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Data Article

Data on the trend of corrosivity and scale formation potential of Shiraz groundwater drinking water resources during 2001–2007

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A B S T R A C T

The aim of this study was to evaluate the corrosivity and scale formation potential of groundwater drinking water resources for the time period of 2001 to 2007 in Shiraz, Iran. Chemical parameters including total alkalinity, EC, pH, temperature, and TDS of ground water resources were analyzed. Langelier saturation indices (LSI) and Ryznar stability indices (RSI) were utilized to determine the potential for corrosivity and scale formation. The data showed that Shiraz groundwater potable water resources tended more likely towards the scale formation potential.

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Specification table

Subject area	Water quality, groundwater management, water science
More specific subject area	Water corrosion science
Type of data	Table and figures
How data was acquired	**Groundwater samples were collected in 1litter bottles and transported to laboratory of shiraz water and wastewater company on the same day and kept at 4 °C. All samples were analyzed according to the standard methods.**
Data format	Raw and analyzed
Experimental factors	Total alkalinity, calcium hardness, EC, pH, temperature, and TDS
Experimental features	Total alkalinity and calcium hardness were determined according to the standard method. The temperature, pH, electrical conductivity and total dissolved solids (TDS) were determined by Aqua-conductivity TDS and temperature meter.
Data source location	**Ground water resources of Shiraz city, Fars province.** **Shiraz lies between longitude 52° 29′to 52° 36′ E and altitude 29° 33′ to 29° 36′ N and is located in the south-west area of Iran.**
Data accessibility	The data are available within this article
Related research article	**Abbas Abbasnia, Majid Radfard, Amir Hossein Mahvi, Ramin Nabizadeh, Mahmood Yousefi, Hamed Soleimani, Mahmood Alimohammadi. Groundwater quality assessment for irrigation purposes based on irrigation water quality index and it's zoning with GIS in the villages of Chabahar, Sistan and Baluchistan, Iran. Data in Brief 19 (2018) 623–631. [1]**

Value of the data

- The data set can be used to monitor the quality of water in the study area.
- The knowledge of the data set can help to predict the occurrence of scaling and corrosion in piping systems and causing many problems such as economic losses and health problems.
- The knowledge of the corrosion indices can be used for monitoring of Shiraz water supply distribution networks.
- These data can be very helpful for researchers dealing with different diseases issues related to the occurrence of corrosion products in the water.
- The data can be useful to operators of water treatment plants for better contamination control or application of suitable pipes.
- Quantitative values from the study of physico-chemical properties of water provide important information for safe drinking water quality management.

1. Data

Shiraz city is located in Fars province situated in south of Iran with dry and moderate climate. Unfortunately, during last decade the amount of precipitation was decreased significantly. The main source Shiraz drinking water is supplied by deep wells [2].

2. Experimental design, materials and methods

Data regarding total alkalinity, EC, pH, temperature, and TDS of different Shiraz ground water resources which were used for drinking water during 2001–2007 were collected from **Shiraz Water and Wastewater Company** (Tables 1–7). Total alkalinity and calcium hardness were determined according to the standard method [3]. The temperature, pH, electrical conductivity and total dissolved solids (TDS) were determined by Aqua-conductivity TDS and temperature meter [3].

Langelier saturation indices (LSI) and Ryznar stability indices (RSI) were determined by the following equations [4–6]:

$$LSI = pH - pHs \tag{1}$$

$$RSI = 2\,(pHs) - pH \tag{2}$$

Table 1
Data regarding the physico-chemical characteristics of different Shiraz ground water quality in 2001.

Groundwater wall number	Alkalinity mg/lit as $CaCO_3$	pH	Temperature °C	TDS	PHS
7.33	383.58	23.4	7.61	188.3	GW 1
7.26	464.1	23.6	7.36	377.3	GW 2
7.32	445.74	23.6	7.47	192.46	GW 3
7.33	648	23.6	7.30	282.6	GW 4
7.52	579.42	23.6	7.36	296.2	GW 5
7.39	573.42	23.7	7.07	338.86	GW 6
7.32	356.76	23.7	7.54	162.7	GW 7
7.40	613.2	23.7	7.58	229.57	GW 8
7.31	550.2	23.4	7.44	279.48	GW 9
7.05	408.72	23.4	7.36	280.41	GW 10
7.52	579.42	23.6	7.36	296.2	GW 11
7.58	679.8	23.7	7.54	291.4	GW 12
7.24	656.4	23.7	7.26	300.5	GW 13
7.32	356.76	23.7	7.54	162.7	GW 14
7.41	529.5	23.4	7.41	178.51	GW 15

Table 2
Data regarding the physico-chemical characteristics of different Shiraz ground water quality in 2002.

Groundwater wall number	Alkalinity mg/lit as $CaCO_3$	pH	Temperature °C	TDS	PHS
7.23	478.86	23.8	7.68	189.84	GW 1
7.32	534.96	23.9	7.65	256.4	GW 2
7.31	524.1	23.8	7.48	208.56	GW 3
7.12	509.4	27.4	7.28	295.08	GW 4
7.00	384.72	24	7.31	316.88	GW 5
7.00	384.72	24	7.31	316.88	GW 6
7.20	364.14	25.1	7.37	171.32	GW 7
7.17	793.2	24	7.64	280.7	GW 8
7.33	593.46	27.1	7.31	285.34	GW 9
7.05	428.16	24	7.58	293.62	GW 10
7.33	593.46	27.1	7.31	285.34	GW 11
7.15	504	27.3	7.1	287.713	GW 12
7.10	341.1	27.4	7.7	161.65	GW 13
7.36	308.82	25.4	7.62	160.7	GW 14
7.47	568.8	27.4	7.5	275.6	GW 15

Table 3
Data regarding the physico-chemical characteristics of different Shiraz ground water quality in 2003.

Groundwater wall number	Alkalinity mg/lit as $CaCO_3$	pH	Temperature °C	TDS	PHS
7.52	474.9	27.8	7.81	194.78	GW 1
7.23	548.4	27.8	7.3	272.16	GW 2
7.17	561.9	24.2	7.47	248.4	GW 3
7.45	718.8	25.6	7.13	287.71	GW 4
7.15	630	24.1	7.04	303.26	GW 5
7.28	603.6	22.5	7.14	359.12	GW 6
7.06	261.792	24.3	7.2	182.29	GW 7
7.16	612.6	24	7.8	249.79	GW 8
7.13	471.78	24	7.42	273.98	GW 9
7.07	524.88	27.9	7.75	291.4	GW 10
7.05	501.36	24.3	7.35	320.8	GW 11
7.19	714.6	24.3	7.49	297.2	GW 12
7.11	547.92	24.3	7.4	186.8	GW 13
7.16	612.6	24	7.8	249.79	GW 14
7.39	530.04	24.3	7.28	294.8	GW 15

Table 4
Data regarding the physico-chemical characteristics of different Shiraz ground water quality in 2004.

Groundwater wall number	Alkalinity mg/lit as $CaCO_3$	pH	Temperature °C	TDS	PHS
6.99	275.16	27.9	7.87	190.42	GW 1
6.96	349.8	24.3	7.27	282.6	GW 2
7.45	498.72	24.4	7.65	204.5	GW 3
7.42	741.6	28.1	7.54	278.1	GW 4
7.13	697.2	24.4	7.42	302.1	GW 5
6.73	274.056	24.3	7.28	348.75	GW 6
7.19	351.9	24.5	7.99	163.2	GW 7
7.21	522	24.5	7.36	240.4	GW 8
7.12	522.78	28.1	7.62	249.79	GW 9
7.10	442.8	24.5	7.49	275.4	GW 10
7.14	526.74	22.9	7.24	223.9	GW 11
7.07	549.9	22.9	7.54	274.11	GW 12
7.15	358.92	22.9	7.39	195.74	GW 13
7.32	583.5	22.7	7.69	179.5	GW 14
7.31	618	23.1	7.24	265.4	GW 15

Table 5
Data regarding the physico-chemical characteristics of different Shiraz ground water quality in 2005.

Groundwater wall number	Alkalinity mg/lit as $CaCO_3$	pH	Temperature °C	TDS	PHS
6.93	310.68	24.6	7.39	206.14	GW 1
6.95	439.44	26.6	7.42	266.18	GW 2
7.19	519.6	24.6	7.55	208.4	GW 3
7.26	704.4	24.7	7.9	247.7	GW 4
7.03	535.2	26.1	7.48	309.54	GW 5
7.25	690.6	23	7.19	323.8	GW 6
7.53	295.02	29.1	7.45	155.6	GW 7
7.38	612	28.6	7.47	247.75	GW 8
7.34	601.2	24.5	7.63	298.4	GW 9
6.79	408.48	24.5	8.16	319.08	GW 10
7.27	313.8	26.2	7.31	276.41	GW 11
7.11	681.6	26.2	7.34	291.4	GW 12
7.03	473.04	22.9	7.42	253.9	GW 13
7.26	512.4	23.2	7.7	204	GW 14
7.11	546.48	23.4	7.39	308.7	GW 15

Table 6
Data regarding the physico-chemical characteristics of different Shiraz ground water quality in 2006.

Groundwater wall number	Alkalinity mg/lit as $CaCO_3$	pH	Temperature °C	TDS	PHS
6.97	271.26	24.8	7.41	190.22	GW 1
7.02	560.4	24.7	7.34	281.34	GW 2
7.25	568.2	24.7	6.97	217.73	GW 3
7.15	659.4	29.4	7.44	272.32	GW 4
7.17	691.2	24.7	7.32	297.3	GW 5
7.10	533.4	24.7	7.07	350.79	GW 6
7.12	373.26	29.4	7.7	187.62	GW 7
7.28	659.4	23	7.25	209.84	GW 8
7.08	513	24.8	7.44	259.84	GW 9
7.30	576.6	24.6	7.37	183.65	GW 10
7.21	506.4	23.3	7.39	242.12	GW 11
7.30	609	23	7.14	271.47	GW 12
7.43	453.78	24.2	7.6	175.4	GW 13
7.02	300.72	25	7.77	161.08	GW 14
6.76	277.14	23.5	7.44	164.46	GW 15

Table 7
Data regarding the physico-chemical characteristics of different Shiraz ground water quality in 2007.

Groundwater wall number	Alkalinity mg/lit as $CaCO_3$	pH	Temperature °C	TDS	PHS
6.90	189.66	16.0	7.57	152.45	GW 1
7.09	458.1	18.7	7.38	280.41	GW 2
7.43	556.56	19.2	7.4	199	GW 3
7.04	513.78	18.6	7.27	263.03	GW 4
7.28	674.4	17.7	7.16	244.94	GW 5
7.18	537.06	17.8	7.22	328.62	GW 6
7.18	325.8	17.3	8.17	123.4	GW 7
7.23	620.4	17.9	7.35	242.64	GW 8
6.99	504.72	15.3	7.3	275.06	GW 9
7.32	509.28	17.7	7.44	263.2	GW 10
7.14	747.6	18.6	7.5	285.4	GW 11
7.28	646.8	19.0	7.2	327	GW 12
7.10	765	19.5	7.18	327.5	GW 13
7.00	524.82	18.6	7.37	277.41	GW 14
7.07	615.6	17.0	7.12	281.17	GW 15

pH = measured pH of the water
pHs = pH at $CaCO_3$ saturation and is determined by the following equation
$pHs = pK_2\text{-}pKs + p\,[Alk_t] + 5pfm$
pK_2- pK_S = constants based on ionic strength and temperature
pCa^{+2} = negative logarithm of the calcium ion concentration, mole/Lit
$pAlk_t$ = negative logarithm of the total alkalinity, equivalents/Lit
pfm = negative ionic strength coefficients at water temperature

Equation (1) was used to measure LSI (Fig. 2), and then the potential of scale formation and corrosion of water sample were determined. A negative number of LSI indicates corrosive water and

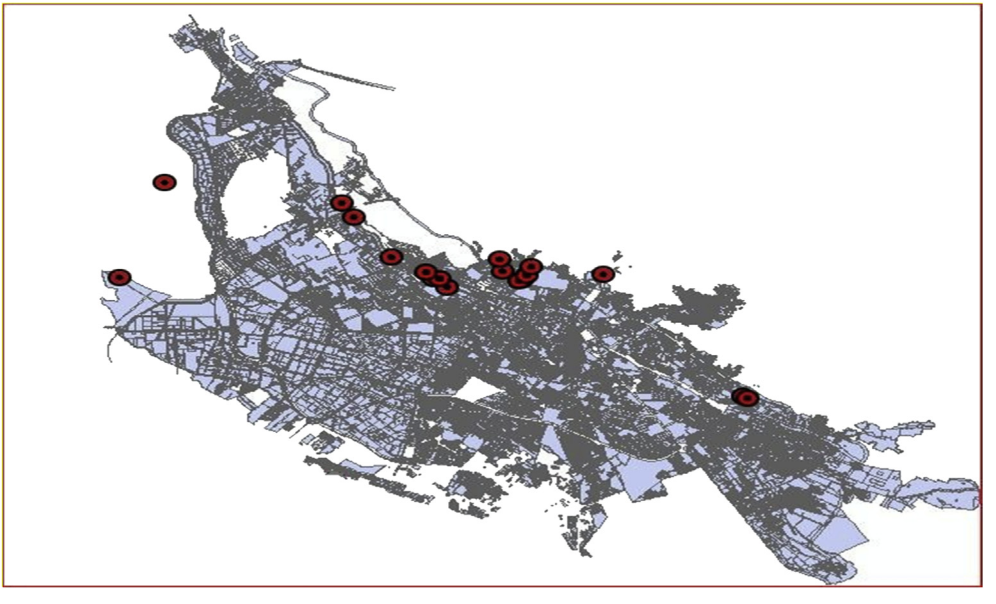

Fig. 1. The location of Sampling points in the study area of Shiraz.

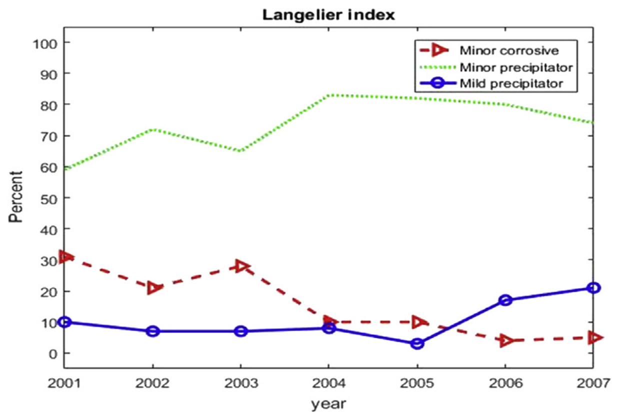

Fig. 2. The trend of corrosion (A), minor precipitation (B) and mild precipitation (C) during 2001–2007 according to the Langelier saturation index.

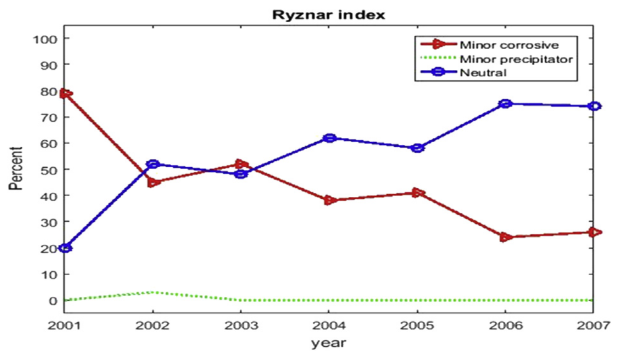

Fig. 3. The trend of corrosion (A), precipitation (B) and normal condition (C) of groundwater resources during 2001–2007 according to the Ryznar stability index.

there is no potential to scale. A positive number of LSI indicates over saturated and it can precipitate calcium carbonate. If LSI is zero, water is at equilibrium.

Equation (2) was also used to measure RSI (Fig. 3). The potential of scale formation and corrosion of water sample summarized as follows:

RSI $\ll$ 6 increase the scale tendency

RSI $\gg$ 8 mild corrosion

Then, the collected data were analyzed using the SPSS statistical software, version 19.

The location of groundwater drinking water resources was shown in the map using google map and GIS and the graph was made by MATLAB software (Fig. 1).

Figs. 2 and 3 **shows the trend of corrosion, precipitation and normal condition of groundwater resources according to the Langelier saturation index and the Ryznar stability index during 2001-2007, respectively.**

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Transparency document

Transparency document associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2019.103736

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.103736.

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