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# Poly[[silver(I)-bis[$\mu_2$-3-(aminomethyl)-pyridine]-$\kappa^2N^1:N^3;\kappa^2N^3:N^1$] hexafluoridophosphate]

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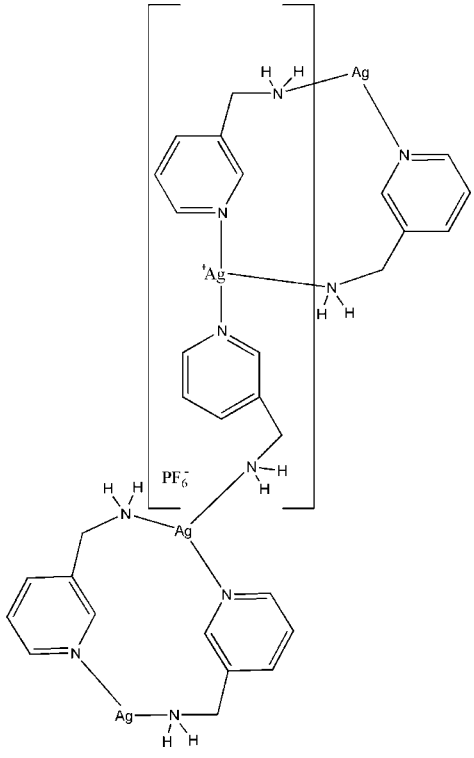
Key indicators: single-crystal X-ray study; $T$ = 110 K; mean $\sigma$(C–C) = 0.005 Å; $R$ factor = 0.029; $wR$ factor = 0.117; data-to-parameter ratio = 15.6.

In the title compound, $\{[Ag(C_6H_8N_2)_2]PF_6\}_n$, a two-dimensional coordination polymer is formed by linking each Ag atom of the $[Ag(3\text{-AMP})]_2$ rings [3-AMP is 3-(aminomethyl)pyridine] with an additional equivalent of 3-AMP. This polymer exhibits hydrogen bonding to the anion, which sits in channels forming a three-dimensional network. Each Ag atom is ligated by two pyridine and two amine groups.

## Related literature

For related literature, see: Feazell *et al.* (2006*a*,*b*,*c*); Klausmeyer *et al.* (2004).




## Experimental

### Crystal data

$[Ag(C_6H_8N_2)_2]PF_6$
$M_r$ = 469.13
Monoclinic, $P2_1/n$
$a$ = 6.9563 (11) Å
$b$ = 11.584 (2) Å
$c$ = 20.060 (3) Å
$\beta$ = 90.271 (5)°
$V$ = 1616.4 (4) Å$^3$
$Z$ = 4
Mo $K\alpha$ radiation
$\mu$ = 1.41 mm$^{-1}$
$T$ = 110 (2) K
0.25 × 0.17 × 0.12 mm

### Data collection

Bruker APEXII CCD area-detector diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996)
$T_{min}$ = 0.740, $T_{max}$ = 0.845
16863 measured reflections
3387 independent reflections
3006 reflections with $I > 2\sigma(I)$
$R_{int}$ = 0.031

### Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.029
$wR(F^2)$ = 0.117
$S$ = 0.96
3387 reflections
217 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 1.18 e Å$^{-3}$
$\Delta\rho_{min}$ = −0.67 e Å$^{-3}$

**Table 1**
Selected geometric parameters (Å, °).

| | | | |
|---|---|---|---|
| Ag1—N1 | 2.296 (3) | Ag1—N3 | 2.357 (3) |
| Ag1—N2$^{i}$ | 2.348 (3) | Ag1—N4$^{ii}$ | 2.367 (3) |
| N1—Ag1—N2$^{i}$ | 128.98 (10) | N1—Ag1—N4$^{ii}$ | 108.13 (9) |
| N1—Ag1—N3 | 108.29 (9) | N2$^{i}$—Ag1—N4$^{ii}$ | 93.57 (10) |
| N2$^{i}$—Ag1—N3 | 104.49 (9) | N3—Ag1—N4$^{ii}$ | 112.55 (9) |

Symmetry codes: (i) $-x, -y, -z$; (ii) $-x+\frac{1}{2}, y-\frac{1}{2}, -z+\frac{1}{2}$.

**Table 2**
Hydrogen-bond geometry (Å, °).

| $D$—H···$A$ | $D$—H | H···$A$ | $D$···$A$ | $D$—H···$A$ |
|---|---|---|---|---|
| N4—H4$A$···F1 | 0.90 | 2.34 | 3.135 (4) | 147 |
| N4—H4$A$···F5 | 0.90 | 2.52 | 3.334 (4) | 151 |
| N4—H4$B$···F3$^{iii}$ | 0.90 | 2.61 | 3.399 (4) | 146 |
| N2—H2$A$···F1$^{iv}$ | 0.90 | 2.38 | 3.010 (4) | 127 |
| N2—H2$A$···F2$^{v}$ | 0.90 | 2.59 | 3.217 (3) | 127 |
| N2—H2$B$···F4$^{v}$ | 0.90 | 2.31 | 2.926 (3) | 126 |

Symmetry codes: (iii) $-x+\frac{3}{2}, y-\frac{1}{2}, -z+\frac{1}{2}$; (iv) $x-\frac{1}{2}, -y+\frac{1}{2}, z-\frac{1}{2}$; (v) $-x+1, -y+1, -z$.

Data collection: *APEX2* (Bruker, 2003); cell refinement: *APEX2*; data reduction: *SAINT-Plus* (Bruker, 2003); program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *SHELXTL* (Sheldrick, 2000); software used to prepare material for publication: *SHELXTL*.

The Bruker APEXII X8 diffractometer was purchased with funds received from the National Science Foundation Major Research Instrumentation Program grant CHE-0321214. KK thanks the Robert A. Welch Foundation for support (AA-1508).

Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: BQ2026).

## References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# supplementary materials

*Acta Cryst.* (2007). E**63**, m2131-m2132 [ **doi:10.1107/S1600536807033430** ]

# Poly[[silver(I)-bis[$\mu_2$-3-(aminomethyl)pyridine]-$\kappa^2N^1:N^3;\kappa^2N^3:N^1$] hexafluoridophosphate]

**C. E. Carson, R. P. Feazell and K. K. Klausmeyer**

## Comment

The title compound, (I), is isostructural with Ag(3-aminomethylpyridine)$_2$BF$_4$ (Klausmeyer *et al.*, 2004). The extended structure reveals that the hexafluorophosphate ions are intercalated between the sheets of 'box-linker-box' units and hydrogen bond with the amine H atoms creating an intricate extended packing structure. The title compound (1) contains silvers in the +1 oxidation state that have distorted tetrahedral geometry with a coordination sphere consisting of two pyridyl N atoms and two amine N atoms from the ligand. The structure displays a "box-linker-box" motif. This motif consists of two 3-AMP ligands binding in a head-to-tail fashion with two silvers. The distance from Ag to Ag across the box is 5.0079 (9) Å. The boxes are then linked by 3-AMP ligands to form the two dimensional polymer.

## Experimental

The reaction was carried out under an argon atmosphere using a Schlenk line and standard Schlenk techniques. Glassware was dried at 120 °C for several hours prior to use. All reagents were stored in an inert-atmosphere glovebox; solvents were distilled under nitrogen from the appropriate drying agent immediately before use This reaction used 2 equiv of 3-AMP (0.150 g, 1.40 mmol) in 5 ml $CH_3CN$ added to a solution of $AgPF_6$ (0.135 g, 0.69 mmol) in 5 ml $CH_3CN$. Upon evaporation of the solvent, a white powder was isolated in 84% yield (0.239 g, 0.583 mmol). Colorless plates of (1) were formed at 5 °C by the slow diffusion of ether into a $CH_3CN$ solution of (1)

## Refinement

Hydrogen atoms were included in calculated positions ($C_{ring}$—H = 0.930 Å); ($C_{methylene}$—H = 0.970 Å); (N—H = 0.900 Å) isotropic displacement parameters were fixed [$U_{iso}$(H) = 1.2$U_{iso}$(C)]; [$U_{iso}$(H) = 1.2$U_{iso}$(N)]; [$U_{iso}$(H) = 1.2$U_{iso}$($C_{ring}$)].

## Figures

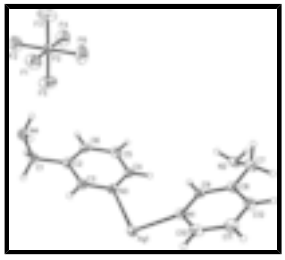

Fig. 1. Thermal ellipsoid plot of the unique portion of 1, ellipsoids are drawn at the 50% probability level.

Fig. 2. The "box-linker-box" motif.

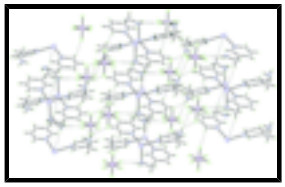

Fig. 3. Extended packing diagram displaying H-bonding.

**Poly[[silver(I)-bis[μ$_2$-3-(aminomethyl)pyridine]- $\kappa^2N^1:N^3;\kappa^2N^3:N^1$] hexafluoridophosphate]**

*Crystal data*

| | |
|---|---|
| $[Ag(C_6H_8N_2)_2]PF_6$ | $F_{000}$ = 928 |
| $M_r$ = 469.13 | $D_x$ = 1.928 Mg m$^{-3}$ |
| Monoclinic, $P2_1/n$ | Mo $K\alpha$ radiation<br>λ = 0.71073 Å |
| Hall symbol: -P 2yn | Cell parameters from 7201 reflections |
| $a$ = 6.9563 (11) Å | θ = 2.7–26.6º |
| $b$ = 11.584 (2) Å | μ = 1.41 mm$^{-1}$ |
| $c$ = 20.060 (3) Å | $T$ = 110 (2) K |
| β = 90.271 (5)º | Block, colorless |
| $V$ = 1616.4 (4) Å$^3$ | 0.25 × 0.17 × 0.12 mm |
| $Z$ = 4 | |

*Data collection*

| | |
|---|---|
| Bruker SMART CCD area-detector diffractometer | 3387 independent reflections |
| Radiation source: fine-focus sealed tube | 3006 reflections with $I > 2\sigma(I)$ |
| Monochromator: graphite | $R_{int}$ = 0.031 |
| $T$ = 110(2) K | $\theta_{max}$ = 26.7º |
| φ and ω scans | $\theta_{min}$ = 2.0º |
| Absorption correction: multi-scan (SADABS; Sheldrick, 1996) | $h$ = −8→8 |
| $T_{min}$ = 0.740, $T_{max}$ = 0.845 | $k$ = −14→14 |
| 16863 measured reflections | $l$ = −25→25 |

*Refinement*

| | |
|---|---|
| Refinement on $F^2$ | Secondary atom site location: difference Fourier map |
| Least-squares matrix: full | Hydrogen site location: inferred from neighbouring sites |
| $R[F^2 > 2\sigma(F^2)]$ = 0.029 | H-atom parameters constrained |
| $wR(F^2)$ = 0.117 | $w = 1/[\sigma^2(F_o^2) + (0.1P)^2]$<br>where $P = (F_o^2 + 2F_c^2)/3$ |
| $S$ = 0.96 | $(\Delta/\sigma)_{max} < 0.001$ |
| 3387 reflections | $\Delta\rho_{max}$ = 1.18 e Å$^{-3}$ |
| 217 parameters | $\Delta\rho_{min}$ = −0.67 e Å$^{-3}$ |

Primary atom site location: structure-invariant direct methods

Extinction correction: none

*Special details*

**Geometry**. All e.s.d.'s (except the e.s.d. in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell e.s.d.'s are taken into account individually in the estimation of e.s.d.'s in distances, angles and torsion angles; correlations between e.s.d.'s in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell e.s.d.'s is used for estimating e.s.d.'s involving l.s. planes.

**Refinement**. Refinement of $F^2$ against ALL reflections. The weighted *R*-factor *wR* and goodness of fit *S* are based on $F^2$, conventional *R*-factors *R* are based on *F*, with *F* set to zero for negative $F^2$. The threshold expression of $F^2 > \sigma(F^2)$ is used only for calculating *R*-factors(gt) *etc*. and is not relevant to the choice of reflections for refinement. *R*-factors based on $F^2$ are statistically about twice as large as those based on *F*, and *R*- factors based on ALL data will be even larger.

*Fractional atomic coordinates and isotropic or equivalent isotropic displacement parameters (Å$^2$)*

| | *x* | *y* | *z* | $U_{iso}$*/$U_{eq}$ |
|---|---|---|---|---|
| Ag1 | 0.04519 (3) | −0.028628 (19) | 0.122801 (11) | 0.01880 (13) |
| N4 | 0.3921 (4) | 0.3978 (2) | 0.26917 (13) | 0.0221 (6) |
| H4A | 0.4637 | 0.4383 | 0.2402 | 0.026* |
| H4B | 0.4343 | 0.3244 | 0.2680 | 0.026* |
| N2 | 0.2897 (4) | 0.0347 (2) | −0.13631 (16) | 0.0220 (6) |
| H2A | 0.3146 | 0.0632 | −0.1771 | 0.026* |
| H2B | 0.3382 | 0.0847 | −0.1063 | 0.026* |
| N1 | 0.2333 (4) | −0.1277 (2) | 0.04850 (13) | 0.0185 (5) |
| N3 | 0.1174 (4) | 0.1695 (2) | 0.11364 (13) | 0.0187 (5) |
| C9 | 0.2783 (4) | −0.0771 (3) | −0.00970 (15) | 0.0174 (6) |
| H9 | 0.2622 | 0.0024 | −0.0131 | 0.021* |
| C6 | 0.1799 (4) | 0.4065 (3) | 0.11783 (17) | 0.0214 (6) |
| H6 | 0.1999 | 0.4859 | 0.1188 | 0.026* |
| C4 | 0.1308 (4) | 0.2319 (3) | 0.05778 (15) | 0.0179 (6) |
| H4 | 0.1192 | 0.1942 | 0.0170 | 0.021* |
| C8 | 0.3470 (4) | −0.1354 (3) | −0.06464 (16) | 0.0184 (6) |
| C2 | 0.1688 (4) | 0.3443 (3) | 0.17690 (15) | 0.0184 (6) |
| C3 | 0.1356 (4) | 0.2257 (3) | 0.17155 (15) | 0.0187 (6) |
| H3 | 0.1255 | 0.1831 | 0.2107 | 0.022* |
| C12 | 0.3746 (5) | −0.2542 (3) | −0.05791 (17) | 0.0243 (7) |
| H12 | 0.4206 | −0.2974 | −0.0935 | 0.029* |
| C5 | 0.1610 (4) | 0.3499 (3) | 0.05785 (16) | 0.0214 (6) |
| H5 | 0.1685 | 0.3904 | 0.0179 | 0.026* |
| C11 | 0.3334 (5) | −0.3069 (3) | 0.00161 (17) | 0.0257 (7) |
| H11 | 0.3526 | −0.3859 | 0.0068 | 0.031* |
| C10 | 0.2636 (4) | −0.2420 (3) | 0.05352 (17) | 0.0225 (7) |
| H10 | 0.2363 | −0.2786 | 0.0937 | 0.027* |
| C1 | 0.1937 (5) | 0.3985 (3) | 0.24467 (16) | 0.0232 (7) |
| H1A | 0.1488 | 0.4777 | 0.2427 | 0.028* |
| H1B | 0.1136 | 0.3575 | 0.2763 | 0.028* |
| C7 | 0.3925 (5) | −0.0750 (3) | −0.12915 (16) | 0.0241 (7) |

| | | | | |
|---|---|---|---|---|
| H7A | 0.5297 | −0.0607 | −0.1312 | 0.029* |
| H7B | 0.3584 | −0.1251 | −0.1661 | 0.029* |
| P2 | 0.74018 (13) | 0.62393 (7) | 0.16233 (4) | 0.0247 (2) |
| F1 | 0.7579 (4) | 0.52866 (18) | 0.21854 (13) | 0.0396 (6) |
| F2 | 0.7217 (3) | 0.7249 (2) | 0.21651 (12) | 0.0419 (6) |
| F3 | 0.9663 (3) | 0.6428 (2) | 0.16267 (13) | 0.0476 (6) |
| F4 | 0.7170 (4) | 0.71905 (19) | 0.10383 (12) | 0.0463 (6) |
| F5 | 0.5096 (3) | 0.6095 (2) | 0.16439 (13) | 0.0484 (6) |
| F6 | 0.7550 (5) | 0.52789 (19) | 0.10652 (14) | 0.0519 (8) |

*Atomic displacement parameters (Å$^2$)*

| | $U^{11}$ | $U^{22}$ | $U^{33}$ | $U^{12}$ | $U^{13}$ | $U^{23}$ |
|---|---|---|---|---|---|---|
| Ag1 | 0.01953 (19) | 0.02047 (18) | 0.01639 (18) | 0.00159 (8) | 0.00101 (11) | 0.00152 (8) |
| N4 | 0.0196 (13) | 0.0271 (14) | 0.0195 (13) | 0.0014 (11) | −0.0016 (10) | −0.0055 (11) |
| N2 | 0.0207 (15) | 0.0242 (15) | 0.0212 (15) | 0.0011 (10) | 0.0021 (12) | 0.0064 (10) |
| N1 | 0.0157 (13) | 0.0208 (12) | 0.0191 (13) | −0.0007 (10) | 0.0005 (10) | 0.0020 (10) |
| N3 | 0.0158 (12) | 0.0188 (13) | 0.0214 (13) | −0.0008 (10) | −0.0015 (10) | −0.0009 (10) |
| C9 | 0.0135 (14) | 0.0190 (14) | 0.0197 (14) | −0.0008 (12) | −0.0019 (11) | −0.0005 (12) |
| C6 | 0.0180 (15) | 0.0182 (14) | 0.0280 (17) | −0.0018 (12) | −0.0014 (12) | −0.0032 (13) |
| C4 | 0.0138 (14) | 0.0217 (14) | 0.0181 (14) | 0.0009 (12) | −0.0021 (11) | −0.0023 (12) |
| C8 | 0.0101 (14) | 0.0243 (15) | 0.0209 (15) | 0.0026 (12) | 0.0005 (11) | 0.0016 (12) |
| C2 | 0.0125 (14) | 0.0231 (15) | 0.0197 (15) | 0.0012 (12) | −0.0002 (11) | −0.0061 (12) |
| C3 | 0.0173 (15) | 0.0217 (14) | 0.0172 (14) | 0.0008 (12) | −0.0007 (12) | 0.0000 (12) |
| C12 | 0.0177 (15) | 0.0269 (16) | 0.0283 (17) | 0.0033 (13) | 0.0030 (13) | −0.0051 (13) |
| C5 | 0.0190 (15) | 0.0242 (15) | 0.0209 (15) | 0.0013 (13) | −0.0011 (12) | 0.0043 (12) |
| C11 | 0.0246 (17) | 0.0200 (15) | 0.0325 (18) | 0.0065 (13) | 0.0012 (14) | 0.0021 (14) |
| C10 | 0.0166 (15) | 0.0220 (15) | 0.0287 (17) | 0.0031 (12) | 0.0004 (13) | 0.0076 (13) |
| C1 | 0.0210 (16) | 0.0270 (16) | 0.0216 (16) | 0.0013 (13) | 0.0009 (13) | −0.0042 (13) |
| C7 | 0.0227 (16) | 0.0290 (17) | 0.0207 (16) | 0.0064 (15) | 0.0050 (12) | 0.0024 (13) |
| P2 | 0.0297 (5) | 0.0218 (4) | 0.0228 (4) | −0.0035 (3) | 0.0063 (4) | −0.0012 (3) |
| F1 | 0.0413 (14) | 0.0420 (14) | 0.0356 (13) | 0.0008 (9) | 0.0004 (11) | 0.0163 (9) |
| F2 | 0.0488 (14) | 0.0400 (13) | 0.0368 (12) | 0.0031 (11) | 0.0051 (10) | −0.0080 (10) |
| F3 | 0.0317 (12) | 0.0407 (13) | 0.0704 (17) | −0.0021 (10) | 0.0145 (11) | 0.0096 (12) |
| F4 | 0.0753 (18) | 0.0309 (11) | 0.0326 (12) | −0.0017 (11) | −0.0010 (11) | 0.0074 (10) |
| F5 | 0.0307 (12) | 0.0544 (15) | 0.0601 (16) | −0.0054 (11) | −0.0093 (11) | 0.0077 (13) |
| F6 | 0.082 (2) | 0.0376 (15) | 0.0358 (15) | 0.0010 (12) | 0.0038 (14) | −0.0110 (10) |

*Geometric parameters (Å, °)*

| | | | |
|---|---|---|---|
| Ag1—N1 | 2.296 (3) | C4—H4 | 0.9300 |
| Ag1—N2$^{i}$ | 2.348 (3) | C8—C12 | 1.396 (4) |
| Ag1—N3 | 2.357 (3) | C8—C7 | 1.506 (4) |
| Ag1—N4$^{ii}$ | 2.367 (3) | C2—C3 | 1.397 (4) |
| N4—C1 | 1.462 (4) | C2—C1 | 1.507 (4) |
| N4—Ag1$^{iii}$ | 2.367 (3) | C3—H3 | 0.9300 |
| N4—H4A | 0.9000 | C12—C11 | 1.372 (5) |
| N4—H4B | 0.9000 | C12—H12 | 0.9300 |

| | | | |
|---|---|---|---|
| N2—C7 | 1.465 (4) | C5—H5 | 0.9300 |
| N2—Ag1$^{i}$ | 2.348 (3) | C11—C10 | 1.375 (5) |
| N2—H2A | 0.9000 | C11—H11 | 0.9300 |
| N2—H2B | 0.9000 | C10—H10 | 0.9300 |
| N1—C10 | 1.344 (4) | C1—H1A | 0.9700 |
| N1—C9 | 1.345 (4) | C1—H1B | 0.9700 |
| N3—C3 | 1.337 (4) | C7—H7A | 0.9700 |
| N3—C4 | 1.337 (4) | C7—H7B | 0.9700 |
| C9—C8 | 1.379 (4) | P2—F6 | 1.582 (3) |
| C9—H9 | 0.9300 | P2—F1 | 1.582 (2) |
| C6—C5 | 1.376 (4) | P2—F3 | 1.588 (2) |
| C6—C2 | 1.389 (4) | P2—F2 | 1.602 (2) |
| C6—H6 | 0.9300 | P2—F5 | 1.613 (2) |
| C4—C5 | 1.383 (4) | P2—F4 | 1.617 (2) |
| N1—Ag1—N2$^{i}$ | 128.98 (10) | C2—C3—H3 | 118.0 |
| N1—Ag1—N3 | 108.29 (9) | C11—C12—C8 | 119.6 (3) |
| N2$^{i}$—Ag1—N3 | 104.49 (9) | C11—C12—H12 | 120.2 |
| N1—Ag1—N4$^{ii}$ | 108.13 (9) | C8—C12—H12 | 120.2 |
| N2$^{i}$—Ag1—N4$^{ii}$ | 93.57 (10) | C6—C5—C4 | 119.1 (3) |
| N3—Ag1—N4$^{ii}$ | 112.55 (9) | C6—C5—H5 | 120.5 |
| C1—N4—Ag1$^{iii}$ | 118.38 (19) | C4—C5—H5 | 120.5 |
| C1—N4—H4A | 107.7 | C12—C11—C10 | 119.4 (3) |
| Ag1$^{iii}$—N4—H4A | 107.7 | C12—C11—H11 | 120.3 |
| C1—N4—H4B | 107.7 | C10—C11—H11 | 120.3 |
| Ag1$^{iii}$—N4—H4B | 107.7 | N1—C10—C11 | 122.5 (3) |
| H4A—N4—H4B | 107.1 | N1—C10—H10 | 118.7 |
| C7—N2—Ag1$^{i}$ | 116.5 (2) | C11—C10—H10 | 118.7 |
| C7—N2—H2A | 108.2 | N4—C1—C2 | 113.9 (3) |
| Ag1$^{i}$—N2—H2A | 108.2 | N4—C1—H1A | 108.8 |
| C7—N2—H2B | 108.2 | C2—C1—H1A | 108.8 |
| Ag1$^{i}$—N2—H2B | 108.2 | N4—C1—H1B | 108.8 |
| H2A—N2—H2B | 107.3 | C2—C1—H1B | 108.8 |
| C10—N1—C9 | 117.2 (3) | H1A—C1—H1B | 107.7 |
| C10—N1—Ag1 | 122.2 (2) | N2—C7—C8 | 112.5 (3) |
| C9—N1—Ag1 | 118.8 (2) | N2—C7—H7A | 109.1 |
| C3—N3—C4 | 117.3 (3) | C8—C7—H7A | 109.1 |
| C3—N3—Ag1 | 115.16 (19) | N2—C7—H7B | 109.1 |
| C4—N3—Ag1 | 127.4 (2) | C8—C7—H7B | 109.1 |
| N1—C9—C8 | 124.3 (3) | H7A—C7—H7B | 107.8 |
| N1—C9—H9 | 117.9 | F6—P2—F1 | 90.49 (14) |
| C8—C9—H9 | 117.9 | F6—P2—F3 | 91.82 (16) |
| C5—C6—C2 | 119.5 (3) | F1—P2—F3 | 91.09 (14) |
| C5—C6—H6 | 120.2 | F6—P2—F2 | 177.56 (15) |
| C2—C6—H6 | 120.2 | F1—P2—F2 | 91.85 (13) |
| N3—C4—C5 | 123.0 (3) | F3—P2—F2 | 88.81 (13) |
| N3—C4—H4 | 118.5 | F6—P2—F5 | 90.78 (16) |

| | | | |
|---|---|---|---|
| C5—C4—H4 | 118.5 | F1—P2—F5 | 89.07 (13) |
| C9—C8—C12 | 117.0 (3) | F3—P2—F5 | 177.39 (16) |
| C9—C8—C7 | 122.3 (3) | F2—P2—F5 | 88.58 (13) |
| C12—C8—C7 | 120.8 (3) | F6—P2—F4 | 88.41 (13) |
| C6—C2—C3 | 117.0 (3) | F1—P2—F4 | 178.28 (15) |
| C6—C2—C1 | 123.1 (3) | F3—P2—F4 | 90.27 (14) |
| C3—C2—C1 | 119.8 (3) | F2—P2—F4 | 89.24 (13) |
| N3—C3—C2 | 124.1 (3) | F5—P2—F4 | 89.62 (14) |
| N3—C3—H3 | 118.0 | | |

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

*Hydrogen-bond geometry (Å, °)*

| *D*—H···*A* | *D*—H | H···*A* | *D*···*A* | *D*—H···*A* |
|---|---|---|---|---|
| N4—H4A···F1 | 0.90 | 2.34 | 3.135 (4) | 147 |
| N4—H4A···F5 | 0.90 | 2.52 | 3.334 (4) | 151 |
| N4—H4B···F3$^{iv}$ | 0.90 | 2.61 | 3.399 (4) | 146 |
| N2—H2A···F1$^{v}$ | 0.90 | 2.38 | 3.010 (4) | 127 |
| N2—H2A···F2$^{vi}$ | 0.90 | 2.59 | 3.217 (3) | 127 |
| N2—H2B···F4$^{vi}$ | 0.90 | 2.31 | 2.926 (3) | 126 |

Symmetry codes: (iv) −*x*+3/2, *y*−1/2, −*z*+1/2; (v) *x*−1/2, −*y*+1/2, *z*−1/2; (vi) −*x*+1, −*y*+1, −*z*.

**Fig. 1**

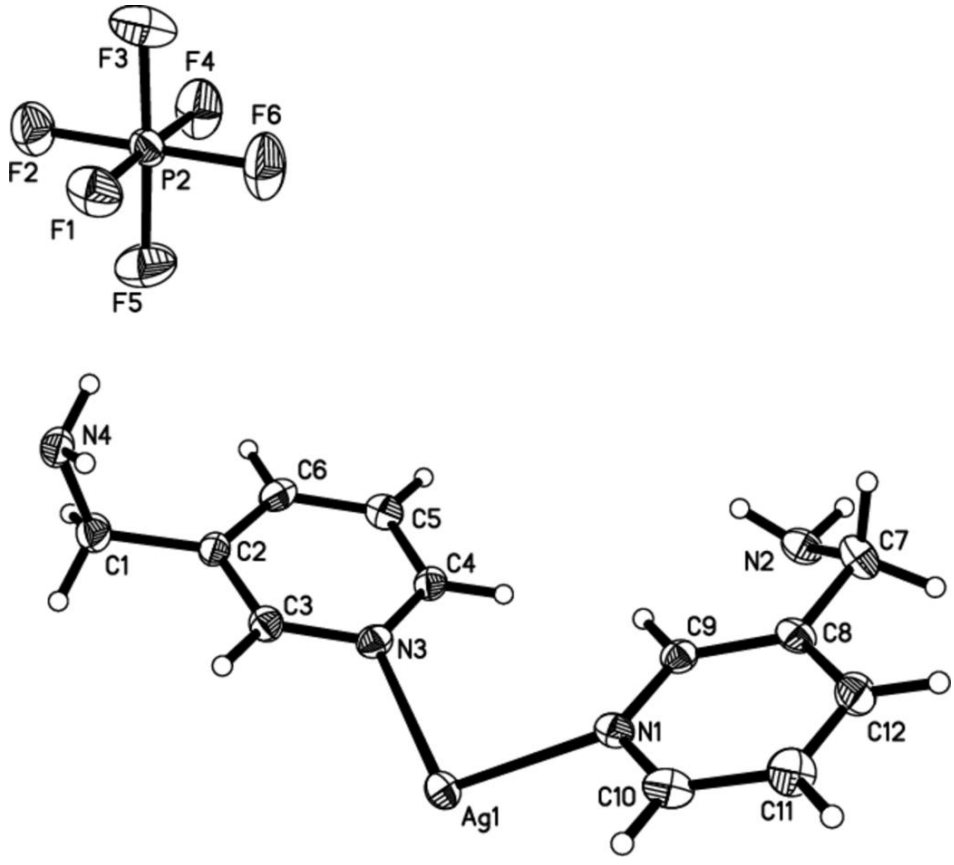
F3
F4
F6
F2
P2
F1
F5
N4
C6
C5
C1
C2
C4
C3
N3
N2
C7
C9
C8
N1
C12
C10
C11
Ag1

**Fig. 2**

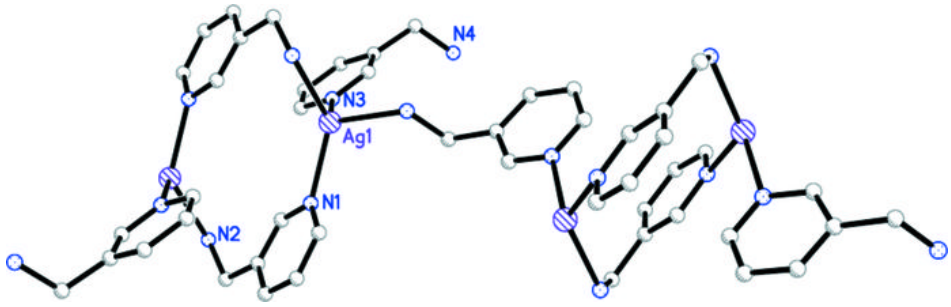

**Fig. 3**