conditions, Micro- Nanotechnol. Sens. Syst. Appl. Viii (2016) 9836.
[1585] T. Cerling, et al., Forensic stable isotope biogeochemistry, Annu. Rev. Earth Planet Sci. 44 (2016) 175–206, 44.
[1586] Y. Makino, Y. Urano, K. Kaneko, Trial analysis of drug profiling by liquid chromatography/mass spectrometry and inductively coupled plasma mass spectrometry to establish the origin of ephedrines used as precursors for illicit production of methamphetamine, Rapid Commun. Mass Spectrom. 33 (11) (2019) 995–1005.
[1587] M. Parr, et al., SFC-MS/MS as an orthogonal technique for improved screening of polar analytes in anti-doping control, Anal. Bioanal. Chem. 408 (24) (2016) 6789–6797.
[1588] V. Pauk, K. Lemr, Forensic applications of supercritical fluid chromatography - mass spectrometry, J. Chromatogr. B-Anal. Technol. Biomed. Life Sci. 1086 (2018) 184–196.
[1589] M. Ivic, et al., A chemometrical Analysis of voltammetric Data for simultaneous Determination of phenobarbital Sodium and paracetamol Obtained at a gold electrode, Int. J. Electrochem. Sci. 11 (7) (2016) 5935–5951.
[1590] S. Shutic, et al., Forensic identification of pharmaceuticals via portable X-ray fluorescence and diffuse reflectance spectroscopy, Forensic Sci. Int. 279 (2017) 22–32.
[1591] M. Jones, et al., Drug formulation advances in extended-release medications for pain control, Curr. Pain Headache Rep. (6) (2016) 20.
[1592] D. Mastropietro, S. Muppalaneni, H. Omidian, Deterred drug abuse using superabsorbent polymers, Expet Opin. Drug Deliv. 13 (11) (2016) 1523–1531.
[1593] S. Inoue, et al., A randomized, double-blind study of hydromorphone hydrochloride extended-release tablets versus oxycodone hydrochloride extended-release tablets for cancer pain: efficacy and safety in Japanese cancer patients (EXHEAL: a Phase III study of EXtended-release HydromorphonE for cAncer pain reLief), J. Pain Res. 10 (2017) 1953–1961.
[1594] A. Roberto, et al., A comparison between the administration of oral prolonged-release oxycodone-naloxone and transdermal fentanyl in patients with moderate-to-severe cancer pain: a propensity score analysis, J. Pain Res. 10 (2017) 2123–2133.
[1595] A. Berardi, et al., Formulation, swelling and dissolution kinetics study of zein based matrix tablets, Powder Technol. 310 (2017) 241–249.
[1596] J. Pergolizzi, et al., Abuse-deterrent opioids: an update on current approaches and considerations, Curr. Med. Res. Opin. 34 (4) (2018) 711–723.
[1597] S. Butler, R. Black, A. Fleming, Relative abuse of crush-resistant prescription opioid tablets via alternative oral modes of administration, Pain Med. 19 (8) (2018) 1613–1627.
[1598] K. By, et al., Important statistical considerations in the evaluation of post-market studies to assess whether opioids with abuse-deterrent properties result in reduced abuse in the community, Pharmacoepidemiol. Drug Saf. 27 (5) (2018) 473–478.
[1599] Z. Shi, et al., Efficacy and safety of titration with controlled-release oxycodone versus immediate-release morphine in patients with moderate cancer pain, Int. J. Clin. Exp. Med. 11 (3) (2018) 2595–2602.
[1600] L. Webster, et al., Human abuse potential studies of abuse-deterrent opioids: lessons from oral and intranasal studies with morphine abuse-deterrent, extended-release, injection-molded tablets, Curr. Med. Res. Opin. 34 (5) (2018) 893–901.
[1601] T. Mikuma, et al., Approaching over 10 000-fold sensitivity increase in chiral capillary electrophoresis: cation-selective exhaustive injection and sweeping cyclodextrin-modified micellar electrokinetic chromatography, Electrophoresis 37 (22) (2016) 2970–2976.
[1602] G. Brajkovic, et al., Fatal cocaine intoxication in a body packer, Vojnosanit. Pregl. 73 (2) (2016) 198–201.
[1603] M. Bulakci, F. Cengel, The role of radiology in diagnosis and management of drug mules: an update with new challenges and new diagnostic tools, Br. J. Radiol. 89 (1060) (2016) 20150888.
[1604] O. Kaplan, O. Sogut, M. Yigit, International smuggling of cocaine by body concealment: a case report, Iran. Red Crescent Med. J. (2) (2017) 19.
[1605] S. Visentin, et al., Death by heroin intoxication in a body pusher with an innovative packaging technique: case report and review of the literature,

Forensic Sci. Int. 280 (2017) 8–14.
[1606] C. Villarreal, J. Rojas, M. Ochoa, Operational impact of canine teams in the fight against drug trafficking in Colombia: review of their contribution, strategies and recent trends, Revue Scientifique Et Technique-Office International Des Epizooties 37 (1) (2018) 201–211.
[1607] V. Francis, H. Holness, K. Furton, The ability of narcotic detection canines to detect illegal synthetic cathinones (bath salts), Front. Vet. Sci. (2019) 6.
[1608] K. Goss, The physical chemistry of odors - consequences for the work with detection dogs, Forensic Sci. Int. 296 (2019) 110–114.
[1609] J. Wright, J. Edwards, S. Walker, Exposures associated with clandestine methamphetamine drug laboratories in Australia, Rev. Environ. Health 31 (3) (2016) 329–352.
[1610] E. Hearne, et al., A scoping review of home-produced heroin and amphetamine-type stimulant substitutes: implications for prevention, treatment, and policy, Harm Reduct. J. (2016) 13.
[1611] J. Aldridge, D. Decary-Hetu, Hidden wholesale: the drug diffusing capacity of online drug cryptomarkets, Int. J. Drug Pol. 35 (2016) 7–15.
[1612] O.R. Bilgrei, From "herbal highs" to the "heroin of cannabis": Exploring the evolving discourse on synthetic cannabinoid use in a Norwegian Internet drug forum, Int. J. Drug Pol. 29 (2016) 1–8.
[1613] B. Bowser, R. Fullilove, C. Word, Is the new heroin epidemic really new? Racializing heroin, J. Natl. Med. Assoc. 109 (1) (2017) 28–32.
[1614] F. Caudevilla, et al., Results of an international drug testing service for cryptomarket users, Int. J. Drug Pol. 35 (2016) 38–41.
[1615] D. Rhumorbarbe, et al., Buying drugs on a Darknet market: a better deal? Studying the online illicit drug market through the analysis of digital, physical and chemical data, Forensic Sci. Int. 267 (2016) 173–182.
[1616] J. Van Buskirk, et al., Characterising dark net marketplace purchasers in a sample of regular psychostimulant users, Int. J. Drug Pol. 35 (2016) 32–37.
[1617] D. Dolliver, J. Kuhns, The presence of new psychoactive substances in a tor network marketplace environment, J. Psychoact. Drugs 48 (5) (2016) 321–329.
[1618] J. Broseus, et al., Studying illicit drug trafficking on Darknet markets: structure and organisation from a Canadian perspective, Forensic Sci. Int. 264 (2016) 7–14.
[1619] D. Frangez, et al., Online counterfeit medicine trade IN Slovenia, Criminal Justice and Security in Central and Eastern Europe: Safety, Security, and Social Control in Local Communities (2016) 337–350.
[1620] B. Tofighi, et al., Craigslist as a source for heroin: a report of two cases, J. Subst. Use 21 (5) (2016) 543–546.
[1621] D. van der Gouwe, et al., Purity, adulteration and price of drugs bought online versus off-line in The Netherlands, Addiction 112 (4) (2017) 640–648.
[1622] J. Broseus, et al., Forensic drug intelligence and the rise of cryptomarkets. Part I: studying the Australian virtual market, Forensic Sci. Int. 279 (2017) 288–301.
[1623] M. Van Hout, E. Hearne, New psychoactive substances (NPS) on cryptomarket fora: an exploratory study of characteristics of forum activity between NPS buyers and vendors, Int. J. Drug Pol. 40 (2017) 102–110.
[1624] R. Vrolijk, et al., Is online information on ecstasy tablet content safe? Addiction 112 (1) (2017) 94–100.
[1625] J. Cunliffe, et al., An island apart? Risks and prices in the Australian cryptomarket drug trade, Int. J. Drug Pol. 50 (2017) 64–73.
[1626] D. Decary-Hetu, O. Quessy-Dore, Are repeat buyers in cryptomarkets loyal customers? Repeat business between dyads of cryptomarket vendors and users, Am. Behav. Sci. 61 (11) (2017) 1341–1357.
[1627] P. Griffiths, J. Mounteney, Disruptive potential of the internet to transform illicit drug markets and impact on future patterns of drug consumption, Clin. Pharmacol. Therapeut. 101 (2) (2017) 176–178.
[1628] M. Haden, D. Wood, P. Dargan, The impact of the Psychoactive Substances Act 2016 on the online availability of MDMB-CHMICA, Qjm-Int. J. Med. 110 (10) (2017) 619–622.
[1629] E. Wadsworth, et al., A market on both "sides" of the law: The use of the hidden web for the sale of new psychoactive substances, Hum. Psychopharmacol. Clin. Exp. 32 (3) (2017).
[1630] M. Chary, D. Yi, A. Manini, Candyflipping and other combinations: identifying drug-drug combinations from an online forum, Front. Psychiatr. (2018) 9.
[1631] I. Ladegaard, Instantly hooked? Freebies and Samples of opioids, cannabis, MDMA, and other Drugs in an illicit E-commerce market, J. Drug Issues 48 (2) (2018) 226–245.
[1632] V. Belackova, et al., Assessing the impact of laws controlling the online availability of 25I-NBOMe, AH-7921, MDPV and MXE - outcomes of a semi-automated e-shop monitoring, Drugs Educ. Prev. Pol. 25 (2) (2018) 109–117.
[1633] M. Morelato, et al., Forensic drug intelligence and the rise of cryptomarkets. Part II: combination of data from the physical and virtual markets, Forensic Sci. Int. 288 (2018) 201–210.
[1634] D. Dolliver, S. Ericson, K. Love, A geographic Analysis of drug trafficking Patterns on the TOR network, Geogr. Rev. 108 (1) (2018) 45–68.
[1635] J. Densley, et al., An altered state? Emergent changes to illicit drug markets and distribution networks in scotland, Int. J. Drug Pol. 58 (2018) 113–120.
[1636] R. Koenraadt, K. van de Ven, The Internet and lifestyle drugs: an analysis of demographic characteristics, methods, and motives of online purchasers of illicit lifestyle drugs in The Netherlands, Drugs Educ. Prev. Pol. 25 (4) (2018) 345–355.
[1637] J. Martin, et al., Effect of restricting the legal supply of prescription opioids on buying through online illicit marketplaces: interrupted time series analysis, BMJ Br. Med. J. (Clin. Res. Ed.) (2018) 361.
[1638] M. Paquet-Clouston, C. Autixier, D. Decary-Hetu, Understanding the interactions of online drug senders on cryptomarket discussion forums, Can. J. Criminol. Crim. Justice 60 (4) (2018) 455–477.
[1639] M. Paquet-Clouston, D. Decary-Hetu, C. Morselli, Assessing market competition and vendors' size and scope on AlphaBay, Int. J. Drug Pol. 54 (2018) 87–98.
[1640] D. Rhumorbarbe, et al., Characterising the online weapons trafficking on cryptomarkets, Forensic Sci. Int. 283 (2018) 16–20.
[1641] U. Lokala, et al., Global trends, local harms: availability of fentanyl-type drugs on the dark web and accidental overdoses in Ohio, Comput. Math. Organ. Theor. 25 (1) (2019) 48–59.
[1642] V. Bhaskar, R. Linacre, S. Machin, The economic functioning of online drugs markets, J. Econ. Behav. Organ. 159 (2019) 426–441.
[1643] E. Jardine, The trouble with (supply-side) counts: the potential and limitations of counting sites, vendors or products as a metric for threat trends on the Dark Web, Intell. Natl. Secur. 34 (1) (2019) 95–111.
[1644] V. Waybright, S. Ma, K. Schug, Validated multi-drug determination using liquid chromatography with tandem mass spectrometry for the evaluation of a commercial drug disposal product, J. Separ. Sci. 39 (9) (2016) 1666–1674.
[1645] J. Jaramillo-Stametz, et al., Multi-state medication take back initiative: controlled substances collected from 2011 to 2015, J. Subst. Use 23 (1) (2018) 36–42.
[1646] A. Ribeiro, et al., Using forensic practical activities to foster attractiveness to science education, in: 10th International Conference of Education, Research and Innovation (Iceri2017), 2017, pp. 5568–5573.
[1647] N. Holden, et al., IUPAC periodic Table of the Elements and isotopes (IPTEI) for the education community (IUPAC technical report), Pure Appl. Chem. 90 (12) (2018) 1833–2092.
[1648] C. Priddis, N. Vandenberg, Australasian forensic science summit 2016: education and training towards 2030, Aust. J. Forensic Sci. 50 (3) (2018) 293–304.
[1649] C. Roux, O. Ribaux, F. Crispino, Forensic science 2020-the end of the crossroads? Aust. J. Forensic Sci. 50 (6) (2018) 607–618.
[1650] S. Yang, B. Mei, X. Yue, Mobile augmented reality assisted chemical education: insights from elements 4D, J. Chem. Educ. 95 (6) (2018) 1060–1062.
[1651] R. Beck, M. Erdmann, Reinforcing mass spectrometry concepts through an undergraduate laboratory exercise utilizing a direct analysis in real time enabled mass spectrometer, J. Chem. Educ. 95 (4) (2018) 652–661.
[1652] H. Hamnett, A. McKie, Developing a procedure for learning and assessing peer review in a forensic science programme, Assess Eval. High Educ. 44 (5) (2019) 787–798.
[1653] D. San Pietro, B. Kammrath, P. De Forest, Is forensic science in danger of extinction? Sci. Justice 59 (2) (2019) 199–202.
[1654] C. van den Eeden, C. de Poot, P. van Koppen, The forensic confirmation bias: a comparison between experts and novices, J. Forensic Sci. 64 (1) (2019) 120–126.
[1655] S. Chamrat, C. Yuenyong, T. Sangpradit, Teaching chemistry in the Cloud: the preparation of future teachers for 21st century learning, in: International Conference of Science Educators and Teachers (Iset) 2018: : Proceedings of the 6th International Conference for Science Educators and Teachers (Iset) 2018, 2019, p. 2081.
[1656] M. Freire, V. Talanquer, E. Amaral, Conceptual profile of chemistry: a framework for enriching thinking and action in chemistry education 41 (5) (2019) 674–692.
[1657] V. Noval, J. Carriazo, The periodicity OF chemical elements and the materials performance: a complement for the comprehension OF the periodic table, Quim. Nova 42 (2) (2019) 232–236.
[1658] C. Su, T. Cheng, A sustainability innovation experiential learning Model for virtual reality chemistry laboratory: an empirical Study with PLS-SEM and IPMA, Sustainability 11 (4) (2019).
[1659] R. Vadlapatla, E. Wong, S. Gayakvvad, Electronic drug delivery systems: an overview, J. Drug Deliv. Sci. Technol. 41 (2017) 359–366.
[1660] B. Durciova, et al., Gold nanoparticles based multiplex lateral flow immunoassay for detection of drugs of abuse, Chem. Listy 110 (10) (2016) 708–715.
[1661] I. Gomila, et al., Cross-Reactivity of Chloroquine and hydroxychloroquine with DRI amphetamine immunoassay, Ther. Drug Monit. 39 (2) (2017) 192–196.
[1662] I. Gomila, et al., Cross-reactivity of selected old and novel psychoactive substances (NPS) in an amphetamine and ecstasy immunoassay, Clin. Toxicol. 54 (4) (2016) 381–382.
[1663] E. Heather, et al., Organic impurity profiling of methylone and intermediate compounds synthesized from catechol, Drug Test. Anal. 9 (3) (2017) 436–445.
[1664] H. Salouros, Illicit drug chemical profiling: current and future state, Aust. J. Forensic Sci. 50 (6) (2018) 689–696.
[1665] K. Plachka, F. Svec, L. Novakova, Ultra-high performance supercritical fluid chromatography in impurity control: searching for generic screening approach, Anal. Chim. Acta 1039 (2018) 149–161.
[1666] A. Kimergard, et al., How resistant to tampering are codeine containing analgesics on the market? Assessing the potential for opioid extraction,

Pain Ther. 5 (2) (2016) 187–201.
[1667] J. Pascali, et al., Internet pseudoscience: testing opioid containing formulations with tampering potential, J. Pharmaceut. Biomed. Anal. 153 (2018) 16–21.
[1668] T. Lyapustina, et al., Effect of a "pill mill" law on opioid prescribing and utilization: the case of Texas, Drug Alcohol Depend. 159 (2016) 190–197.
[1669] M. Rychert, C. Wilkins, What products are considered psychoactive under New Zealand's legal market for new psychoactive substances (NPS, 'legal highs')? Implications for law enforcement and penalties, Drug Test. Anal. 8 (8) (2016) 768–778.
[1670] V. Belackova, et al., Assessing the concordance between illicit drug laws on the books and drug law enforcement: comparison of three states on the continuum from "decriminalised" to "punitive", Int. J. Drug Pol. 41 (2017) 148–157.
[1671] W. Hall, The future of the international drug control system and national drug prohibitions, Addiction 113 (7) (2018) 1210–1223.
[1672] A. Wilcox, N. NicDaeid, Jurors' perceptions of forensic science expert witnesses: experience, qualifications, testimony style and credibility, Forensic Sci. Int. 291 (2018) 100–108.
[1673] J. Rzymkowski, A. Piatek, The development of a stereoselective method for the synthesis of tetrasubstituted derivatives of ,-Unsaturated carboxylic acids, Helv. Chim. Acta 99 (9) (2016) 665–673.
[1674] J. Cunningham, L. Liu, R. Callaghan, Essential/precursor chemicals and drug consumption: impacts of US sodium permanganate and Mexico pseudoephedrine controls on the numbers of US cocaine and methamphetamine users, Addiction 111 (11) (2016) 1999–2009.
[1675] S. Cunningham, K. Finlay, Identifying demand responses to illegal drug supply interdictions, Health Econ. 25 (10) (2016) 1268–1290.
[1676] D. Snyder, C. Pulliam, R. Cooks, Single analyzer precursor scans using an ion trap, Rapid Commun. Mass Spectrom. 30 (7) (2016) 800–804.
[1677] K. Graniczkowska, et al., Capacitive sensing of N-formylamphetamine based on immobilized molecular imprinted polymers, Biosens. Bioelectron. 92 (2017) 741–747.
[1678] L. Molgaard, et al., Improved detection of chemical substances from colorimetric sensor data using probabilistic machine learning, Chem. Biol. Radiol. Nucl.Expl. (Cbrne) Sens. Xviii (2017) 10183.
[1679] M. Molgaard, et al., Combined colorimetric and gravimetric CMUT sensor for detection of phenylacetone, 2017 IEEE Int. Ultrason. Symp. (Ius) (2017) 1–4.
[1680] S. Ciochina, M. Praisler, M. Coman, Hierarchical cluster Analysis applied for the automated recognition of psychoactive substances and of their main precursors, in: 2017 5th International Symposium on Electrical and Electronics Engineering (Iseee), 2017.
[1681] M. Molgaard, et al., Combined colorimetric and gravimetric CMUT sensor for detection of benzyl methyl ketone, Sensor. Actuator. B Chem. 275 (2018) 483–489.
[1682] A. Rianjanu, et al., Polyacrylonitrile nanofiber-based quartz crystal Microbalance for sensitive Detection of safrole, Sensors (4) (2018) 18.
[1683] F. Ramsthaler, et al., Statistical results in forensic studies 26 (1) (2016) 12–21. Pitfalls in planning, evaluation, interpretation and reporting. Rechtsmedizin.
[1684] W. Wallace, et al., Mass spectral library quality assurance by inter-library comparison, J. Am. Soc. Mass Spectrom. 28 (4) (2017) 733–738.
[1685] C. Barbieri, J. Sarkis, Estimating the uncertainty from sampling in pollution crime investigation: the importance of metrology in the forensic interpretation of environmental data, Forensic Sci. Int. 288 (2018) 14–22.
[1686] K. Middlebrook, A proficiency testing scheme to evaluate the effectiveness of laboratory sample reduction of a soil sample, Accred Qual. Assur. 24 (2) (2019) 137–143.
[1687] D. Ciccarone, Fentanyl in the US heroin supply: a rapidly changing risk environment, Int. J. Drug Pol. 46 (2017) 107–111.
[1688] G. Doran, et al., Air quality inside police drug safes and drug storage areas, J. Anal. Toxicol. 42 (5) (2018) 360–364.
[1689] A.L. Schaffer, et al., Interrupted time series analysis of the effect of rescheduling alprazolam in Australia: taking control of prescription drug use, JAMA Int. Med. 176 (8) (2016) 1223–1225.
[1690] A.L. Schaffer, et al., Up-Scheduling of Alprazolam to a "controlled drug": interrupted time series Analysis of its Impact on benzodiazepine (BZD) prescribing, Dispensing and Poisonings in Australia, Pharmacoepidemiol. Drug Saf. 25 (2016) 346–347.
[1691] R. Cairns, J.A. Brown, N.A. Buckley, The impact of codeine re-scheduling on misuse: a retrospective review of calls to Australia's largest poisons centre, Addiction 111 (10) (2016) 1848–1853.
[1692] L. Day, et al., Comparison of unintentional exposures to codeine and hydrocodone reported to Texas poison centers, J. Emerg. Med. 50 (5) (2016) 744–752.
[1693] B. Lloyd, et al., Alprazolam in fatal overdose following regulatory rescheduling: a response to Deacon, et al, Int. J. Drug Pol. 39 (2017) 138–139.
[1694] D. Gauvin, et al., The drug discrimination assay: interpretative value of partial generalization for drug schedule control actions, J. Pharmacol. Toxicol. Methods 90 (2018) 48–57.
[1695] A. Natarajan, et al., Domain adaptation methods for improving lab-to-field generalization of cocaine detection using wearable ECG, Proc ACM Int. Conf. Ubiquitous Comput. (2016) 875–885, 2016.
[1696] D. Lu, F. Lu, G. Pang, A novel tetrahydrocannabinol electrochemical nano immunosensor Based on horseradish Peroxidase and double-layer gold nanoparticles, Molecules (10) (2016) 21.
[1697] S. Palanisamy, et al., A facile electrochemical Preparation of reduced graphene Oxide@Polydopamine composite: a novel electrochemical sensing Platform for amperometric Detection of chlorpromazine, Sci. Rep. (2016) 6.
[1698] S. Barthwal, N. Singh, ZnO-CNT nanocomposite : a Device as electrochemical sensor, Mater. Today-Proc. 4 (4) (2017) 5552–5560.
[1699] Y. Akbarian, M. Shabani-Nooshabadi, H. Karimi-Maleh, Fabrication of a new electrocatalytic sensor for determination of diclofenac, morphine and mefenamic acid using synergic effect of NiO-SWCNT and 2, 4-dimethyl-N/[1-(2, 3-dihydroxy phenyl) methylidene] aniline, Sensor. Actuator. B Chem. 273 (2018) 228–233.
[1700] A. Freires, et al., Exploiting CdSe/ZnS core-shell photocatalyst modified with cytochrome c for epinephrine determination in drugs utilized in cardiopulmonary resuscitation, Microchem. J. 139 (2018) 18–23.
[1701] A. Sarker, et al., Social media mining for toxicovigilance: automatic monitoring of prescription medication abuse from twitter, Drug Saf. 39 (3) (2016) 231–240.
[1702] J. Kalyanam, et al., Exploring trends of nonmedical use of prescription drugs and polydrug abuse in the Twittersphere using unsupervised machine learning, Addict. Behav. 65 (2017) 289–295.
[1703] T. Mackey, et al., Twitter-based Detection of illegal online Sale of prescription opioid, Am. J. Publ. Health 107 (12) (2017) 1910–1915.
[1704] M. Krauss, et al., Get drunk. Smoke weed. Have fun.": a content Analysis of tweets about Marijuana and alcohol, Am. J. Health Promot. 31 (3) (2017) 200–208.
[1705] H. Meng, et al., National substance use patterns on Twitter, PloS One (11) (2017) 12.
[1706] A. Nguyen, et al., Evaluating marijuana-related tweets on twitter, in: 2017 Ieee 7th Annual Computing and Communication Workshop and Conference Ieee Ccwc-2017, 2017.
[1707] N. Peiper, et al., Patterns of twitter behavior among networks of cannabis dispensaries in California, J. Med. Internet Res. (7) (2017) 19.
[1708] M. Washha, et al., A topic-based hidden Markov Model for real-time spam tweets filtering, Knowl.-Based Intel. Inf. Eng. Syst. 112 (2017) 833–843.
[1709] K. Thaikla, et al., Cannabis and Kratom online information in Thailand: Facebook trends 2015-2016, Subst. Abuse Treat. Prev. Pol. (2018) 13.
[1710] P. Cavazos-Rehg, et al., No high like a brownie high": a content analysis of edible marijuana tweets, Am. J. Health Promot. 32 (4) (2018) 880–886.
[1711] P. Cichosz, R. Romaniuk, M. Linczuk, Anomaly detection in discussion forum posts using global Vectors. Photonics applications in astronomy, communications, Ind. High-Energy Phys. Exp. (2018) 10808, 2018.
[1712] R. Daniulaityte, et al., A Twitter-based survey on marijuana concentrate use, Drug Alcohol Depend. 187 (2018) 155–159.
[1713] C. Miliano, et al., Sales and advertising channels of new psychoactive substances (NPS): internet, social networks, and smartphone apps, Brain Sci. 8 (7) (2018).
[1714] T. Mackey, et al., Solution to detect, classify, and report illicit online Marketing and Sales of controlled Substances via twitter: using machine Learning and web Forensics to combat digital opioid access, J. Med. Internet Res. 20 (4) (2018).
[1715] L. Moyle, et al., #Drugsforsale: An exploration of the use of social media and encrypted messaging apps to supply and access drugs, Int. J. Drug Pol. 63 (2019) 101–110.
[1716] J. Min, et al., Forensic comparison of soil samples, Soil Crim. Environ. Foren. (2016) 71–105.
[1717] P. Owens, et al., Fingerprinting and tracing the sources of soils and sediments: earth and ocean science, geoarchaeological, forensic, and human health applications, Earth Sci. Rev. 162 (2016) 1–23.
[1718] O. Gradusova, et al., Methodology of forensic soil examination in Russia and a view on the world standardization process, Soil Crim. Environ. Foren. (2016) 121–136.
[1719] C. Bagsby, et al., Stability of pentobarbital in soil, J. Environ. Sci. Health - Part B Pesticides, Food Contam. Agric. Wastes 53 (3) (2018) 207–213.
[1720] A. Braun, et al., Detection of ricin in plant extracts and soil using liquid chromatography-high-resolution mass spectrometry, J. Anal. Chem. 73 (8) (2018) 786–795.
[1721] J. Chalmers, K. Lancaster, C. Hughes, The stigmatisation of 'ice' and underreporting of meth/amphetamine use in general population surveys: a case study from Australia, Int. J. Drug Pol. 36 (2016) 15–24.
[1722] R. Watson, Cannabis, heroin, and cocaine dominate Europe's (sic)24bn illegal drugs market, BMJ Br. Med. J. (Clin. Res. Ed.) (2016) 353.
[1723] H. Alblooshi, et al., The pattern of substance use disorder in the United Arab Emirates in 2015: results of a National Rehabilitation Centre cohort study, Subst. Abuse Treat. Prev. Pol. 11 (1) (2016) 19.
[1724] R.M. Gladden, P. Martinez, P. Seth, Fentanyl law enforcement Submissions and increases in synthetic opioid-involved overdose deaths-27 states, 2013-2014, Mmwr-Morb. Mortal. Weekly Rep. 65 (33) (2016) 837–843.
[1725] A.B. Peterson, et al., Increases in fentanyl-related overdose deaths - Florida and Ohio, 2013-2015, Mmwr-Morb. Mortal. Weekly Rep. 65 (33) (2016) 844–849.
[1726] J. Bryant, et al., Illicit and injecting drug use among Indigenous young people in urban, regional and remote Australia, Drug Alcohol Rev. 35 (4) (2016) 447–455.

[1727] A. Desrosiers, et al., Emerging drug use trends in kelantan, Malaysia, J. Psychoact. Drugs 48 (3) (2016) 218–226.
[1728] S. Felix, K. Mack, C. Jones, Trends in the distribution of opioids in Puerto Rico, 1999-2013, Puert. Rico Health Sci. J. 35 (3) (2016) 165–169.
[1729] A. Nikfarjam, et al., National population size estimation of illicit drug users through the network scale-up method in 2013 in Iran, Int. J. Drug Pol. 31 (2016) 147–152.
[1730] M. Van Hout, E. Hearne, Confessions of contemporary English opium-eaters: a netnographic study of consumer negotiation of over-the-counter morphine for misuse, J. Subst. Use 21 (2) (2016) 141–152.
[1731] G. Yang, et al., Drug use and, its associated factors among money boys in Hunan Province, China, Publ. Health 140 (2016) 213–220.
[1732] J. Palamar, et al., Correlates of new psychoactive substance use among a self-selected sample of nightclub attendees in the United States, Am. J. Addict. 25 (5) (2016) 400–407.
[1733] M. Sande, Characteristics of the use of 3-MMC and other new psychoactive drugs in Slovenia, and the perceived problems experienced by users, Int. J. Drug Pol. 27 (2016) 65–73.
[1734] J. Mounteney, et al., The drug situation in Europe: an overview of data available on illicit drugs and new psychoactive substances from European monitoring in 2015, Addiction 111 (1) (2016) 34–48.
[1735] B. Piper, et al., Use and misuse of opioids in Maine: results from pharmacists, the prescription monitoring, and the diversion alert programs, J. Stud. Alcohol Drugs 77 (4) (2016) 556–565.
[1736] H. Alblooshi, et al., The pattern of substance use disorder in the United Arab Emirates in 2015: results of a National Rehabilitation Centre cohort study, Subst. Abuse Treat. Prev. Pol. (2016) 11.
[1737] G.R. Madsen, T.S. Petersen, K.P. Dalhoff, NBOMe hallucinogenic drug exposures reported to the Danish Poison Information Centre, Danish Med. J. 64 (6) (2017).
[1738] W.S. John, L.T. Wu, Trends and correlates of cocaine use and cocaine use disorder in the United States from 2011 to 2015, Drug Alcohol Depend. 180 (2017) 376–384.
[1739] H. Spiller, H. Hays, Heroin, cocaine and methamfetamine exposures reported to US poison centers (NPDS): 2005-2016, Clin. Toxicol. 55 (7) (2017), p. 797–797.
[1740] M.J. Livingstone, et al., Codeine use among children in the United States: a nationally representative study from 1996 to 2013, Paediatr. Anaesth. 27 (1) (2017) 19–27.
[1741] L. Geddes, et al., Intravenous fentanyl use among people who inject drugs in Australia, Drug Alcohol Rev. 36 (2017) 33–34.
[1742] D. Krause, et al., High concomitant misuse of fentanyl in subjects on opioid maintenance treatment, Subst. Use Misuse 52 (5) (2017) 639–645.
[1743] T.J. Cicero, M.S. Ellis, Z.A. Kasper, Increases in self-reported fentanyl use among a population entering drug treatment: the need for systematic surveillance of illicitly manufactured opioids, Drug Alcohol Depend. 177 (2017) 101–103.
[1744] R. Daniulaityte, et al., Overdose deaths related to fentanyl and its analogs - Ohio, january-february 2017, Mmwr-Morb. Mortal. Weekly Rep. 66 (34) (2017) 904–908.
[1745] B.D.L. Marshall, et al., Epidemiology of fentanyl-involved drug overdose deaths: a geospatial retrospective study in Rhode Island, USA, Int. J. Drug Pol. 46 (2017) 130–135.
[1746] A.D. Bode, et al., Fentanyl laced heroin and its contribution to a spike in heroin overdose in Miami-Dade County, AJEM (Am. J. Emerg. Med.) 35 (9) (2017) 1364–1365.
[1747] J.J. Carroll, et al., Exposure to fentanyl-contaminated heroin and overdose risk among illicit opioid users in Rhode Island: a mixed methods study, Int. J. Drug Pol. 46 (2017) 136–145.
[1748] H. Hedegaard, M. Warner, A.M. Minino, Rates of drug overdose deaths involving heroin, by selected age groups - United States, 2006-2015, Mmwr-Morb. Mortal. Weekly Rep. 65 (52) (2017), p. 1497–1497.
[1749] J.K. O'Donnell, R.M. Gladden, P. Seth, Trends in deaths involving heroin and synthetic opioids excluding methadone, and law enforcement drug product reports, by census region - United States, 2006-2015, Mmwr-Morb. Mortal. Weekly Rep. 66 (34) (2017) 897–903.
[1750] H. Olsen, et al., Geographical trends of heroin abuse in the United States, Clin. Toxicol. 55 (7) (2017), p. 792–792.
[1751] L.N. Rodda, et al., A Cluster of fentanyl-laced heroin Deaths in 2015 in melbourne, Australia, J. Anal. Toxicol. 41 (4) (2017) 318–324.
[1752] A. Roxburgh, et al., Trends in heroin and pharmaceutical opioid overdose deaths in Australia, Drug Alcohol Depend. 179 (2017) 291–298.
[1753] C.J. Ruhm, Geographic variation in opioid and heroin involved drug poisoning mortality rates, Am. J. Prev. Med. 53 (6) (2017) 745–753.
[1754] S. Slavova, et al., Heroin and fentanyl overdoses in Kentucky: epidemiology and surveillance, Int. J. Drug Pol. 46 (2017) 120–129.
[1755] G.J. Unick, D. Ciccarone, US regional and demographic differences in prescription opioid and heroin-related overdose hospitalizations, Int. J. Drug Pol. 46 (2017) 112–119.
[1756] M.G. Vaughn, C.P. Salas-Wright, S. Oh, Trends in heroin access among adolescents in the United States, 2002-2014, Prev. Med. 99 (2017) 67–68.
[1757] J.R.H. Archer, et al., Trends in the surveillance of mephedrone, MDMA and cocaine detected in anonymous pooled street urine samples: is mephedrone use decreasing in the UK? Clin. Toxicol. 55 (5) (2017), p. 418–418.
[1758] M. Edland-Gryt, S. Sandberg, W. Pedersen, From ecstasy to MDMA: recreational drug use, symbolic boundaries, and drug trends, Int. J. Drug Pol. 50 (2017) 1–8.
[1759] T. Hannemann, L. Kraus, D. Piontek, Consumption patterns of nightlife attendees in Munich: a latent-class Analysis, Subst. Use Misuse 52 (11) (2017) 1511–1521.
[1760] G. Jeanne, et al., New patterns of substance use and abuse among French adolescents, a knowledge synthesis, Encephale-Revue De Psychiatrie Clinique Biologique Et Therapeutique 43 (4) (2017) 346–353.
[1761] A. Karlsson, L. Burns, Increasing use OF crystal MDMA IN Australia, Drug Alcohol Rev. 36 (2017) 42–43.
[1762] E. Leslie, et al., Willingness to cooperate with police: a population-based study of Australian young adult illicit stimulant users, Criminol. Crim. Justice 17 (3) (2017) 301–318.
[1763] J. Palamar, et al., Self-reported ecstasy/MDMA/"Molly" Use in a Sample of Nightclub and dance festival Attendees in New York city, Subst. Use Misuse 52 (1) (2017) 82–91.
[1764] J. Palamar, et al., Shifting characteristics of ecstasy users ages 12-34 in the United States, 2007-2014, Drug Alcohol Depend. 181 (2017) 20–24.
[1765] A. Stamates, et al., An examination of the most recent episode of molly use among college students, J. Drug Issues 47 (2) (2017) 309–316.
[1766] Z. Arok, et al., Changes in illicit, licit and stimulant designer drug use patterns in South-East Hungary between 2008 and 2015, Leg. Med. 28 (2017) 37–44.
[1767] E. Frauger, et al., Surveillance system on drug abuse: interest of the French national OPPIDUM program of French addictovigilance network, Therapie 72 (4) (2017) 491–501.
[1768] K. Kang, et al., Trends in major opioid analgesic consumption in Taiwan, 2002-2014, J. Formos. Med. Assoc. 116 (7) (2017) 529–535.
[1769] R. Wightman, et al., Comparative analysis of opioid queries on Erowid.org: an opportunity to advance harm reduction, Subst. Use Misuse 52 (10) (2017) 1315–1319.
[1770] A. Matthews, et al., I like the old stuff better than the new stuff? Subjective experiences of new psychoactive substances, Int. J. Drug Pol. 40 (2017) 44–49.
[1771] K. Morley, et al., Polysubstance use and misuse or abuse of prescription opioid analgesics: a multi-level analysis of international data, Pain 158 (6) (2017) 1138–1144.
[1772] A. Secora, et al., Drug availability adjustments in population-based studies of prescription opioid abuse, Pharmacoepidemiol. Drug Saf. 26 (2) (2017) 180–191.
[1773] K. Stewart, et al., Geospatial analysis of drug poisoning deaths involving heroin in the USA, 2000-2014, J. Urban Health-Bull. N. Y. A. Med. 94 (4) (2017) 572–586.
[1774] L. Schilling, et al., Licit and illicit substance use patterns among university students in Germany using cluster analysis, Subst. Abuse Treat. Prev. Pol. (2017) 12.
[1775] J. Palamar, What's in a name? Correlates of ecstasy users Knowing or Agreeing that Molly is ecstasy/MDMA, J. Psychoact. Drugs 50 (1) (2018) 88–93.
[1776] K. Hider-Mlynarz, P. Cavalie, P. Maison, Trends in analgesic consumption in France over the last 10years and comparison of patterns across Europe, Br. J. Clin. Pharmacol. 84 (6) (2018) 1324–1334.
[1777] E. Jouanjus, et al., Medical prescriptions falsified by the patients: a 12-year national monitoring to assess prescription drug diversion, Fund. Clin. Pharmacol. 32 (3) (2018) 306–322.
[1778] R. Karinen, et al., Heroin deaths in Norway in 2000 and 2009: a comparative study of polydrug use, Heroin Addict. Relat. Clin. Probl. 20 (2) (2018) 23–29.
[1779] K. Leung, et al., Surveillance of drug abuse in Hong Kong by hair analysis using LC-MS/MS, Drug Test. Anal. 10 (6) (2018) 977–983.
[1780] E. Karanges, et al., Trends in opioid utilisation in Australia, 2006-2015: insights from multiple metrics, Pharmacoepidemiol. Drug Saf. 27 (5) (2018) 504–512.
[1781] T. Irii, et al., Development of a dual test procedure for DNA typing and methamphetamine detection using a trace amount of stimulant-containing blood, Leg. Med. 20 (2016) 53–60.
[1782] L. Lapointe, Developing data to transform death prevention: lessons from the fentanyl crisis, Forensic Sci. Int. 277 (2017) 134–135.
[1783] A. AL-Imam, et al., Captagon: use and trade in the Middle East, Hum. Psychopharmacol. Clin. Exp. 32 (3) (2017).
[1784] D. Ciccarone, J. Ondocsin, S.G. Mars, Heroin uncertainties: Exploring users' perceptions of fentanyl-adulterated and -substituted 'heroin', Int. J. Drug Pol. 46 (2017) 146–155.
[1785] C. Guillou, et al., Collaboratorion of the Joint research centre and European customs labo-ratories for the identification of new psychoactive substances, Curr. Pharmaceut. Biotechnol. 19 (2) (2018) 91–98.
[1786] M. Ismail, et al., Noninvasive detection of cocaine and heroin use with single fingerprints: determination of an environmental cutoff, Clin. Chem. 64 (6) (2018) 909–917.
[1787] N. Lauzon, P. Chaurand, Detection of exogenous substances in latent fingermarks by silver-assisted LDI imaging MS: perspectives in forensic sciences, Analyst 143 (15) (2018) 3586–3594.