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Poly[[diaquabis(μ_3-3-carboxylato-4-hydroxybenzenesulfonato)tri-μ_2-pyrazine-tetrasilver(I)] dihydrate]

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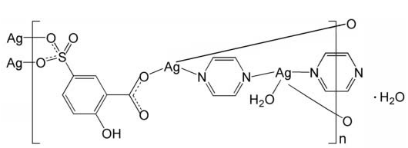
Key indicators: single-crystal X-ray study; *T* = 293 K; mean σ(C–C) = 0.006 Å; *R* factor = 0.033; *wR* factor = 0.073; data-to-parameter ratio = 13.2.

The title coordination polymer, $\{[Ag_4(C_7H_4O_6S)_2(C_4H_4N_2)_3(H_2O)_2]\cdot 2H_2O\}_n$, contains two independent Ag^I ions. One Ag^I ion is coordinated by one O atom from a 3-carboxylato-4-hydroxybenzenesulfonate (*L*) ligand, two N atoms from two pyrazine ligands and a water molecule. The other Ag^I ion is coordinated by two O atoms from two *L* ligands and one N atom from a pyrazine ligand. One of the pyrazine ligands lies on an inversion center. The *L* and pyrazine ligands link the Ag^I ions into polymeric layers parallel to the *ac* plane. The layers are connected by intermolecular O—H⋯O hydrogen bonds. An intramolecular O—H⋯O hydrogen bond is also present in the *L* ligand.

Related literature

For a related structure, see: Nie & Qu (2011).



Experimental

Crystal data

$[Ag_4(C_7H_4O_6S)_2(C_4H_4N_2)_3(H_2O)_2]\cdot 2H_2O$
M_r = 1176.14
Triclinic, $P\bar{1}$
a = 7.646 (5) Å
b = 10.340 (4) Å
c = 11.375 (4) Å
α = 78.751 (3)°
β = 73.436 (4)°
γ = 82.882 (5)°
V = 843.2 (7) Å^3
Z = 1
Mo *Kα* radiation
μ = 2.50 mm^{-1}
T = 293 K
0.21 × 0.15 × 0.12 mm

Data collection

Bruker APEX CCD diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996)
T_{min} = 0.622, T_{max} = 0.754
7253 measured reflections
3387 independent reflections
2190 reflections with $I > 2\sigma(I)$
R_{int} = 0.058

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.033
$wR(F^2)$ = 0.073
S = 0.88
3387 reflections
256 parameters
5 restraints
H atoms treated by a mixture of independent and constrained refinement
$\Delta\rho_{max}$ = 0.70 e Å^{-3}
$\Delta\rho_{min}$ = −1.09 e Å^{-3}

Table 1
Selected bond lengths (Å).

Ag1—N1	2.180 (3)	Ag2—N3	2.262 (3)
Ag1—O3^{i}	2.621 (3)	Ag2—O1^{ii}	2.516 (4)
Ag1—O6	2.153 (3)	Ag2—OW2	2.576 (4)
Ag2—N2	2.245 (3)		

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

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

D—H⋯*A*	*D*—H	H⋯*A*	*D*⋯*A*	*D*—H⋯*A*
OW1—H1A⋯O5	0.88 (2)	1.89 (2)	2.751 (4)	168 (6)
OW1—H1B⋯O5^{iii}	0.89 (2)	2.00 (2)	2.883 (5)	173 (6)
OW2—H2A⋯O2^{iii}	0.88 (2)	1.91 (3)	2.757 (5)	161 (6)
OW2—H2B⋯OW1^{iv}	0.89 (2)	2.03 (3)	2.794 (6)	143 (2)
O4—H4A⋯O6	0.82	1.84	2.556 (4)	146

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

Data collection: *SMART* (Bruker, 2007); cell refinement: *SAINT* (Bruker, 2007); data reduction: *SAINT*; program(s) used to solve structure: *SHELXS97* (Sheldrick, 2008); program(s) used to refine structure: *SHELXL97* (Sheldrick, 2008); molecular graphics: *XP* in *SHELXTL* (Sheldrick, 2008) and *DIAMOND* (Brandenburg, 1999); software used to prepare material for publication: *SHELXTL*.

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Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: HY2474).

References

Brandenburg, K. (1999). *DIAMOND*. Crystal Impact GbR, Bonn, Germany.
Bruker (2007). *SMART* and *SAINT*. Bruker AXS Inc., Madison, Wisconsin, USA.
Nie, X. & Qu, J.-N. (2011). *Acta Cryst.* E**67**, m1107–m1108.
Sheldrick, G. M. (1996). *SADABS*. University of Göttingen, Germany.
Sheldrick, G. M. (2008). *Acta Cryst.* A**64**, 112–122.

supplementary materials

Acta Cryst. (2011). E**67**, m1545 [doi:10.1107/S1600536811041626]

Poly[[diaquabis(μ_3-3-carboxylato-4-hydroxybenzenesulfonato)tri-μ_2-pyrazine-tetrasilver(I)] dihydrate]

Y.-Y. Liu, S.-T. Wang and Y.-S. Yan

Comment

As part of an investigation of the applications of transition metal complexes, there is a need to prepare further examples of these compounds. In this paper, the structure of the title compound is described.

As shown in Fig. 1, there exist two crystallographically independent Ag^I ions. Ag1 atom is three-coordinated (Table 1), having an approximate T-shaped geometry composed of one sulfonate O atom, one carboxylate O atom from two 3-carboxylate-4-hydroxybenzenesulfonate (*L*) ligands and one N atom from a pyrazine ligand. Ag2 atom is coordinated by one sulfonate O atom of an *L* ligand, two N atoms from two pyrazine ligands and one water molecule (Nie & Qu, 2011). The Ag^I ions are bridged by the *L* and pyrazine ligands, forming a two-dimensional polymeric layer (Fig. 2). The layers are connected by intermolecular O—H···O hydrogen bonds (Table 2). An intramolecular O—H···O hydrogen bond is present in the *L* ligand.

Experimental

To a mixture of 5-sulfosalicylic acid (0.109 g, 0.5 mmol) and NaOH (0.040 g, 1.0 mmol) in water (5 ml) was added $AgNO_3$ (0.170 g, 1.0 mmol), giving a clear solution. Then ethanol (15 ml) was added to the solution, and white precipitate appeared. The precipitate was collected and dissolved in water. To the solution was added pyrazine (0.081 g, 1 mmol) in methanol (5 ml) and white precipitate formed. The precipitate was dissolved by dropwise addition of acetonitrile. Colorless crystals were obtained from the filtrate after standing in a dark room for several days (yield: 0.150 g, 51%).

Refinement

H atoms bound to C atoms and hydroxyl O atom were positioned geometrically and refined using a riding model, with C—H = 0.93 and O—H = 0.82 Å and with U_{iso}(H) = 1.2(1.5 for hydroxyl)U_{eq}(C, O). Water H atoms were located from a difference Fourier map and refined with a retraint of O—H = 0.88 Å and with U_{iso}(H) = 1.5U_{eq}(O).

Figures

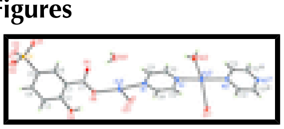

Fig. 1. The asymmetric unit of the title compound. Displacement ellipsoids are drawn at the 30% probability level. [Symmetry codes: (i) -*x*, -*y*, -1 - *z*; (ii) 1 - *x*, -*y*, 1 - *z*; (iii) 1 - *x*, 1 - *y*, 1 - *z*.]

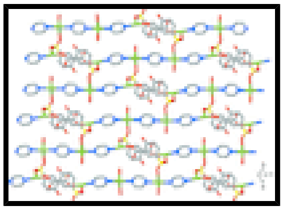

Fig. 2. View of the two-dimensional layer in the title compound.

Poly[[diaquabis(μ_3-3-carboxylato-4-hydroxybenzenesulfonato)tri-μ_2- pyrazine-tetrasilver(I)] dihydrate]

Crystal data

$[Ag_4(C_7H_4O_6S)_2(C_4H_4N_2)_3(H_2O)_2]\cdot 2H_2O$	$Z = 1$
$M_r = 1176.14$	$F(000) = 574$
Triclinic, $P\overline{1}$	$D_x = 2.316$ Mg m^{-3}
Hall symbol: -P 1	Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å
$a = 7.646$ (5) Å	Cell parameters from 2192 reflections
$b = 10.340$ (4) Å	$\theta = 3.2$–27.5°
$c = 11.375$ (4) Å	$\mu = 2.50$ mm^{-1}
$\alpha = 78.751$ (3)°	$T = 293$ K
$\beta = 73.436$ (4)°	Block, colorless
$\gamma = 82.882$ (5)°	0.21 × 0.15 × 0.12 mm
$V = 843.2$ (7) Å^3	

Data collection

Bruker APEX CCD diffractometer	3387 independent reflections
Radiation source: fine-focus sealed tube	2190 reflections with $I > 2\sigma(I)$
graphite	$R_{int} = 0.058$
φ and ω scans	$\theta_{max} = 27.5°$, $\theta_{min} = 3.2°$
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996)	$h = -9\rightarrow 9$
$T_{min} = 0.622$, $T_{max} = 0.754$	$k = -12\rightarrow 13$
7253 measured reflections	$l = -12\rightarrow 14$

Refinement

Refinement on F^2	Primary atom site location: structure-invariant direct methods
Least-squares matrix: full	Secondary atom site location: difference Fourier map
$R[F^2 > 2\sigma(F^2)] = 0.033$	Hydrogen site location: inferred from neighbouring sites
$wR(F^2) = 0.073$	H atoms treated by a mixture of independent and constrained refinement
$S = 0.88$	$w = 1/[\sigma^2(F_o^2) + (0.0213P)^2]$ where $P = (F_o^2 + 2F_c^2)/3$
3387 reflections	$(\Delta/\sigma)_{max} < 0.001$
256 parameters	$\Delta\rho_{max} = 0.70$ e Å^{-3}

5 restraints $\Delta\rho_{min} = -1.09$ e Å^{-3}

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

	x	*y*	*z*	U_{iso}*/U_{eq}
Ag1	0.29090 (6)	0.17665 (4)	−0.29686 (4)	0.03972 (13)
Ag2	0.39877 (5)	0.41619 (4)	0.22945 (4)	0.03870 (13)
C1	0.1323 (5)	0.1138 (4)	−0.6235 (4)	0.0216 (9)
C2	0.2275 (6)	−0.0059 (4)	−0.6494 (4)	0.0253 (10)
C3	0.1985 (6)	−0.0669 (4)	−0.7399 (4)	0.0288 (10)
H3	0.2663	−0.1448	−0.7589	0.035*
C4	0.0686 (6)	−0.0115 (4)	−0.8019 (4)	0.0263 (10)
H4	0.0493	−0.0518	−0.8630	0.032*
C5	−0.0332 (5)	0.1047 (4)	−0.7726 (4)	0.0219 (9)
C6	−0.0001 (5)	0.1680 (4)	−0.6871 (4)	0.0214 (9)
H6	−0.0656	0.2474	−0.6709	0.026*
C7	0.1616 (6)	0.1842 (5)	−0.5288 (4)	0.0266 (10)
C8	0.3541 (6)	0.1792 (5)	−0.0457 (4)	0.0311 (11)
H8	0.3830	0.0903	−0.0517	0.037*
C9	0.3716 (6)	0.2241 (4)	0.0570 (4)	0.0299 (11)
H9	0.4142	0.1646	0.1171	0.036*
C10	0.2678 (6)	0.4298 (5)	−0.0175 (4)	0.0317 (11)
H10	0.2345	0.5181	−0.0100	0.038*
C11	0.2525 (6)	0.3863 (5)	−0.1201 (5)	0.0322 (11)
H11	0.2101	0.4459	−0.1802	0.039*
C12	0.5470 (6)	0.3813 (5)	0.4676 (4)	0.0288 (10)
H12	0.5817	0.2972	0.4474	0.035*
C13	0.4107 (6)	0.5879 (5)	0.4325 (4)	0.0294 (11)
H13	0.3477	0.6518	0.3871	0.035*
N1	0.2969 (5)	0.2599 (4)	−0.1363 (3)	0.0280 (9)
N2	0.3295 (5)	0.3496 (4)	0.0728 (4)	0.0281 (9)
N3	0.4568 (5)	0.4690 (4)	0.3978 (3)	0.0288 (9)
O1	−0.3073 (6)	0.2729 (4)	−0.7854 (4)	0.0730 (16)
O2	−0.1208 (6)	0.2172 (5)	−0.9749 (4)	0.0738 (14)
O3	−0.3110 (6)	0.0589 (4)	−0.8372 (5)	0.0805 (17)
O4	0.3512 (4)	−0.0688 (3)	−0.5882 (3)	0.0359 (8)
H4A	0.3588	−0.0253	−0.5370	0.054*
O5	0.0833 (5)	0.2950 (3)	−0.5153 (3)	0.0421 (9)
O6	0.2710 (4)	0.1232 (3)	−0.4660 (3)	0.0353 (8)
S1	−0.20943 (15)	0.16850 (10)	−0.84628 (11)	0.0261 (3)
OW1	0.0538 (5)	0.4656 (4)	−0.3518 (4)	0.0460 (10)
H1A	0.072 (8)	0.403 (5)	−0.397 (5)	0.069*
H1B	0.021 (8)	0.542 (3)	−0.393 (5)	0.069*
OW2	0.2451 (5)	0.6472 (4)	0.1729 (4)	0.0449 (9)
H2A	0.230 (8)	0.686 (5)	0.100 (3)	0.067*
H2B	0.128 (3)	0.648 (3)	0.218 (4)	0.067*

Atomic displacement parameters ($Å^2$)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Ag1	0.0586 (3)	0.0419 (3)	0.0292 (2)	−0.00358 (19)	−0.0243 (2)	−0.01205 (18)
Ag2	0.0527 (2)	0.0423 (3)	0.0330 (3)	0.00471 (18)	−0.0272 (2)	−0.01620 (19)
C1	0.026 (2)	0.019 (2)	0.022 (2)	0.0003 (17)	−0.009 (2)	−0.0059 (18)
C2	0.028 (2)	0.022 (2)	0.025 (3)	0.0019 (18)	−0.011 (2)	0.0001 (19)
C3	0.034 (2)	0.023 (2)	0.030 (3)	0.0092 (19)	−0.012 (2)	−0.010 (2)
C4	0.033 (2)	0.025 (3)	0.026 (3)	−0.0005 (19)	−0.012 (2)	−0.011 (2)
C5	0.026 (2)	0.022 (2)	0.020 (2)	0.0034 (18)	−0.010 (2)	−0.0069 (18)
C6	0.026 (2)	0.019 (2)	0.020 (2)	0.0019 (17)	−0.009 (2)	−0.0044 (18)
C7	0.033 (2)	0.029 (3)	0.021 (3)	−0.004 (2)	−0.013 (2)	−0.004 (2)
C8	0.040 (3)	0.025 (3)	0.032 (3)	0.003 (2)	−0.016 (2)	−0.007 (2)
C9	0.035 (2)	0.029 (3)	0.030 (3)	0.001 (2)	−0.017 (2)	−0.004 (2)
C10	0.041 (3)	0.028 (3)	0.032 (3)	0.006 (2)	−0.020 (2)	−0.010 (2)
C11	0.040 (3)	0.031 (3)	0.031 (3)	−0.001 (2)	−0.022 (2)	−0.002 (2)
C12	0.039 (3)	0.022 (3)	0.026 (3)	0.003 (2)	−0.011 (2)	−0.006 (2)
C13	0.039 (3)	0.026 (3)	0.026 (3)	0.003 (2)	−0.015 (2)	−0.005 (2)
N1	0.031 (2)	0.032 (2)	0.024 (2)	−0.0006 (17)	−0.0104 (18)	−0.0063 (18)
N2	0.030 (2)	0.033 (2)	0.026 (2)	−0.0027 (17)	−0.0116 (19)	−0.0080 (18)
N3	0.034 (2)	0.033 (2)	0.022 (2)	−0.0005 (17)	−0.0131 (19)	−0.0043 (18)
O1	0.076 (3)	0.092 (3)	0.077 (3)	0.056 (3)	−0.058 (3)	−0.059 (3)
O2	0.066 (3)	0.111 (4)	0.036 (3)	0.010 (3)	−0.025 (2)	0.012 (2)
O3	0.082 (3)	0.041 (3)	0.143 (5)	−0.019 (2)	−0.087 (4)	0.020 (3)
O4	0.0398 (18)	0.035 (2)	0.041 (2)	0.0159 (15)	−0.0263 (18)	−0.0129 (16)
O5	0.066 (2)	0.029 (2)	0.047 (2)	0.0100 (17)	−0.037 (2)	−0.0191 (17)
O6	0.0442 (19)	0.039 (2)	0.033 (2)	0.0043 (16)	−0.0252 (18)	−0.0135 (16)
S1	0.0345 (6)	0.0234 (6)	0.0274 (7)	0.0032 (5)	−0.0195 (5)	−0.0074 (5)
OW1	0.068 (3)	0.041 (2)	0.036 (2)	0.001 (2)	−0.026 (2)	−0.0095 (18)
OW2	0.059 (2)	0.039 (2)	0.039 (2)	0.0057 (18)	−0.020 (2)	−0.0083 (18)

Geometric parameters (Å, °)

Ag1—N1	2.180 (3)	C8—H8	0.9300
Ag1—O3^{i}	2.621 (3)	C9—N2	1.332 (5)
Ag1—O6	2.153 (3)	C9—H9	0.9300
Ag2—N2	2.245 (3)	C10—N2	1.346 (6)
Ag2—N3	2.262 (3)	C10—C11	1.368 (6)
Ag2—O1^{ii}	2.516 (4)	C10—H10	0.9300
Ag2—OW2	2.576 (4)	C11—N1	1.343 (6)
C1—C2	1.395 (6)	C11—H11	0.9300
C1—C6	1.408 (5)	C12—N3	1.343 (5)
C1—C7	1.491 (6)	C12—C13^{iii}	1.369 (6)
C2—O4	1.360 (5)	C12—H12	0.9300
C2—C3	1.388 (6)	C13—N3	1.340 (5)
C3—C4	1.382 (6)	C13—C12^{iii}	1.369 (6)
C3—H3	0.9300	C13—H13	0.9300

C4—C5	1.392 (6)	O1—S1	1.415 (3)
C4—H4	0.9300	O2—S1	1.444 (5)
C5—C6	1.366 (5)	O3—S1	1.423 (4)
C5—S1	1.778 (4)	O4—H4A	0.8200
C6—H6	0.9300	OW1—H1A	0.88 (2)
C7—O5	1.241 (5)	OW1—H1B	0.89 (2)
C7—O6	1.281 (5)	OW2—H2A	0.88 (2)
C8—N1	1.335 (6)	OW2—H2B	0.89 (2)
C8—C9	1.383 (6)		

O6—Ag1—N1	171.57 (13)	N2—C10—C11	122.4 (4)
N2—Ag2—N3	175.29 (14)	N2—C10—H10	118.8
N2—Ag2—O1^{ii}	95.52 (12)	C11—C10—H10	118.8
N3—Ag2—O1^{ii}	84.24 (12)	N1—C11—C10	121.9 (4)
N2—Ag2—OW2	89.83 (12)	N1—C11—H11	119.1
N3—Ag2—OW2	92.92 (12)	C10—C11—H11	119.1
O1^{ii}—Ag2—OW2	147.05 (16)	N3—C12—C13^{iii}	121.9 (4)
C2—C1—C6	118.4 (3)	N3—C12—H12	119.0
C2—C1—C7	122.6 (4)	C13^{iii}—C12—H12	119.0
C6—C1—C7	119.0 (4)	N3—C13—C12^{iii}	122.3 (4)
O4—C2—C1	122.5 (3)	N3—C13—H13	118.8
O4—C2—C3	116.8 (4)	C12^{iii}—C13—H13	118.8
C1—C2—C3	120.8 (4)	C8—N1—C11	116.0 (4)
C4—C3—C2	119.8 (4)	C8—N1—Ag1	117.5 (3)
C4—C3—H3	120.1	C11—N1—Ag1	126.5 (3)
C2—C3—H3	120.1	C9—N2—C10	115.6 (4)
C3—C4—C5	119.8 (3)	C9—N2—Ag2	118.8 (3)
C3—C4—H4	120.1	C10—N2—Ag2	125.1 (3)
C5—C4—H4	120.1	C13—N3—C12	115.8 (4)
C6—C5—C4	120.6 (3)	C13—N3—Ag2	123.5 (3)
C6—C5—S1	120.4 (3)	C12—N3—Ag2	120.7 (3)
C4—C5—S1	119.1 (3)	S1—O1—Ag2^{iv}	139.7 (2)
C5—C6—C1	120.5 (4)	C2—O4—H4A	109.5
C5—C6—H6	119.7	C7—O6—Ag1	123.7 (3)
C1—C6—H6	119.7	O1—S1—O3	115.8 (3)
O5—C7—O6	124.1 (3)	O1—S1—O2	110.9 (3)
O5—C7—C1	120.2 (4)	O3—S1—O2	110.4 (3)
O6—C7—C1	115.6 (4)	O1—S1—C5	106.73 (19)
N1—C8—C9	121.9 (4)	O3—S1—C5	105.6 (2)
N1—C8—H8	119.1	O2—S1—C5	106.9 (2)
C9—C8—H8	119.1	H1A—OW1—H1B	110 (6)
N2—C9—C8	122.2 (4)	Ag2—OW2—H2A	128 (4)
N2—C9—H9	118.9	Ag2—OW2—H2B	107.5 (17)
C8—C9—H9	118.9	H2A—OW2—H2B	100 (5)

C6—C1—C2—O4	−176.7 (4)	C11—C10—N2—C9	−1.2 (7)
C7—C1—C2—O4	1.4 (7)	C11—C10—N2—Ag2	170.5 (4)
C6—C1—C2—C3	3.1 (7)	O1^{ii}—Ag2—N2—C9	35.7 (4)
C7—C1—C2—C3	−178.8 (4)	OW2—Ag2—N2—C9	−176.9 (4)

O4—C2—C3—C4	177.1 (4)	O1^{ii}—Ag2—N2—C10	−135.8 (4)
C1—C2—C3—C4	−2.7 (7)	OW2—Ag2—N2—C10	11.6 (4)
C2—C3—C4—C5	−0.4 (7)	C12^{iii}—C13—N3—C12	0.2 (8)
C3—C4—C5—C6	3.1 (7)	C12^{iii}—C13—N3—Ag2	−177.7 (3)
C3—C4—C5—S1	−176.0 (4)	C13^{iii}—C12—N3—C13	−0.2 (8)
C4—C5—C6—C1	−2.6 (7)	C13^{iii}—C12—N3—Ag2	177.8 (3)
S1—C5—C6—C1	176.4 (3)	O1^{ii}—Ag2—N3—C13	147.0 (4)
C2—C1—C6—C5	−0.4 (7)	OW2—Ag2—N3—C13	−0.1 (4)
C7—C1—C6—C5	−178.6 (4)	O1^{ii}—Ag2—N3—C12	−30.8 (4)
C2—C1—C7—O5	174.9 (5)	OW2—Ag2—N3—C12	−177.9 (4)
C6—C1—C7—O5	−7.0 (7)	O5—C7—O6—Ag1	15.5 (7)
C2—C1—C7—O6	−4.6 (7)	C1—C7—O6—Ag1	−165.0 (3)
C6—C1—C7—O6	173.5 (4)	Ag2^{iv}—O1—S1—O3	−50.2 (6)
N1—C8—C9—N2	1.2 (7)	Ag2^{iv}—O1—S1—O2	76.5 (5)
N2—C10—C11—N1	0.5 (7)	Ag2^{iv}—O1—S1—C5	−167.4 (4)
C9—C8—N1—C11	−1.8 (7)	C6—C5—S1—O1	−8.2 (5)
C9—C8—N1—Ag1	176.7 (3)	C4—C5—S1—O1	170.9 (4)
C10—C11—N1—C8	1.0 (7)	C6—C5—S1—O3	−132.0 (4)
C10—C11—N1—Ag1	−177.4 (4)	C4—C5—S1—O3	47.1 (5)
C8—C9—N2—C10	0.3 (7)	C6—C5—S1—O2	110.5 (4)
C8—C9—N2—Ag2	−171.9 (3)	C4—C5—S1—O2	−70.4 (4)

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

Hydrogen-bond geometry (Å, °)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
OW1—H1A···O5	0.88 (2)	1.89 (2)	2.751 (4)	168 (6)
OW1—H1B···O5^{v}	0.89 (2)	2.00 (2)	2.883 (5)	173 (6)
OW2—H2A···O2^{v}	0.88 (2)	1.91 (3)	2.757 (5)	161 (6)
OW2—H2B···OW1^{vi}	0.89 (2)	2.03 (3)	2.794 (6)	143 (2)
O4—H4A···O6	0.82	1.84	2.556 (4)	146

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

Fig. 1

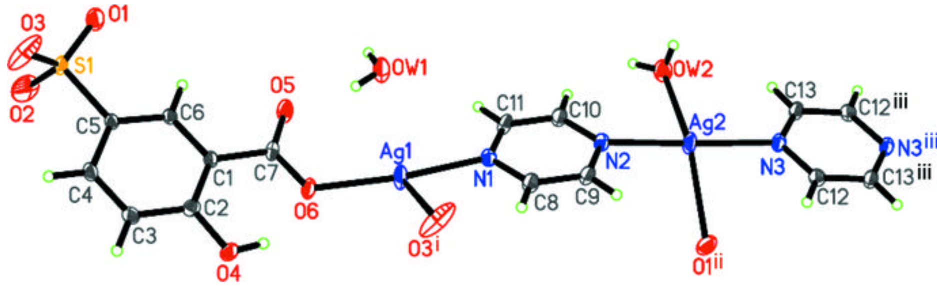
O3
O1
S1
O2
C5
C6
O5
OW1
C4
C1
C7
C3
C2
O6
O4
Ag1
O3i
C11
C10
N1
C8
C9
N2
OW2
Ag2
O1ii
C13
C12iii
N3
N3iii
C13iii
C12

Fig. 2