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(2,2′-Bipyridyl-κ^2N,N')nitrato(triphenylphosphine-κP)silver(I)

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Key indicators

Single-crystal X-ray study
T = 173 K
Mean σ(C–C) = 0.003 Å
R factor = 0.032
wR factor = 0.095
Data-to-parameter ratio = 22.7

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

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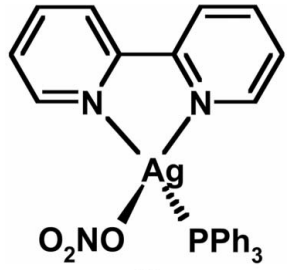
The title complex, $[Ag(NO_3)(C_{10}H_8N_2)(C_{18}H_{15}P)]$, contains a bidentate bipyridyl ligand, a monodentate triphenylphosphine molecule and a nitrate anion coordinated to silver. The geometry of the resulting AgN_2PO coordination could be described as grossly distorted tetrahedral or as irregular.

Comment

Depending on the ligands involved, silver(I) complexes can show a wide variety of structures (Sampanthar *et al.*, 2000; Brandys & Puddephatt, 2001; Khlobystov *et al.*, 2001; Che *et al.*, 1991; Constable *et al.*, 1992; You *et al.*, 2005; Alyea *et al.*, 2002; Näther *et al.*, 2004; Liu *et al.*, 2005). In this context, we decided to examine the nature of the silver complex formed with a conjugated ligand (bipyridyl). Therefore, the title compound, $[Ag(NO_3)(bpy)(PPh_3)]$, (I), has been synthesized and structurally investigated.



(I)

Compound (I) is a monomeric complex (Fig. 1) in which the bipyridyl group is *N*,*N*-bidentate and the nitrate anion is monodentate, although a long Ag—O2 bond of 2.805 (3) Å is also present. Selected geometric parameters are listed in Table 1. The Ag—N, Ag—P and Ag—O bond lengths in (I) are in good agreement with the corresponding distances in related complexes (Sampanthar *et al.*, 2000). The coordination geometry around silver in (I) could be described as grossly distorted tetrahedral (average bond angle = 106.5°) or possibly as irregular. Similar distorted silver coordination environments have been observed in related complexes (Ng & Othman, 1997; Zhang *et al.*, 2003). The crystal packing of (I) is shown in Fig. 2.

Experimental

Compound (I) was prepared by the reaction of $AgNO_3$ with PPh_3 and bipyridyl (molar ratio 1:1:1) in acetonitrile solution at 298 K. The precipitate was filtered off and dried under vacuum. Colourless crystals of (I) were obtained by the diffusion of Et_2O vapour into an acetonitrile–methanol (1:1, *v*/*v*) solution of the complex at 273 K.

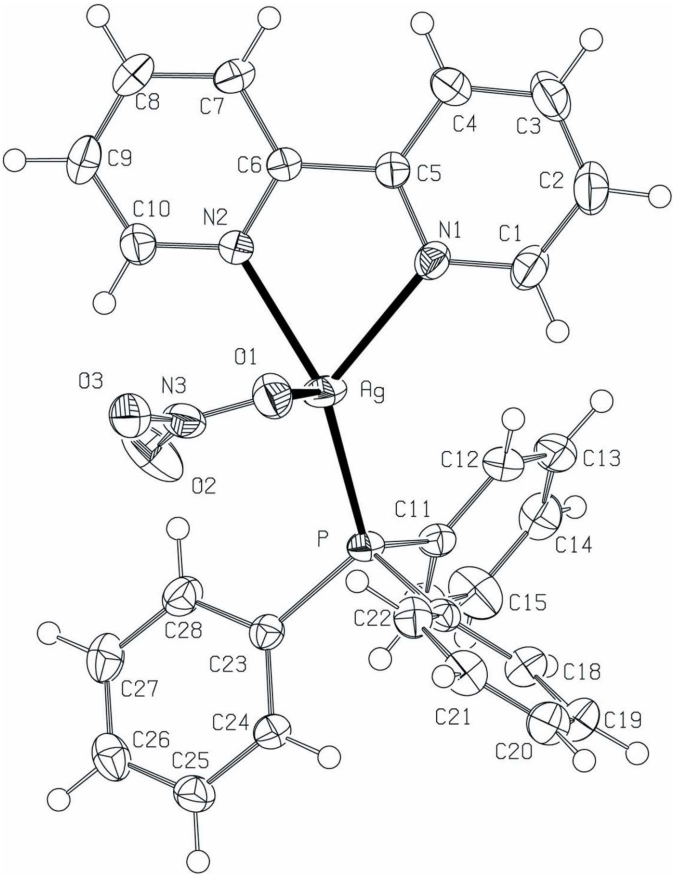


Figure 1
A view of (I), showing 50% probability displacement ellipsoids (arbitrary spheres for the H atoms). Atoms C16 (bonded to C11 and C15) and C17 (bonded to P, C18 and C22) are unlabelled for clarity.

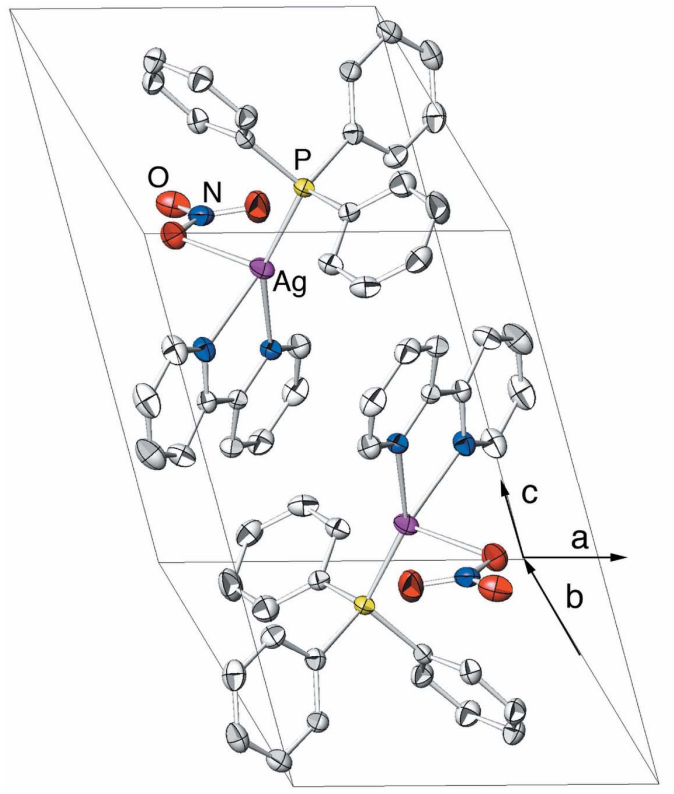


Figure 2
The unit-cell contents of (I), viewed along the *b* axis. H atoms have been omitted.

Crystal data

$[Ag(NO_3)(C_{10}H_8N_2)(C_{18}H_{15}P)]$	$Z = 2$
$M_r = 588.33$	$D_x = 1.548$ Mg m^{-3}
Triclinic, $P\overline{1}$	Mo $K\alpha$ radiation
$a = 8.070$ (5) Å	Cell parameters from 9415 reflections
$b = 9.644$ (5) Å	$\theta = 1.0$–$30.0°$
$c = 18.125$ (5) Å	$\mu = 0.90$ mm^{-1}
$\alpha = 100.28$ (5)°	$T = 173$ (2) K
$\beta = 96.20$ (5)°	Prism, colourless
$\gamma = 112.12$ (5)°	0.10 × 0.08 × 0.06 mm
$V = 1261.9$ (11) Å^3	

Data collection

Nonius KappaCCD diffractometer	$R_{int} = 0.037$
φ scans	$\theta_{max} = 30.1°$
19212 measured reflections	$h = -11 \rightarrow 11$
7388 independent reflections	$k = -13 \rightarrow 13$
6228 reflections with $I > 2\sigma(I)$	$l = -25 \rightarrow 25$

Refinement

Refinement on F^2	$w = 1/[\sigma^2(F_o^2) + (0.0472P)^2 + 0.1974P]$ where $P = (F_o^2 + 2F_c^2)/3$
$R[F^2 > 2\sigma(F^2)] = 0.032$	$(\Delta/\sigma)_{max} = 0.001$
$wR(F^2) = 0.095$	$\Delta\rho_{max} = 0.41$ e Å^{-3}
$S = 1.06$	$\Delta\rho_{min} = -0.99$ e Å^{-3}
7388 reflections	
325 parameters	
H-atom parameters constrained	

Table 1
Selected geometric parameters (Å, °).

Ag—N1	2.353 (3)	Ag—P	2.3475 (15)
Ag—N2	2.3036 (17)	Ag—O1	2.573 (2)
N2—Ag—N1	71.67 (8)	N1—Ag—O1	91.20 (8)
N1—Ag—P	126.47 (7)	N2—Ag—O1	84.89 (7)
N2—Ag—P	151.77 (5)	P—Ag—O1	113.22 (6)

H atoms were placed in idealized locations (C—H = 0.95 Å) and refined as riding with $U_{iso}(H) = 1.2U_{eq}$(carrier).

Data collection: *COLLECT* (Nonius, 1998); cell refinement: *DENZO* (Otwinowski & Minor, 1997); data reduction: *DENZO* and *SCALEPACK* (Otwinowski & Minor, 1997); program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *PLATON* (Spek, 2003); software used to prepare material for publication: *SHELXL97*.

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