Acta Crystallographica Section E
Structure Reports
Online

ISSN 1600-5368

Bis(2-aminopyridine-κN^1)silver(I) hexafluoroarsenate

Hai-Lang Yang,[a] Zhong-Lu You[b] and Hai-Liang Zhu[c]*

[a]Department of Chemistry, Xiangfan University, Xiangfan Hubei 441000, People's Republic of China, [b]Department of Chemistry, Lanzhou University, Lanzhou 730000, People's Republic of China, and [c]Department of Chemistry, Fuyang Normal College, Fuyang Anhui 236041, People's Republic of China

Correspondence e-mail:
hailiang_zhu@163.com

Received 26 July 2004
Accepted 2 August 2004
Online 7 August 2004

The title compound, $[Ag(C_5H_6N_2)_2](AsF_6)$, is a mononuclear silver(I) compound. The Ag atom is bicoordinated in a distorted linear configuration by two N atoms from two symmetry-related 2-aminopyridine ligands. In the crystal structure, the molecules are linked by N—H···F intermolecular hydrogen bonds, forming layers parallel to the *ac* plane.

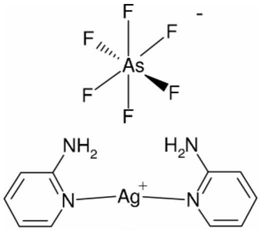
Key indicators

Single-crystal X-ray study
T = 293 K
Mean σ(C–C) = 0.007 Å
R factor = 0.037
wR factor = 0.098
Data-to-parameter ratio = 12.2

For details of how these key indicators were automatically derived from the article, see http://journals.iucr.org/e.

Comment

Recently, we have reported the structures of a few silver(I) complexes (You, Zhu & Liu, 2004; You, Yang *et al.*, 2004; Zhu *et al.*, 1999, 2000). As an extension of our work on the structural characterization of silver(I) complexes, the title complex, (I), is reported here.



(I)

The structure of (I), a mononuclear silver(I) complex, is illustrated in Fig. 1. The asymmetric unit contains one-half of the complex cation, with the other half generated by twofold rotation symmetry, and one-half of a hexafluoroarsenate anion, with the other half related by a crystallographic inversion centre. The Ag and As atoms lie on the crystallographic twofold axis and inversion centre, respectively.

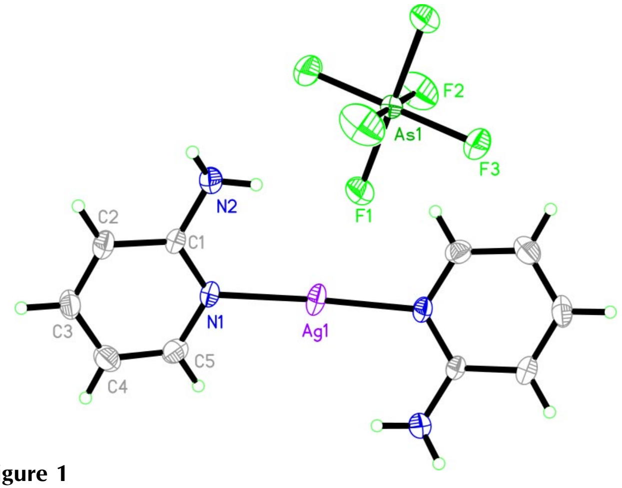


Figure 1
The structure of (I), showing the atom-numbering scheme. Displacement ellipsoids are drawn at the 30% probability level.

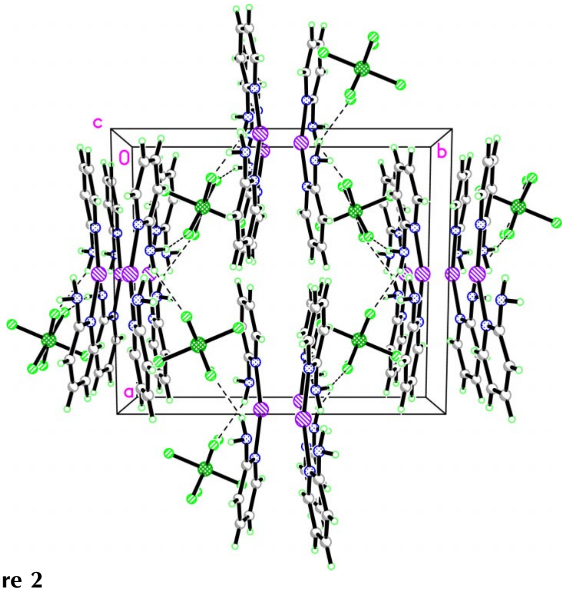


Figure 2
A packing diagram of (I), viewed along the *c* axis. Hydrogen bonds are shown as dashed lines.

In the cation, the Ag^I atom is in a roughly linear coordination environment and is bicoordinated by two N atoms from two symmetry-related 2-aminopyridine ligands. The N1—Ag1—N1($1 - x$, y, $\frac{1}{2} - z$) angle is 167.40 (17)°, indicating a significantly distorted linear geometry for atom Ag1; this value is comparable to that observed in a similar silver(I) complex [172.37 (8)°; Zhu *et al.*, 2003]. The Ag—N bond length is 2.143 (4) Å, which is comparable to the value observed in another similar complex [2.148 (3) Å; You, Yang *et al.*, 2004]. In the anion, the central As^V atom is coordinated by six F atoms in an octahedral geometry. The three *trans* angles are exactly equal to 180° by symmetry and all other angles around As1 are close to 90°, ranging from 89.4 (2) to 90.6 (2)° (Table 1), indicating a very slightly distorted octahedral geometry for atom As1.

In the crystal structure, the molecules are linked by N—H···F intermolecular hydrogen bonds (Table 2), forming layers parallel to the *ac* plane (Fig. 2).

Experimental

2-Aminopyridine (0.1 mmol, 9.4 mg) and silver hexafluoroarsenate (0.1 mmol, 29.7 mg) were dissolved in an ammonia solution (10 ml, 30%). The mixture was stirred for 10 min at room temperature to give a clear colourless solution. The resulting solution was kept in air and, after slow evaporation of the solvent over a period of 8 d, large colourless block-shaped crystals of (I) formed at the bottom of the vessel.

Crystal data

$[Ag(C_5H_6N_2)_2](AsF_6)$
$M_r = 485.03$
Monoclinic, $C2/c$
$a = 11.379$ (2) Å
$b = 12.971$ (3) Å
$c = 10.158$ (2) Å
$\beta = 103.90$ (3)°
$V = 1455.3$ (5) Å^3
$Z = 4$
$D_x = 2.214$ Mg m^{-3}
Mo $K\alpha$ radiation
Cell parameters from 872 reflections
$\theta = 2.1$–23.2°
$\mu = 3.71$ mm^{-1}
$T = 293$ (2) K
Block, colourless
0.18 × 0.12 × 0.11 mm

Data collection

Siemens SMART CCD area-detector diffractometer
ω scans
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996)
$T_{min} = 0.555$, $T_{max} = 0.686$
2453 measured reflections
1353 independent reflections
1210 reflections with $I > 2\sigma(I)$
$R_{int} = 0.041$
$\theta_{max} = 26.0°$
$h = -10 \rightarrow 14$
$k = -10 \rightarrow 16$
$l = -12 \rightarrow 11$

Refinement

Refinement on F^2
$R[F^2 > 2\sigma(F^2)] = 0.037$
$wR(F^2) = 0.099$
$S = 1.08$
1353 reflections
111 parameters
H atoms treated by a mixture of independent and constrained refinement
$w = 1/[\sigma^2(F_o^2) + (0.0626P)^2]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{max} < 0.001$
$\Delta\rho_{max} = 0.95$ e Å^{-3}
$\Delta\rho_{min} = -0.76$ e Å^{-3}
Extinction correction: *SHELXL*97
Extinction coefficient: 0.0051 (7)

Table 1
Selected geometric parameters (Å, °).

Ag1—N1	2.143 (4)	As1—F3	1.705 (3)
As1—F2	1.689 (3)	As1—F1	1.722 (3)
$N1^i$—Ag1—N1	167.40 (17)	F2—As1—$F1^{ii}$	89.84 (17)
F2—As1—$F2^{ii}$	180	F3—As1—$F1^{ii}$	89.49 (14)
F2—As1—$F3^{ii}$	90.6 (2)	F2—As1—F1	90.16 (17)
F2—As1—F3	89.4 (2)	F3—As1—F1	90.51 (14)
$F3^{ii}$—As1—F3	180	$F1^{ii}$—As1—F1	180

Symmetry codes: (i) $1 - x, y, \frac{1}{2} - z$; (ii) $\frac{3}{2} - x, \frac{1}{2} - y, -z$.

Table 2
Hydrogen-bonding geometry (Å, °).

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
N2—H2*B*···$F3^{iii}$	0.90 (1)	2.23 (2)	3.077 (5)	158 (4)
N2—H2*A*···F1	0.90 (1)	2.32 (2)	3.163 (5)	157 (4)

Symmetry code: (iii) $x - \frac{1}{2}, \frac{1}{2} - y, z - \frac{1}{2}$.

Atoms H2*A* and H2*B* were located in a difference Fourier map and refined isotropically, with the N—H and H···H distances restrained to 0.90 (1) and 1.43 (2) Å, respectively. The other H atoms were placed in idealized positions and constrained to ride on their parent atoms, with C—H distances of 0.93 Å, and with $U_{iso}(H) = 1.2U_{eq}(C)$.

Data collection: *SMART* (Siemens, 1996); cell refinement: *SAINT* (Siemens, 1996); data reduction: *SAINT*; program(s) used to solve structure: *SHELXS*97 (Sheldrick, 1997*a*); program(s) used to refine structure: *SHELXL*97 (Sheldrick, 1997*a*); molecular graphics: *SHELXTL* (Sheldrick, 1997*b*); software used to prepare material for publication: *SHELXTL*.

The authors thank the Education Office of Anhui Province, People's Republic of China, for research grant No. 2004kj300zd.

References

Sheldrick, G. M. (1996). *SADABS*. University of Göttingen, Germany.
Sheldrick, G. M. (1997*a*). *SHELXS*97 and *SHELXL*97. University of Göttingen, Germany.
Sheldrick, G. M. (1997*b*). *SHELXTL*. Version 5.1. Bruker AXS Inc., Madison, Wisconsin, USA.

Siemens (1996). *SMART* and *SAINT*. Siemens Analytical X-ray Instruments Inc., Madison, Wisconsin, USA.

You, Z.-L., Yang, L., Zou, Y., Zeng, W.-J., Liu, W.-S. & Zhu, H.-L. (2004). *Acta Cryst.* C**60**, m117–m118.

You, Z.-L., Zhu, H.-L. & Liu, W.-S. (2004). *Acta Cryst.* C**60**, m231–m232.

Zhu, H.-L., Liu, X.-Y., Wang, X.-J., Yang, F., Usman, A. & Fun, H.-K. (2003). *Z. Anorg. Allg. Chem.* **629**, 1986–1990.

Zhu, H.-L., Tong, Y.-X. & Chen, X.-M. (2000). *J. Chem. Soc. Dalton Trans.* pp. 4182–4186.

Zhu, H.-L., Tong, Y.-X., Long, L.-S., Tong, M.-L. & Chen, X.-M. (1999). *Supramol. Chem.* **11**, 119–133.