Poly[bis(μ_3-benzyloxyiminoacetato)nitrato-trisilver(I)]

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The title compound, $[Ag_3(C_9H_8NO_3)_2(NO_3)]_n$, exists as a three-dimensional framework and possesses a trinuclear unit consisting of three Ag atoms bridged by two benzyloxyiminoacetate monoanions *via* N and O atoms, one Ag atom having also a monodentate nitrate ligand. The three Ag atoms are independent and exist in different coordination environments.

Comment

The structure of the title compound, (I), was investigated as part of ongoing structural studies of organometallic complexes constructed from multidentate heterocyclic ligands and transition metal ions (Siaw-Lattey *et al.*, 2005; Kalra *et al.*, 2004; Sengupta *et al.*, 2004). Despite the known donor properties of nitrogen in a variety of ligand structures, little has been reported concerning the potential ligand properties of oxime ethers (Brunner *et al.*, 2003). Oxime ethers are stable and are relatively simple to synthesize and thus it was of interest to us to explore their ligand properties.

(I)
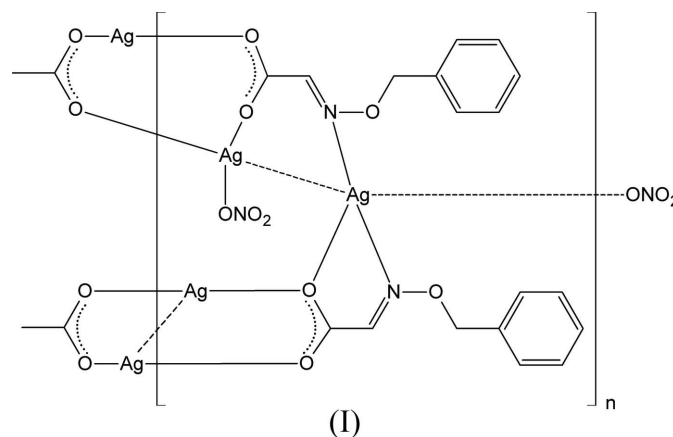
The title compound was obtained by the reaction of benzyloxyiminoacetic acid and silver nitrate. As shown in Fig. 1, there are three independent Ag^I atoms, two deprotonated benzyloxyiminoacetate monoanions (OBnIA) and one nitrate group in the structural asymmetric unit.

Fig. 2 presents the extended structure of (I). The Ag1 atom is coordinated by two N atoms from two different OBnIA ligands and atom O12 from one of these ligands. Atom O32 of the second OBnIA ligand is linked to another Ag atom (Ag2). Adding two more oxygen linkages, O33[ii] [symmetry code: (ii) $-x, -y, 1-z$] from a symmetry-related OBnIA ligand and O1[i] from the nitrate anion [symmetry code: (i) $x, \frac{1}{2}-y, \frac{1}{2}+z$], a distorted trigonal coordination environment about Ag2 is formed. The bond distances of Ag1 and Ag2 to relevant N or
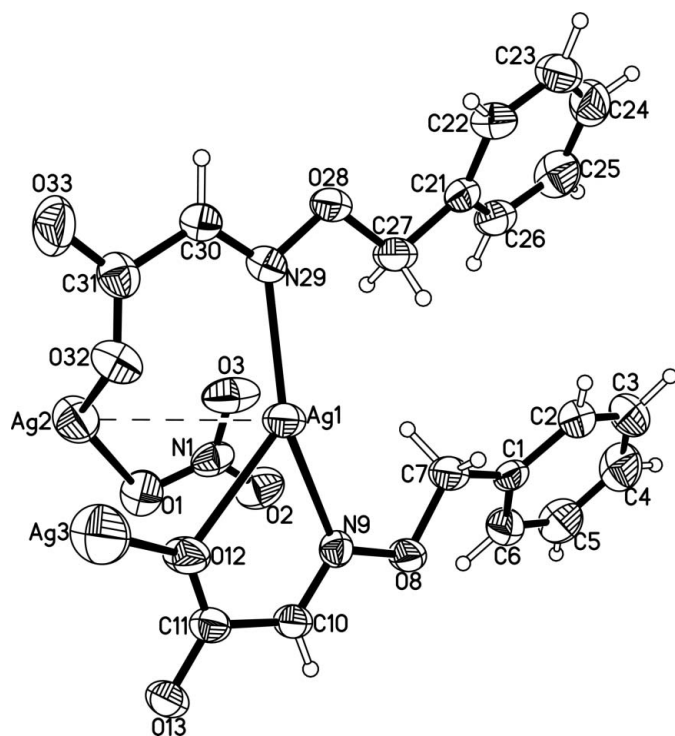
Figure 1
A view of the asymmetric unit of polymer (I), with displacement ellipsoids drawn at the 50% probability level. H atoms are presented as open circles with arbitrary radii. The dashed line indicates an Ag···Ag interaction.
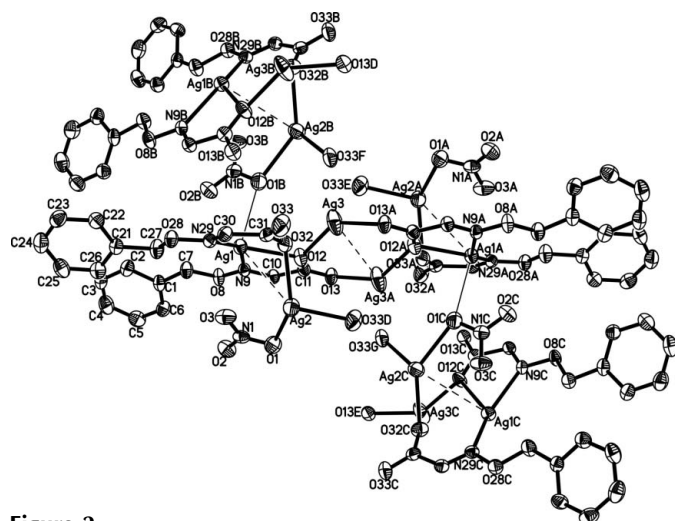

Figure 2
A view of the extended structure of polymer (I), with displacement ellipsoids drawn at the 40% probability level. H atoms have been omitted for clarity. The coordination of the Ag atoms is shown completed with symmetry-equivalent atoms. Dashed lines indicate Ag1···Ag2 and Ag3···Ag3C interactions. [Symmetry codes: (A) $-x, -y + 1, -z + 1$; (B) $x, -y + \frac{1}{2}, z - \frac{1}{2}$; (C) $-x, y + \frac{1}{2}, -z + \frac{3}{2}$; (D) $-x, -y, -z + 1$; (E) $x, -y + \frac{3}{2}, z + \frac{1}{2}$; (F) $-x, y + \frac{1}{2}, -z + \frac{1}{2}$; (G) $x, -y + \frac{1}{2}, z + \frac{1}{2}$.]

O atoms (Table 1) are very similar to the analogous bond lengths in related structures (Chen *et al.*, 2004; Feazell *et al.*, 2004; Zheng *et al.*, 2004). The distortion of the trigonal geometry about Ag1 is basically caused by the bidentate bonding which forces the chelating angle N9—Ag1—O12 to be narrowed. Unlike Ag1 and Ag2, Ag3 is essentially linearly

coordinated, defined by O12 and O13[iii] [symmetry code: (iii) $-x, 1 - y, 1 - z$]. Ag3 also interacts weakly with an inversion-related Ag3[iii], and a similar interaction exists between Ag1 and Ag2 (Table 1). Via the bridged anions, as well as the inversion symmetry operation, the infinitely interwoven network is obtained.

Experimental

Benzyloxyiminoacetic acid (100 mg, 5.5 mmol) was dissolved in tetrahydrofuran (5 ml), to obtain a clear solution. An aqueous solution of silver nitrate (95 mg, 5.5 mmol) was then added dropwise very slowly to form two layers. Placing the reactants in the dark without any disturbance for several days resulted in the formation of crystals (yield: 122 mg, 63%; m.p. 421–423 K).

Crystal data

$[Ag_3(C_9H_8NO_3)_2(NO_3)]$	$Z = 4$
$M_r = 741.95$	$D_x = 2.401$ Mg m^{-3}
Monoclinic, $P2_1/c$	Mo $K\alpha$ radiation
$a = 23.996$ (2) Å	$\mu = 2.89$ mm^{-1}
$b = 7.0691$ (7) Å	$T = 296$ (2) K
$c = 12.2522$ (12) Å	Thin plate, colourless
$\beta = 99.047$ (2)°	$0.31 \times 0.27 \times 0.04$ mm
$V = 2052.5$ (4) Å^3	

Data collection

Bruker APEX diffractometer	17961 measured reflections
φ and ω scans	4958 independent reflections
Absorption correction: multi-scan	3988 reflections with $I > 2\sigma(I)$
($SADABS$; Bruker, 1997)	$R_{int} = 0.034$
$T_{min} = 0.463$, $T_{max} = 0.903$	$\theta_{max} = 28.4°$

Refinement

Refinement on F^2	$w = 1/[\sigma^2(F_o^2) + (0.0947P)^2$
$R[F^2 > 2\sigma(F^2)] = 0.062$	$+ 8.7822P]$
$wR(F^2) = 0.172$	where $P = (F_o^2 + 2F_c^2)/3$
$S = 1.05$	$(\Delta/\sigma)_{max} < 0.001$
4958 reflections	$\Delta\rho_{max} = 2.58$ e Å^{-3}
298 parameters	$\Delta\rho_{min} = -1.78$ e Å^{-3}
H-atom parameters constrained	

Table 1
Selected geometric parameters (Å, °).

Ag1—N29	2.322 (5)	Ag2—O33[ii]	2.421 (6)
Ag1—N9	2.405 (5)	Ag2—O32	2.436 (5)
Ag1—O12	2.456 (5)	Ag3—O12	2.219 (5)
Ag1—O1	2.594 (6)	Ag3—O13[iii]	2.233 (5)
Ag1···Ag2	3.3509 (9)	Ag3···Ag3[iii]	3.2184 (19)
Ag2—O1[i]	2.403 (6)		
N29—Ag1—N9	150.97 (18)	O12—Ag1—O1	83.22 (18)
N29—Ag1—O12	136.32 (18)	O1[i]—Ag2—O33[ii]	90.9 (2)
N9—Ag1—O12	66.62 (16)	O1[i]—Ag2—O32	138.5 (2)
N29—Ag1—O1	95.96 (19)	O33[ii]—Ag2—O32	109.8 (2)
N9—Ag1—O1	105.85 (19)	O12—Ag3—O13[iii]	140.4 (2)

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

H atoms were positioned geometrically, with C—H = 0.95–0.98 Å, and refined as riding with $U_{iso}(H) = 1.2U_{eq}$(carrier).

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

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