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# Bis(μ-4,6-dimethylpyrimidine-2-thiolato)-$\kappa^3N,S:S;\kappa^3S:N,S$-bis[(triphenylphosphane-$\kappa P$)silver(I)]

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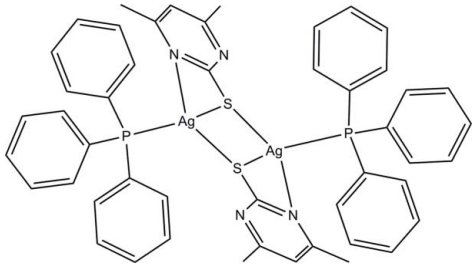
Key indicators: single-crystal X-ray study; $T$ = 293 K; mean $\sigma$(C–C) = 0.004 Å; $R$ factor = 0.032; $wR$ factor = 0.088; data-to-parameter ratio = 20.9.

The dinuclear title complex, $[Ag_2(C_6H_7N_2S)_2(C_{18}H_{15}P)_2]$, comprises two inversion-related $[Ag(C_6H_7N_2S)(C_{18}H_{15}P)]$ units. The pyrimidinethiolate anion acts both as a bridging and a chelating ligand. The $Ag^I$ ions are linked *via* two $\mu_2$-S donor atoms, which generate a strictly planar $Ag_2S_2$ core with an Ag···Ag separation of 2.9569 (4) Å. The $Ag^I$ ion presents a distorted tetrahedral coordination geometry. In the crystal, weak C—H···N and C—H···S hydrogen bonds link the complex molecules into a two-dimensional network parallel to (010).

## Related literature

For the structures of metal(I) coordination compounds and their potential applications, see: Aslanidis *et al.* (1997); McFarlane *et al.* (1998); Nawaz *et al.* (2011); Hameau *et al.* (2012); Nimthong *et al.* (2012); Pakawatchai *et al.* (2012). For relevant examples of discrete complexes, see: Cox *et al.* (2000); Lobana *et al.* (2008); Isab *et al.* (2010).




## Experimental

### Crystal data

$[Ag_2(C_6H_7N_2S)_2(C_{18}H_{15}P)_2]$
$M_r$ = 1018.67
Monoclinic, $P2_1/n$
$a$ = 11.7050 (5) Å
$b$ = 15.3084 (7) Å
$c$ = 12.5331 (6) Å
$\beta$ = 97.483 (1)°
$V$ = 2226.62 (18) Å$^3$
$Z$ = 2
Mo $K\alpha$ radiation
$\mu$ = 1.08 mm$^{-1}$
$T$ = 293 K
0.29 × 0.18 × 0.09 mm

### Data collection

Bruker SMART CCD diffractometer
Absorption correction: multi-scan (*SADABS*; Bruker, 2003)
$T_{min}$ = 0.793, $T_{max}$ = 0.909
26686 measured reflections
5568 independent reflections
4798 reflections with $I > 2\sigma(I)$
$R_{int}$ = 0.023

### Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.032
$wR(F^2)$ = 0.088
$S$ = 1.04
5568 reflections
266 parameters
H atoms treated by a mixture of independent and constrained refinement
$\Delta\rho_{max}$ = 0.54 e Å$^{-3}$
$\Delta\rho_{min}$ = −0.29 e Å$^{-3}$

**Table 1**
Hydrogen-bond geometry (Å, °).

| $D$—H···$A$ | $D$—H | H···$A$ | $D$···$A$ | $D$—H···$A$ |
|---|---|---|---|---|
| C14—H14···S1$^{i}$ | 0.93 | 2.94 | 3.801 (3) | 154 |
| C14—H14···N2$^{ii}$ | 0.93 | 2.69 | 3.471 (4) | 143 |
| C35—H35···N2$^{iii}$ | 0.93 | 2.93 | 3.756 (4) | 151 |

Symmetry codes: (i) $x+1, y, z$; (ii) $-x+2, -y, -z$; (iii) $x, y, z+1$.

Data collection: *SMART* (Bruker, 1998); cell refinement: *SAINT* (Bruker, 2003); data reduction: *SAINT*; program(s) used to solve structure: *SHELXS97* (Sheldrick, 2008); program(s) used to refine structure: *SHELXL97* (Sheldrick, 2008); molecular graphics: *Mercury* (Macrae *et al.*, 2008); software used to prepare material for publication: *SHELXTL* (Sheldrick, 2008) and *publCIF* (Westrip, 2010).

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Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: BH2464).

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# supplementary materials

*Acta Cryst.* (2012). E**68**, m1572–m1573 [doi:10.1107/S1600536812048210]

# Bis(*μ*-4,6-dimethylpyrimidine-2-thiolato)-$\kappa^3N,S:S;\kappa^3S:N,S$-bis[(triphenylphosphane-$\kappa P$)silver(I)]

**Yupa Wattanakanjana, Chaveng Pakawatchai, Sukanya Kowittheeraphong and Ruthairat Nimthong**

## Comment

In recent years, a large number of structural reports on metal(I) complexes containing heterocyclic thiones as ligands or mixed-ligands with triphenylphosphane have been studied (Aslanidis *et al.*, 1997; McFarlane *et al.*, 1998; Pakawatchai *et al.*, 2012; Nimthong *et al.*, 2012) because of not only their potential applications due to their antimicrobial activities (Nawaz *et al.*, 2011), but also strongly luminescent properties (Hameau *et al.*, 2012).

The structure of the title dinuclear mixed-ligand complex displays the distorted tetrahedral coordination of each $Ag^I$ center, which exhibits a planar $Ag_2S_2$ moiety in which each of the doubly S-bridged $Ag^I$ centers is surrounded by the one P atom of phosphane ligand and one N atom of the dmpymtH ligands (Fig. 1). The Ag—Ag distance of 2.9569 (4) Å in the four-membered $Ag_2S_2$ ring is shorter than in $[Ag_2X_2(\text{l-S-pySH})_2(PPh_3)_2]$ ($X$ = Cl and Br), 3.8425 (8) and 3.8211 (4) Å, respectively (Lobana *et al.*, 2008) and also shorter than the sum of the covalent radii of two $Ag^I$ centers (3.44 Å). Focusing on the comparison of bond distances and bond angles around the $Ag^I$ ion, the Ag—S bond lengths [2.5492 (6)–2.7897 (6) Å] are in good agreement with values reported for other silver(I) complexes with heterocyclic thione ligands, such as 2.5548 (9) Å for $[Ag(PPh_3)(pymtH)Br]_2$ (Cox *et al.*, 2000) and 2.537 (2) Å for $[Ag(Ph_3P)(Diaz)_2]_2(NO_3)_2$ (Nawaz *et al.*, 2011). The Ag1—P1 bond length of 2.4088 (6) Å is similar to that found in $[Ag(PPh_3)(\text{thiourea})(NO_3)]_2.[Ag(PPh_3)(\text{thiourea})]_2(NO_3)_2$ [2.4029 (10)–2.4157 (10) Å] (Isab *et al.*, 2010). The two S1–Ag1–P1 angles of 116.81 (2) and 123.56 (2)° are larger than the normal tetrahedral value of 109.5°. In the crystal, the intermolecular interactions C14($sp^2$)—H14···N2 [H14···N2 = 2.686 (4) Å, C14($sp^2$)···N2 = 3.471 (4) Å and C14($sp^2$)—H14···N2 = 142.52 (8)°] and C14($sp^2$)—H14···S1 [H14···S1 = 2.942 (3) Å, C14($sp^2$)···S1 = 3.801 (3) Å and C14($sp^2$)—H14···S1 = 154.18 (9)°] form chains (Fig. 2). Moreover, secondary interactions C35($sp^2$)—H35···N2 [H35···N2 = 2.928 (4) Å, C35($sp^2$)···N2 = 3.756 (4) Å and C35($sp^2$)—H35···N2 = 150.48 (7)°] are also observed, which form the two-dimensional layer network (Fig. 3).

## Experimental

Triphenylphosphane (0.31 g, 1.18 mmol) was dissolved in 30 $cm^3$ of ethanol at 335 K. Silver acetate (0.10 g, 0.60 mmol) was added and the mixture was stirred for 3 h. 4,6-Dimethylpyrimidine-2(1*H*)-thione (0.18 g, 0.46 mmol) was added and the new reaction mixture was refluxed for 2 h where upon the precipitate gradually disappeared. The resulting clear solution was filtered off and left to evaporate at room temperature. The crystalline solid, which was deposited upon standing for several days, was filtered off and dried under reduced pressure.

## Refinement

The H atoms bonded to C atoms were constrained to ride on their parent atoms with C—H bond lengths of 0.93 Å [aryl CH, $U_{iso}$(H) = 1.2$U_{eq}$(C)] and 0.96 Å [methyl $CH_3$, $U_{iso}$(H) = 1.5$U_{eq}$(C)] except for H3, which was located in a difference

map and refined isotropically.

### Computing details

Data collection: *SMART* (Bruker, 1998); cell refinement: *SAINT* (Bruker, 2003); data reduction: *SAINT* (Bruker, 2003); program(s) used to solve structure: *SHELXS97* (Sheldrick, 2008); program(s) used to refine structure: *SHELXL97* (Sheldrick, 2008); molecular graphics: *Mercury* (Macrae *et al.*, 2008); software used to prepare material for publication: *SHELXTL* (Sheldrick, 2008) and *publCIF* (Westrip, 2010).

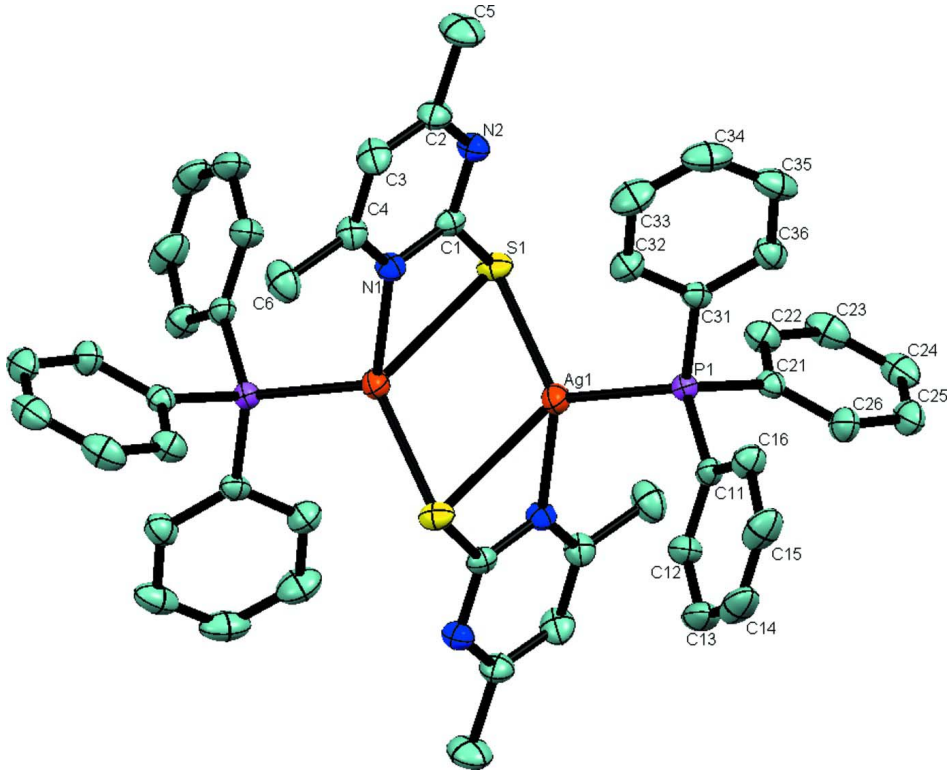


**Figure 1**

The molecular structure with displacement ellipsoids drawn at the 30% probability level.

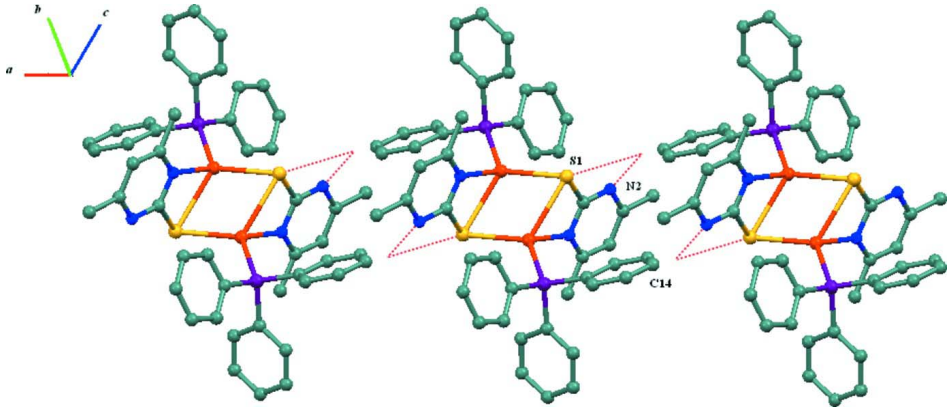


**Figure 2**

Part of the crystal structure with C—H···N and C—H···S hydrogen bonds interactions showed as dashed lines.

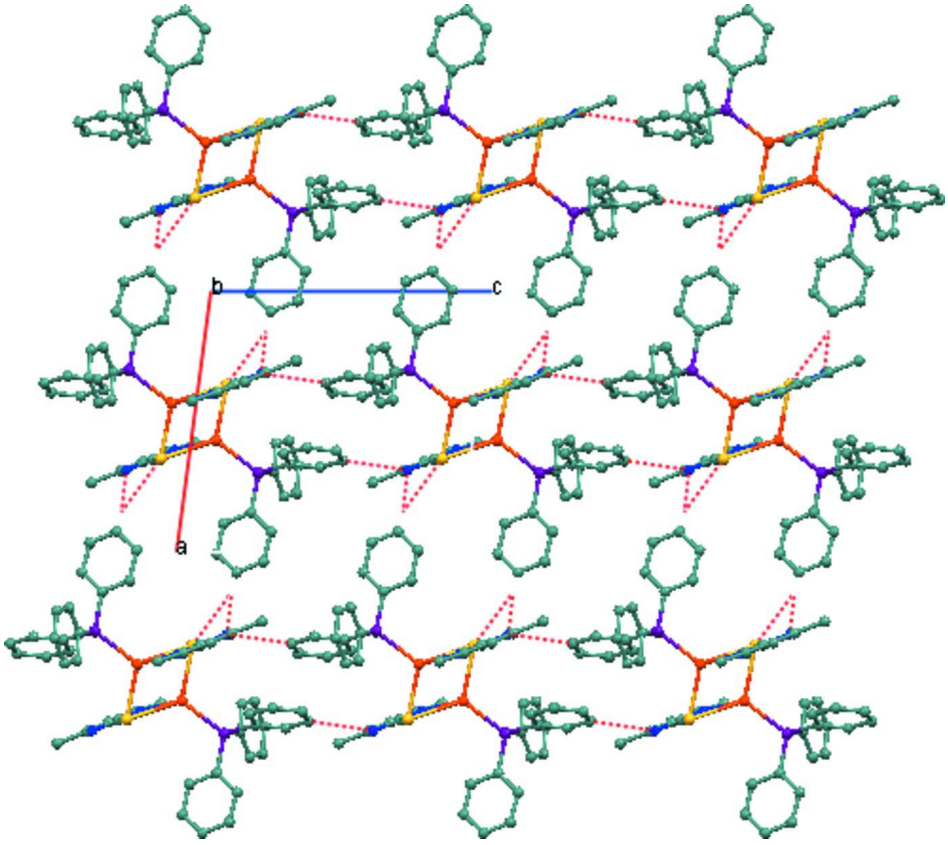


**Figure 3**

The packing diagram viewed down the *b* axis. The dashed lines represent intermolecular C—H···N and C—H···S interactions.

**Bis(*μ*-4,6-dimethylpyrimidine-2-thiolato)-$\kappa^3N,S:S$; $\kappa^3S:N,S$-bis[(triphenylphosphane-$\kappa P$)silver(I)]**

*Crystal data*

$[Ag_2(C_6H_7N_2S)_2(C_{18}H_{15}P)_2]$
$M_r = 1018.67$
Monoclinic, $P2_1/n$
Hall symbol: -P 2yn
$a = 11.7050$ (5) Å
$b = 15.3084$ (7) Å
$c = 12.5331$ (6) Å
$\beta = 97.483$ (1)°
$V = 2226.62$ (18) Å$^3$
$Z = 2$
$F(000) = 1032$
$D_x = 1.519$ Mg m$^{-3}$
Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å
Cell parameters from 8845 reflections
$\theta = 2.2$–$28.3°$
$\mu = 1.08$ mm$^{-1}$
$T = 293$ K
Block, yellow
0.29 × 0.18 × 0.09 mm

*Data collection*

Bruker SMART CCD diffractometer
Radiation source: fine-focus sealed tube
Graphite monochromator
$\varphi$ and $\omega$ scans
Absorption correction: multi-scan (*SADABS*; Bruker, 2003)
$T_{min} = 0.793$, $T_{max} = 0.909$
26686 measured reflections
5568 independent reflections
4798 reflections with $I > 2\sigma(I)$
$R_{int} = 0.023$
$\theta_{max} = 28.3°$, $\theta_{min} = 2.1°$
$h = -15 \rightarrow 15$
$k = -20 \rightarrow 20$
$l = -16 \rightarrow 16$

*Refinement*

Refinement on $F^2$
Least-squares matrix: full
$R[F^2 > 2\sigma(F^2)] = 0.032$
$wR(F^2) = 0.088$
$S = 1.04$
5568 reflections
266 parameters
0 restraints
0 constraints
Primary atom site location: structure-invariant direct methods
Secondary atom site location: difference Fourier map
Hydrogen site location: inferred from neighbouring sites
H atoms treated by a mixture of independent and constrained refinement
$w = 1/[\sigma^2(F_o^2) + (0.0481P)^2 + 0.8969P]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max} = 0.003$
$\Delta\rho_{max} = 0.54$ e Å$^{-3}$
$\Delta\rho_{min} = -0.29$ e Å$^{-3}$

*Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å²)*

| | *x* | *y* | *z* | $U_{iso}$*/$U_{eq}$ |
|---|---|---|---|---|
| C1 | 0.64391 (17) | 0.09032 (14) | −0.12789 (17) | 0.0376 (4) |
| C2 | 0.6887 (2) | 0.20334 (17) | −0.2336 (2) | 0.0512 (6) |
| C3 | 0.6524 (3) | 0.26179 (17) | −0.1622 (2) | 0.0578 (7) |
| C4 | 0.6137 (2) | 0.23054 (15) | −0.07073 (19) | 0.0457 (5) |
| C5 | 0.7338 (4) | 0.2323 (2) | −0.3350 (3) | 0.0798 (10) |
| H5A | 0.7548 | 0.1820 | −0.3739 | 0.120* |
| H5B | 0.8003 | 0.2687 | −0.3168 | 0.120* |
| H5C | 0.6752 | 0.2647 | −0.3790 | 0.120* |
| C6 | 0.5799 (3) | 0.28888 (19) | 0.0155 (2) | 0.0673 (8) |
| H6A | 0.5556 | 0.2540 | 0.0721 | 0.101* |
| H6B | 0.5177 | 0.3261 | −0.0141 | 0.101* |
| H6C | 0.6446 | 0.3241 | 0.0440 | 0.101* |
| C21 | 0.69001 (19) | 0.17384 (14) | 0.30847 (17) | 0.0390 (4) |
| C22 | 0.5829 (2) | 0.21344 (18) | 0.3033 (2) | 0.0525 (6) |
| H22 | 0.5174 | 0.1845 | 0.2712 | 0.063* |
| C23 | 0.5735 (3) | 0.2965 (2) | 0.3463 (2) | 0.0662 (8) |
| H23 | 0.5015 | 0.3229 | 0.3427 | 0.079* |
| C24 | 0.6690 (3) | 0.33977 (17) | 0.3938 (2) | 0.0654 (8) |
| H24 | 0.6618 | 0.3951 | 0.4230 | 0.079* |
| C25 | 0.7747 (3) | 0.30172 (18) | 0.3984 (2) | 0.0620 (7) |
| H25 | 0.8396 | 0.3314 | 0.4304 | 0.074* |
| C26 | 0.7861 (2) | 0.21889 (17) | 0.3557 (2) | 0.0533 (6) |
| H26 | 0.8587 | 0.1936 | 0.3588 | 0.064* |
| C31 | 0.66300 (17) | −0.00663 (15) | 0.36218 (17) | 0.0384 (4) |
| C32 | 0.6224 (2) | −0.08985 (19) | 0.3347 (2) | 0.0581 (6) |
| H32 | 0.6112 | −0.1070 | 0.2630 | 0.070* |
| C33 | 0.5986 (3) | −0.1472 (2) | 0.4139 (3) | 0.0799 (10) |
| H33 | 0.5735 | −0.2035 | 0.3955 | 0.096* |
| C34 | 0.6118 (3) | −0.1213 (3) | 0.5202 (3) | 0.0781 (10) |
| H34 | 0.5955 | −0.1602 | 0.5732 | 0.094* |
| C35 | 0.6487 (3) | −0.0385 (2) | 0.5481 (2) | 0.0698 (9) |
| H35 | 0.6559 | −0.0207 | 0.6196 | 0.084* |
| C36 | 0.6751 (2) | 0.0184 (2) | 0.4697 (2) | 0.0530 (6) |
| H36 | 0.7013 | 0.0743 | 0.4890 | 0.064* |
| N1 | 0.60828 (16) | 0.14406 (12) | −0.05384 (15) | 0.0397 (4) |

| | | | | |
|---|---|---|---|---|
| N2 | 0.68507 (17) | 0.11646 (13) | −0.21745 (15) | 0.0452 (4) |
| H3 | 0.665 (3) | 0.318 (2) | −0.173 (2) | 0.064 (8)* |
| C11 | 0.84851 (19) | 0.04687 (14) | 0.2463 (2) | 0.0406 (5) |
| C12 | 0.8906 (3) | 0.0742 (2) | 0.1534 (2) | 0.0591 (7) |
| H12 | 0.8425 | 0.1018 | 0.0987 | 0.071* |
| C13 | 1.0069 (3) | 0.0597 (2) | 0.1432 (3) | 0.0782 (11) |
| H13 | 1.0360 | 0.0783 | 0.0815 | 0.094* |
| C14 | 1.0778 (3) | 0.0188 (2) | 0.2223 (4) | 0.0801 (11) |
| H14 | 1.1547 | 0.0093 | 0.2143 | 0.096* |
| C15 | 1.0368 (2) | −0.0081 (2) | 0.3123 (3) | 0.0726 (9) |
| H15 | 1.0858 | −0.0362 | 0.3658 | 0.087* |
| C16 | 0.9221 (2) | 0.00566 (18) | 0.3264 (2) | 0.0531 (6) |
| H16 | 0.8950 | −0.0127 | 0.3892 | 0.064* |
| Ag1 | 0.570898 (16) | 0.048363 (12) | 0.086830 (13) | 0.04660 (8) |
| P1 | 0.69618 (5) | 0.06407 (4) | 0.25410 (4) | 0.03501 (12) |
| S1 | 0.35819 (5) | 0.02130 (4) | 0.09946 (5) | 0.04512 (14) |

*Atomic displacement parameters (Å²)*

| | $U^{11}$ | $U^{22}$ | $U^{33}$ | $U^{12}$ | $U^{13}$ | $U^{23}$ |
|---|---|---|---|---|---|---|
| C1 | 0.0319 (9) | 0.0395 (11) | 0.0411 (11) | 0.0003 (8) | 0.0034 (8) | 0.0072 (9) |
| C2 | 0.0592 (15) | 0.0507 (14) | 0.0446 (12) | −0.0067 (11) | 0.0096 (11) | 0.0118 (11) |
| C3 | 0.083 (2) | 0.0362 (13) | 0.0531 (15) | −0.0049 (12) | 0.0057 (13) | 0.0099 (11) |
| C4 | 0.0538 (13) | 0.0383 (11) | 0.0436 (12) | 0.0023 (10) | 0.0012 (10) | 0.0032 (9) |
| C5 | 0.113 (3) | 0.070 (2) | 0.0621 (18) | −0.0094 (19) | 0.0349 (18) | 0.0209 (16) |
| C6 | 0.097 (2) | 0.0480 (15) | 0.0575 (16) | 0.0074 (15) | 0.0102 (16) | −0.0049 (12) |
| C21 | 0.0473 (11) | 0.0363 (10) | 0.0345 (10) | 0.0001 (9) | 0.0090 (9) | 0.0024 (8) |
| C22 | 0.0541 (14) | 0.0543 (14) | 0.0499 (13) | 0.0089 (11) | 0.0103 (11) | 0.0040 (11) |
| C23 | 0.082 (2) | 0.0571 (16) | 0.0636 (17) | 0.0293 (16) | 0.0268 (16) | 0.0113 (14) |
| C24 | 0.108 (2) | 0.0344 (12) | 0.0598 (16) | 0.0041 (14) | 0.0351 (17) | 0.0037 (11) |
| C25 | 0.084 (2) | 0.0435 (14) | 0.0615 (16) | −0.0152 (14) | 0.0203 (15) | −0.0097 (12) |
| C26 | 0.0585 (15) | 0.0439 (13) | 0.0584 (15) | −0.0052 (11) | 0.0108 (12) | −0.0087 (11) |
| C31 | 0.0330 (10) | 0.0453 (12) | 0.0378 (10) | 0.0022 (9) | 0.0075 (8) | 0.0037 (9) |
| C32 | 0.0635 (16) | 0.0516 (15) | 0.0603 (16) | −0.0116 (13) | 0.0116 (13) | 0.0003 (12) |
| C33 | 0.083 (2) | 0.0578 (18) | 0.100 (3) | −0.0168 (16) | 0.019 (2) | 0.0209 (18) |
| C34 | 0.0669 (19) | 0.090 (2) | 0.081 (2) | 0.0028 (17) | 0.0261 (17) | 0.041 (2) |
| C35 | 0.0621 (17) | 0.105 (3) | 0.0443 (14) | 0.0128 (17) | 0.0149 (13) | 0.0211 (15) |
| C36 | 0.0534 (14) | 0.0641 (16) | 0.0412 (12) | 0.0022 (12) | 0.0047 (11) | 0.0015 (11) |
| N1 | 0.0436 (9) | 0.0373 (9) | 0.0383 (9) | 0.0003 (8) | 0.0061 (7) | 0.0036 (7) |
| N2 | 0.0486 (10) | 0.0472 (11) | 0.0415 (10) | −0.0010 (9) | 0.0118 (8) | 0.0043 (8) |
| C11 | 0.0376 (11) | 0.0377 (11) | 0.0481 (12) | −0.0057 (8) | 0.0120 (9) | −0.0107 (9) |
| C12 | 0.0602 (16) | 0.0659 (16) | 0.0554 (15) | −0.0148 (13) | 0.0236 (13) | −0.0094 (13) |
| C13 | 0.071 (2) | 0.087 (2) | 0.087 (2) | −0.0274 (18) | 0.047 (2) | −0.0282 (19) |
| C14 | 0.0470 (15) | 0.071 (2) | 0.129 (3) | −0.0104 (15) | 0.036 (2) | −0.039 (2) |
| C15 | 0.0417 (14) | 0.0596 (18) | 0.116 (3) | 0.0051 (13) | 0.0075 (16) | −0.0152 (18) |
| C16 | 0.0423 (12) | 0.0517 (14) | 0.0653 (16) | 0.0035 (11) | 0.0071 (11) | −0.0039 (12) |
| Ag1 | 0.05306 (12) | 0.05106 (12) | 0.03463 (10) | −0.01141 (8) | 0.00173 (8) | 0.00047 (7) |
| P1 | 0.0351 (3) | 0.0382 (3) | 0.0317 (3) | −0.0029 (2) | 0.0043 (2) | −0.0018 (2) |
| S1 | 0.0448 (3) | 0.0354 (3) | 0.0576 (3) | 0.0031 (2) | 0.0160 (3) | 0.0063 (2) |

*Geometric parameters (Å, º)*

| | | | |
|---|---|---|---|
| C1—N2 | 1.339 (3) | C31—P1 | 1.815 (2) |
| C1—N1 | 1.346 (3) | C32—C33 | 1.380 (4) |
| C1—S1$^{i}$ | 1.746 (2) | C32—H32 | 0.9300 |
| C2—N2 | 1.347 (3) | C33—C34 | 1.379 (5) |
| C2—C3 | 1.372 (4) | C33—H33 | 0.9300 |
| C2—C5 | 1.505 (3) | C34—C35 | 1.370 (5) |
| C3—C4 | 1.373 (3) | C34—H34 | 0.9300 |
| C3—H3 | 0.89 (3) | C35—C36 | 1.377 (4) |
| C4—N1 | 1.343 (3) | C35—H35 | 0.9300 |
| C4—C6 | 1.495 (4) | C36—H36 | 0.9300 |
| C5—H5A | 0.9600 | N1—Ag1 | 2.3763 (18) |
| C5—H5B | 0.9600 | C11—C12 | 1.386 (3) |
| C5—H5C | 0.9600 | C11—C16 | 1.387 (4) |
| C6—H6A | 0.9600 | C11—P1 | 1.818 (2) |
| C6—H6B | 0.9600 | C12—C13 | 1.401 (4) |
| C6—H6C | 0.9600 | C12—H12 | 0.9300 |
| C21—C26 | 1.385 (3) | C13—C14 | 1.360 (6) |
| C21—C22 | 1.387 (3) | C13—H13 | 0.9300 |
| C21—P1 | 1.818 (2) | C14—C15 | 1.346 (5) |
| C22—C23 | 1.391 (4) | C14—H14 | 0.9300 |
| C22—H22 | 0.9300 | C15—C16 | 1.393 (4) |
| C23—C24 | 1.367 (5) | C15—H15 | 0.9300 |
| C23—H23 | 0.9300 | C16—H16 | 0.9300 |
| C24—C25 | 1.362 (5) | Ag1—P1 | 2.4088 (6) |
| C24—H24 | 0.9300 | Ag1—S1 | 2.5492 (6) |
| C25—C26 | 1.390 (4) | Ag1—S1$^{i}$ | 2.7897 (6) |
| C25—H25 | 0.9300 | Ag1—Ag1$^{i}$ | 2.9569 (4) |
| C26—H26 | 0.9300 | S1—C1$^{i}$ | 1.746 (2) |
| C31—C32 | 1.387 (4) | S1—Ag1$^{i}$ | 2.7897 (6) |
| C31—C36 | 1.390 (3) | | |
| | | | |
| N2—C1—N1 | 125.0 (2) | C35—C34—C33 | 120.3 (3) |
| N2—C1—S1$^{i}$ | 118.66 (17) | C35—C34—H34 | 119.9 |
| N1—C1—S1$^{i}$ | 116.31 (15) | C33—C34—H34 | 119.9 |
| N2—C2—C3 | 121.8 (2) | C34—C35—C36 | 119.7 (3) |
| N2—C2—C5 | 116.1 (3) | C34—C35—H35 | 120.2 |
| C3—C2—C5 | 122.1 (3) | C36—C35—H35 | 120.2 |
| C2—C3—C4 | 118.8 (2) | C35—C36—C31 | 120.9 (3) |
| C2—C3—H3 | 117.6 (19) | C35—C36—H36 | 119.6 |
| C4—C3—H3 | 123 (2) | C31—C36—H36 | 119.6 |
| N1—C4—C3 | 120.1 (2) | C4—N1—C1 | 117.93 (19) |
| N1—C4—C6 | 116.9 (2) | C4—N1—Ag1 | 137.84 (16) |
| C3—C4—C6 | 122.9 (2) | C1—N1—Ag1 | 103.78 (13) |
| C2—C5—H5A | 109.5 | C1—N2—C2 | 116.3 (2) |
| C2—C5—H5B | 109.5 | C12—C11—C16 | 119.3 (2) |
| H5A—C5—H5B | 109.5 | C12—C11—P1 | 117.4 (2) |
| C2—C5—H5C | 109.5 | C16—C11—P1 | 123.23 (18) |
| H5A—C5—H5C | 109.5 | C11—C12—C13 | 119.0 (3) |

| | | | |
|---|---|---|---|
| H5B—C5—H5C | 109.5 | C11—C12—H12 | 120.5 |
| C4—C6—H6A | 109.5 | C13—C12—H12 | 120.5 |
| C4—C6—H6B | 109.5 | C14—C13—C12 | 120.9 (3) |
| H6A—C6—H6B | 109.5 | C14—C13—H13 | 119.5 |
| C4—C6—H6C | 109.5 | C12—C13—H13 | 119.5 |
| H6A—C6—H6C | 109.5 | C15—C14—C13 | 120.1 (3) |
| H6B—C6—H6C | 109.5 | C15—C14—H14 | 120.0 |
| C26—C21—C22 | 118.8 (2) | C13—C14—H14 | 120.0 |
| C26—C21—P1 | 123.42 (18) | C14—C15—C16 | 121.0 (3) |
| C22—C21—P1 | 117.80 (19) | C14—C15—H15 | 119.5 |
| C21—C22—C23 | 119.9 (3) | C16—C15—H15 | 119.5 |
| C21—C22—H22 | 120.1 | C11—C16—C15 | 119.7 (3) |
| C23—C22—H22 | 120.1 | C11—C16—H16 | 120.2 |
| C24—C23—C22 | 120.7 (3) | C15—C16—H16 | 120.2 |
| C24—C23—H23 | 119.7 | N1—Ag1—P1 | 115.73 (5) |
| C22—C23—H23 | 119.7 | N1—Ag1—S1 | 114.96 (5) |
| C25—C24—C23 | 119.8 (3) | P1—Ag1—S1 | 116.81 (2) |
| C25—C24—H24 | 120.1 | N1—Ag1—S1$^{i}$ | 60.73 (5) |
| C23—C24—H24 | 120.1 | P1—Ag1—S1$^{i}$ | 123.56 (2) |
| C24—C25—C26 | 120.4 (3) | S1—Ag1—S1$^{i}$ | 112.912 (15) |
| C24—C25—H25 | 119.8 | N1—Ag1—Ag1$^{i}$ | 84.41 (5) |
| C26—C25—H25 | 119.8 | P1—Ag1—Ag1$^{i}$ | 155.550 (17) |
| C21—C26—C25 | 120.4 (3) | S1—Ag1—Ag1$^{i}$ | 60.342 (16) |
| C21—C26—H26 | 119.8 | S1$^{i}$—Ag1—Ag1$^{i}$ | 52.570 (14) |
| C25—C26—H26 | 119.8 | C31—P1—C11 | 105.11 (10) |
| C32—C31—C36 | 118.8 (2) | C31—P1—C21 | 104.39 (10) |
| C32—C31—P1 | 117.53 (18) | C11—P1—C21 | 103.96 (10) |
| C36—C31—P1 | 123.68 (19) | C31—P1—Ag1 | 115.14 (7) |
| C33—C32—C31 | 120.0 (3) | C11—P1—Ag1 | 115.39 (8) |
| C33—C32—H32 | 120.0 | C21—P1—Ag1 | 111.66 (7) |
| C31—C32—H32 | 120.0 | C1$^{i}$—S1—Ag1 | 102.21 (7) |
| C34—C33—C32 | 120.3 (3) | C1$^{i}$—S1—Ag1$^{i}$ | 79.07 (7) |
| C34—C33—H33 | 119.9 | Ag1—S1—Ag1$^{i}$ | 67.088 (15) |
| C32—C33—H33 | 119.9 | | |

Symmetry code: (i) −*x*+1, −*y*, −*z*.

*Hydrogen-bond geometry (Å, º)*

| *D*—H···*A* | *D*—H | H···*A* | *D*···*A* | *D*—H···*A* |
|---|---|---|---|---|
| C14—H14···S1$^{ii}$ | 0.93 | 2.94 | 3.801 (3) | 154 |
| C14—H14···N2$^{iii}$ | 0.93 | 2.69 | 3.471 (4) | 143 |
| C35—H35···N2$^{iv}$ | 0.93 | 2.93 | 3.756 (4) | 151 |

Symmetry codes: (ii) *x*+1, *y*, *z*; (iii) −*x*+2, −*y*, −*z*; (iv) *x*, *y*, *z*+1.