

Poly[*diaqua*(μ_2 -5-carboxypyridine-3-carboxylato- κ^2 N:O³)hemi(μ_2 -oxalato- κ^4 O¹,O²:O^{1'},O^{2'})(μ_4 -pyridine-3,5-dicarboxylato- κ^4 N:O³:O^{3'}:O⁵)-silver(I)terbium(III)]

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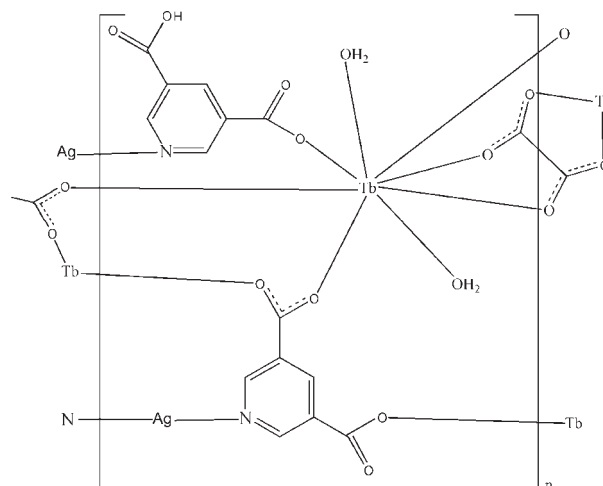
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Key indicators: single-crystal X-ray study; $T = 293$ K; mean $\sigma(\text{C}-\text{C}) = 0.006$ Å; R factor = 0.023; wR factor = 0.062; data-to-parameter ratio = 10.7.

In the title coordination polymer, $[\text{AgTb}(\text{C}_7\text{H}_3\text{NO}_4)(\text{C}_7\text{H}_4\text{NO}_4)(\text{C}_2\text{O}_4)_{0.5}(\text{H}_2\text{O})_2]_n$, the Tb^{III} ion is eight-coordinated by three O atoms from three different pydc ($\text{H}_2\text{pydc} = \text{pyridine-3,5-dicarboxylic acid}$) ligands, one O atom from one Hpydc ligand, two O atoms from one oxalate ligand and two water molecules in a distorted square-antiprismatic geometry. The Ag^{I} ion is coordinated in an almost linear fashion by two pyridyl N atoms from one pydc and one Hpydc ligand and has weak interactions with two carboxylate O atoms. The carboxylate groups of pydc and Hpydc ligands link Tb centers, forming a one-dimensional chain. The oxalate adopts a tetradentate bis-chelating coordination mode, connecting the chains into a two-dimensional layer. These layers are further assembled *via* $[\text{Ag}(\text{pydc})(\text{Hpydc})]$ pillars and $\text{O}-\text{H}\cdots\text{O}$ and $\text{C}-\text{H}\cdots\text{O}$ hydrogen bonds into a three-dimensional coordination framework.

Related literature

For general background to transition metal-lanthanide complexes, see: Barbour (2006); Kepert (2006); Kong *et al.* (2008); Rao *et al.* (2004); Wu *et al.* (2008); Zhang *et al.* (2005).



Experimental

Crystal data

$[\text{AgTb}(\text{C}_7\text{H}_3\text{NO}_4)(\text{C}_7\text{H}_4\text{NO}_4)(\text{C}_2\text{O}_4)_{0.5}(\text{H}_2\text{O})_2]$
 $M_r = 678.05$
Triclinic, $P\bar{1}$
 $a = 7.592$ (3) Å
 $b = 8.249$ (3) Å
 $c = 14.241$ (6) Å
 $\alpha = 98.956$ (4)°

$\beta = 99.556$ (4)°
 $\gamma = 95.839$ (5)°
 $V = 861.3$ (6) Å³
 $Z = 2$
Mo $K\alpha$ radiation
 $\mu = 5.29$ mm⁻¹
 $T = 293$ K
 $0.30 \times 0.24 \times 0.19$ mm

Data collection

Bruker APEXII CCD diffractometer
Absorption correction: multi-scan (SADABS; Sheldrick, 1996)
 $T_{\text{min}} = 0.251$, $T_{\text{max}} = 0.378$

4416 measured reflections
3032 independent reflections
2862 reflections with $I > 2\sigma(I)$
 $R_{\text{int}} = 0.018$

Refinement

$R[F^2 > 2\sigma(F^2)] = 0.023$
 $wR(F^2) = 0.062$
 $S = 1.09$
3032 reflections
284 parameters

H atoms treated by a mixture of independent and constrained refinement
 $\Delta\rho_{\text{max}} = 0.85$ e Å⁻³
 $\Delta\rho_{\text{min}} = -0.79$ e Å⁻³

Table 1

Selected bond lengths (Å).

Tb1—O2	2.346 (3)	Tb1—O1W	2.421 (3)
Tb1—O5	2.364 (3)	Tb1—O2W	2.468 (3)
Tb1—O6 ⁱ	2.365 (3)	Ag1—N1	2.172 (4)
Tb1—O8 ⁱⁱ	2.317 (3)	Ag1—N2 ^{iv}	2.162 (4)
Tb1—O9	2.444 (3)	Ag1—O7 ^v	2.772 (3)
Tb1—O10 ⁱⁱⁱ	2.401 (3)	Ag1—O7 ^{vi}	2.859 (3)

Symmetry codes: (i) $-x + 2, -y + 1, -z$; (ii) $x, y - 1, z$; (iii) $-x + 1, -y, -z$; (iv) $-x + 1, -y + 1, -z + 1$; (v) $x - 1, y - 1, z$; (vi) $-x + 1, -y + 2, -z + 1$.

Table 2

Hydrogen-bond geometry (Å, °).

$D-H\cdots A$	$D-H$	$H\cdots A$	$D\cdots A$	$D-H\cdots A$
O1W—H1W \cdots O5 ⁱ	0.84	2.08	2.820 (5)	147
O1W—H1W \cdots O2W ⁱ	0.84	2.55	3.221 (5)	138
O1W—H2W \cdots O9 ^{vii}	0.84	2.05	2.855 (4)	159
O2W—H3W \cdots O10 ^{viii}	0.84	2.13	2.839 (4)	142
O2W—H4W \cdots O1 ^{viii}	0.84	2.04	2.873 (5)	173
O3—H3A \cdots O1 ^{ix}	0.90 (6)	1.71 (7)	2.554 (5)	154 (6)
C10—H10 \cdots O2W ^{ix}	0.93	2.40	3.314 (6)	169

Symmetry codes: (i) $-x+2, -y+1, -z$; (vii) $-x+1, -y+1, -z$; (viii) $x+1, y, z$; (ix) $x, y+1, z$.

Data collection: *APEX2* (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: *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: HY2227).

References

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Acta Cryst. (2009). E65, m1214-m1215 [doi:10.1107/S1600536809036393]

Poly[*diaqua*(μ_2 -5-carboxypyridine-3-carboxylato- $\kappa^2 N:O^3$)*hemi*(μ_2 -oxalato- $\kappa^4 O^1, O^2:O^1', O^2'$)(μ_4 -pyridine-3,5-dicarboxylato- $\kappa^4 N:O^3:O^3':O^5$)*silver*(I)*terbium*(III)]

H.-F. Guo, L. Qin and X.-Y. Hao

Comment

The design and construction of transition–lanthanide metal complexes has gained great recognition over the last decade because of their intriguing network topologies and potential applications, and due to their magnetic properties, their capacity for gas storage, as luminescent materials, and so on (Barbour, 2006; Kepert, 2006; Kong *et al.*, 2008; Rao *et al.*, 2004; Zhang *et al.*, 2005). Pyridine-3,5-dicarboxylic acid (H₂pydc) is a multifunctional bridging ligand possessing of O and N donors, which can thus be chosen to construct lanthanide–transition heterometallic complex *via* the carboxyl O atoms binding to lanthanides and N atoms bonding to transition metal ions such as Ag^I or Cu^I (Wu *et al.*, 2008). On the basis of above considerations, we utilize H₂pydc, mixed 4d–4f metal ions and nitric acid as our building blocks. A new three-dimensional 4d–4f coordination framework resulted from the hydrothermal treatment of Tb₂O₃, AgNO₃, oxalic acid, H₂pydc and nitric acid in water.

As depicted in Fig. 1, the asymmetric unit of the title compound contains one Tb^{III} ion, one Ag^I ion, half an oxalate ligand, one pydc ligand, one Hpydc ligand and two water molecules. The Tb^{III} ion is eight-coordinated in a distorted square-antiprismatic coordination geometry by three O atoms from three different pydc ligands, one O atom from one Hpydc ligand, two O atoms from one oxalate ligand and two water molecules. The Ag^I ion is located in an almost linear configuration, defined by two N atoms from one pydc and one Hpydc ligands. The carboxylate groups of the pydc and Hpydc ligands link Tb^{III} center to form a one-dimensional chain with a shortest Tb···Tb distance of 5.261 (3) Å (Fig. 2a). The oxalate adopts tetradentate bischelating coordination mode to connect the neighboring chains into a two-dimensional layer (Fig. 2b). These layers are further assembled *via* [Ag(pydc)(Hpydc)] pillars into a three-dimensional coordination framework (Fig. 3). O—H···O and C—H···O hydrogen bonds (Table 1) involving the carboxyl group and coordinated water molecules enhance the stability of the three-dimensional network.

Experimental

A mixture of Tb₂O₃ (0.183 g, 0.5 mmol), AgNO₃ (0.169 g, 1 mmol), H₂pydc (0.167 g, 1 mmol), oxalic acid (0.09 g, 1 mmol), HNO₃ (0.12 ml) and H₂O (10 ml) was placed in a 23 ml Teflon-lined reactor, which was heated to 443 K for 3 d and then cooled to room temperature at a rate of 10 K h⁻¹. The colorless block crystals obtained were washed with water and dried in air (yield 46% based on Tb).

Refinement

C-bound H atoms were placed at calculated positions and treated as riding on the parent C atoms, with C—H = 0.93 Å, and with $U_{\text{iso}}(\text{H}) = 1.2U_{\text{eq}}(\text{C})$. Water H atoms were tentatively located in difference Fourier maps and refined with distance

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restraints of O–H = 0.84 (1) and H···H = 1.39 (1) Å, and with $U_{\text{iso}}(\text{H}) = 1.5U_{\text{eq}}(\text{O})$. Carboxyl H (H3A) atom was refined isotropically.

Figures

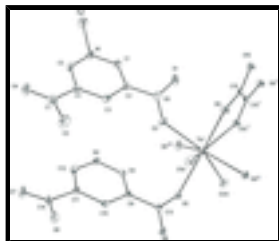


Fig. 1. The asymmetric unit of the title compound. Non-H atoms are shown as 50% probability displacement ellipsoids. H atoms have been omitted for clarity. [Symmetry codes: (i) 1-x, -y, -z; (ii) 2-x, 1-y, -z; (iii) x, -1+y, z.]

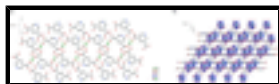


Fig. 2. (a) A view of the one-dimensional chain in the title compound. (b) A polyhedral view of the two-dimensional layer. H atoms have been omitted for clarity.

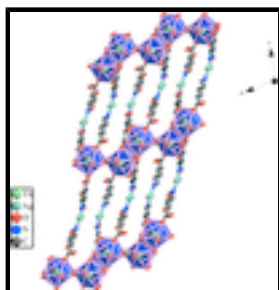


Fig. 3. A polyhedral view of the three-dimensional framework. H atoms have been omitted for clarity.

Poly[*diaqua*(μ_2 -5-carboxypyridine-3-carboxylato- $\kappa^2\text{N}:\text{O}^3$)*hemi*(μ_2 -oxalato- $\kappa^4\text{O}^1,\text{O}^2:\text{O}^1,\text{O}^2$)(μ_4 -pyridine-3,5-dicarboxylato- $\kappa^4\text{N}:\text{O}^3:\text{O}^3':\text{O}^5$)]*silver(I)terbium(III)*

Crystal data

[AgTb(C ₇ H ₃ NO ₄)(C ₇ H ₄ NO ₄)(C ₂ O ₄) _{0.5} (H ₂ O) ₂]	$Z = 2$
$M_r = 678.05$	$F_{000} = 646$
Triclinic, $P\bar{1}$	$D_x = 2.615 \text{ Mg m}^{-3}$
Hall symbol: -P 1	Mo $K\alpha$ radiation, $\lambda = 0.71073 \text{ \AA}$
$a = 7.592 (3) \text{ \AA}$	Cell parameters from 3600 reflections
$b = 8.249 (3) \text{ \AA}$	$\theta = 1.4\text{--}28^\circ$
$c = 14.241 (6) \text{ \AA}$	$\mu = 5.29 \text{ mm}^{-1}$
$\alpha = 98.956 (4)^\circ$	$T = 293 \text{ K}$
$\beta = 99.556 (4)^\circ$	Block, colorless
$\gamma = 95.839 (5)^\circ$	$0.30 \times 0.24 \times 0.19 \text{ mm}$
$V = 861.3 (6) \text{ \AA}^3$	

Data collection

Bruker APEXII CCD diffractometer	3032 independent reflections
Radiation source: fine-focus sealed tube	2862 reflections with $I > 2\sigma(I)$

Monochromator: graphite
 $T = 293$ K
 φ and ω scans
 Absorption correction: multi-scan
 (SADABS; Sheldrick, 1996)
 $T_{\min} = 0.251$, $T_{\max} = 0.378$
 4416 measured reflections

$R_{\text{int}} = 0.018$
 $\theta_{\max} = 25.2^\circ$
 $\theta_{\min} = 2.5^\circ$
 $h = -9 \rightarrow 6$
 $k = -9 \rightarrow 9$
 $l = -16 \rightarrow 17$

Refinement

Refinement on F^2
 Least-squares matrix: full
 $R[F^2 > 2\sigma(F^2)] = 0.023$
 $wR(F^2) = 0.062$
 $S = 1.09$
 3032 reflections
 284 parameters
 Primary atom site location: structure-invariant direct methods

Secondary atom site location: difference Fourier map
 Hydrogen site location: inferred from neighbouring sites
 H atoms treated by a mixture of independent and constrained refinement
 $w = 1/[\sigma^2(F_o^2) + (0.0323P)^2]$
 where $P = (F_o^2 + 2F_c^2)/3$
 $(\Delta/\sigma)_{\max} = 0.049$
 $\Delta\rho_{\max} = 0.85 \text{ e } \text{\AA}^{-3}$
 $\Delta\rho_{\min} = -0.79 \text{ e } \text{\AA}^{-3}$
 Extinction correction: none

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

	<i>x</i>	<i>y</i>	<i>z</i>	$U_{\text{iso}}^*/U_{\text{eq}}$
Tb1	0.80756 (3)	0.29706 (2)	0.080761 (13)	0.01369 (8)
Ag1	0.17209 (6)	0.40250 (5)	0.53284 (3)	0.03343 (12)
O1	0.4372 (5)	0.2187 (4)	0.2009 (2)	0.0305 (8)
O1W	0.7121 (5)	0.5291 (4)	0.0096 (2)	0.0278 (8)
H1W	0.7742	0.5573	-0.0302	0.042*
H2W	0.6316	0.5904	0.0165	0.042*
O2	0.6205 (4)	0.4300 (4)	0.1747 (2)	0.0255 (7)
O2W	1.0914 (4)	0.1769 (4)	0.0759 (2)	0.0253 (7)
H3W	1.1070	0.1393	0.0200	0.038*
H4W	1.1876	0.1905	0.1166	0.038*
O3	0.4778 (6)	0.9748 (5)	0.2896 (3)	0.0449 (10)
O4	0.3416 (5)	1.0334 (4)	0.4169 (2)	0.0346 (8)
O5	1.0531 (4)	0.5114 (3)	0.1239 (2)	0.0203 (7)
O9	0.5031 (4)	0.2064 (3)	-0.0119 (2)	0.0209 (7)
N1	0.3034 (5)	0.5246 (4)	0.4335 (3)	0.0234 (8)
N2	0.8987 (5)	0.7556 (4)	0.3678 (2)	0.0192 (8)
C1	0.3576 (6)	0.4244 (5)	0.3627 (3)	0.0231 (10)
H1	0.3377	0.3106	0.3601	0.028*
C2	0.4420 (6)	0.4845 (5)	0.2934 (3)	0.0188 (9)
C3	0.4629 (6)	0.6531 (5)	0.2942 (3)	0.0204 (9)
H3	0.5162	0.6965	0.2476	0.025*
C4	0.4032 (6)	0.7568 (5)	0.3654 (3)	0.0200 (9)

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C5	0.3273 (6)	0.6886 (5)	0.4347 (3)	0.0208 (10)
H5	0.2917	0.7587	0.4838	0.025*
C6	0.5041 (6)	0.3688 (5)	0.2177 (3)	0.0216 (10)
C7	0.4047 (6)	0.9388 (6)	0.3621 (3)	0.0246 (10)
C8	0.9565 (6)	0.6777 (5)	0.2901 (3)	0.0165 (9)
H8	0.9658	0.5652	0.2849	0.020*
C9	1.0023 (6)	0.7592 (5)	0.2182 (3)	0.0169 (9)
C10	0.9849 (6)	0.9277 (5)	0.2249 (3)	0.0168 (9)
H10	1.0142	0.9848	0.1770	0.020*
C11	0.9234 (6)	1.0091 (5)	0.3038 (3)	0.0166 (9)
C12	0.8845 (6)	0.9188 (5)	0.3740 (3)	0.0201 (9)
H12	0.8469	0.9732	0.4279	0.024*
C13	1.0667 (6)	0.6684 (5)	0.1333 (3)	0.0151 (9)
C15	0.4376 (6)	0.0595 (5)	-0.0196 (3)	0.0168 (9)
O6	1.1310 (4)	0.7500 (3)	0.0780 (2)	0.0211 (7)
C14	0.9003 (6)	1.1915 (5)	0.3113 (3)	0.0202 (10)
O7	0.8768 (5)	1.2673 (4)	0.3899 (2)	0.0328 (8)
O10	0.2771 (4)	-0.0028 (3)	-0.0543 (2)	0.0219 (7)
O8	0.9101 (5)	1.2520 (4)	0.2359 (2)	0.0262 (8)
H3A	0.461 (9)	1.076 (8)	0.276 (4)	0.056 (18)*

Atomic displacement parameters (\AA^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Tb1	0.01701 (13)	0.01146 (12)	0.01419 (12)	0.00272 (8)	0.00639 (8)	0.00282 (8)
Ag1	0.0419 (3)	0.0381 (2)	0.0290 (2)	0.00612 (19)	0.01825 (17)	0.01948 (17)
O1	0.049 (2)	0.0185 (16)	0.0251 (17)	0.0037 (16)	0.0116 (15)	0.0024 (13)
O1W	0.033 (2)	0.0227 (16)	0.0388 (19)	0.0149 (15)	0.0194 (16)	0.0180 (14)
O2	0.0281 (19)	0.0287 (17)	0.0241 (16)	0.0080 (15)	0.0150 (14)	0.0039 (13)
O2W	0.0241 (19)	0.0321 (17)	0.0215 (16)	0.0081 (15)	0.0070 (13)	0.0039 (13)
O3	0.067 (3)	0.0275 (19)	0.055 (2)	0.018 (2)	0.035 (2)	0.0209 (18)
O4	0.045 (2)	0.0241 (17)	0.0375 (19)	0.0126 (17)	0.0136 (17)	0.0024 (15)
O5	0.0284 (18)	0.0129 (14)	0.0208 (15)	0.0011 (13)	0.0096 (13)	0.0029 (11)
O9	0.0192 (17)	0.0147 (14)	0.0288 (16)	0.0013 (13)	0.0027 (13)	0.0063 (12)
N1	0.031 (2)	0.025 (2)	0.0207 (19)	0.0084 (17)	0.0136 (17)	0.0089 (15)
N2	0.022 (2)	0.0199 (18)	0.0191 (18)	0.0048 (16)	0.0083 (15)	0.0085 (14)
C1	0.027 (3)	0.019 (2)	0.028 (2)	0.005 (2)	0.011 (2)	0.0102 (18)
C2	0.019 (2)	0.023 (2)	0.016 (2)	0.0047 (19)	0.0063 (17)	0.0045 (17)
C3	0.020 (2)	0.023 (2)	0.020 (2)	0.0026 (19)	0.0065 (18)	0.0074 (17)
C4	0.016 (2)	0.017 (2)	0.027 (2)	0.0037 (18)	0.0038 (18)	0.0054 (17)
C5	0.022 (3)	0.025 (2)	0.017 (2)	0.0078 (19)	0.0061 (18)	0.0011 (17)
C6	0.027 (3)	0.022 (2)	0.017 (2)	0.008 (2)	0.0038 (19)	0.0046 (17)
C7	0.019 (3)	0.026 (2)	0.028 (2)	0.003 (2)	0.0013 (19)	0.008 (2)
C8	0.015 (2)	0.017 (2)	0.018 (2)	0.0021 (17)	0.0017 (17)	0.0056 (16)
C9	0.019 (2)	0.018 (2)	0.014 (2)	0.0030 (18)	0.0041 (17)	0.0033 (16)
C10	0.020 (2)	0.016 (2)	0.016 (2)	0.0018 (18)	0.0057 (17)	0.0056 (16)
C11	0.018 (2)	0.018 (2)	0.015 (2)	0.0034 (18)	0.0038 (17)	0.0042 (16)
C12	0.023 (3)	0.023 (2)	0.015 (2)	0.0060 (19)	0.0040 (18)	0.0027 (17)

C13	0.017 (2)	0.016 (2)	0.0119 (19)	0.0015 (17)	0.0021 (16)	0.0009 (16)
C15	0.021 (2)	0.015 (2)	0.014 (2)	0.0039 (19)	0.0058 (17)	0.0000 (16)
O6	0.0315 (19)	0.0181 (15)	0.0161 (14)	0.0030 (14)	0.0113 (13)	0.0034 (12)
C14	0.025 (3)	0.017 (2)	0.019 (2)	0.0035 (19)	0.0048 (18)	0.0037 (17)
O7	0.058 (3)	0.0231 (17)	0.0228 (17)	0.0110 (17)	0.0220 (16)	0.0011 (13)
O10	0.0198 (18)	0.0157 (14)	0.0303 (16)	0.0015 (13)	0.0053 (13)	0.0041 (12)
O8	0.045 (2)	0.0196 (15)	0.0179 (15)	0.0103 (15)	0.0109 (14)	0.0071 (12)

Geometric parameters (Å, °)

Tb1—O2	2.346 (3)	N2—C8	1.352 (5)
Tb1—O5	2.364 (3)	N2—C12	1.351 (5)
Tb1—O6 ⁱ	2.365 (3)	N2—Ag1 ^{iv}	2.162 (4)
Tb1—O8 ⁱⁱ	2.317 (3)	C1—C2	1.388 (6)
Tb1—O9	2.444 (3)	C1—H1	0.9300
Tb1—O10 ⁱⁱⁱ	2.401 (3)	C2—C3	1.382 (6)
Tb1—O1W	2.421 (3)	C2—C6	1.494 (6)
Tb1—O2W	2.468 (3)	C3—C4	1.388 (6)
Ag1—N1	2.172 (4)	C3—H3	0.9300
Ag1—N2 ^{iv}	2.162 (4)	C4—C5	1.386 (6)
Ag1—O7 ^v	2.772 (3)	C4—C7	1.508 (6)
Ag1—O7 ^{vi}	2.859 (3)	C5—H5	0.9300
Ag1—Ag1 ^{vii}	3.2867 (12)	C8—C9	1.381 (6)
O1—C6	1.260 (5)	C8—H8	0.9300
O1W—H1W	0.8401	C9—C10	1.400 (6)
O1W—H2W	0.8400	C9—C13	1.500 (6)
O2—C6	1.263 (6)	C10—C11	1.391 (6)
O2W—H3W	0.8402	C10—H10	0.9300
O2W—H4W	0.8400	C11—C12	1.388 (6)
O3—C7	1.309 (6)	C11—C14	1.522 (6)
O3—H3A	0.90 (6)	C12—H12	0.9300
O4—C7	1.207 (5)	C13—O6	1.241 (5)
O5—C13	1.273 (5)	C15—O10	1.260 (5)
O9—C15	1.244 (5)	C15—C15 ⁱⁱⁱ	1.535 (8)
N1—C5	1.343 (6)	C14—O7	1.244 (5)
N1—C1	1.348 (5)	C14—O8	1.262 (5)
O8 ⁱⁱ —Tb1—O2	75.61 (11)	C8—N2—Ag1 ^{iv}	114.8 (3)
O8 ⁱⁱ —Tb1—O6 ⁱ	141.96 (11)	C12—N2—Ag1 ^{iv}	127.0 (3)
O2—Tb1—O6 ⁱ	142.34 (10)	N1—C1—C2	122.6 (4)
O8 ⁱⁱ —Tb1—O5	82.16 (11)	N1—C1—H1	118.7
O2—Tb1—O5	96.02 (11)	C2—C1—H1	118.7
O6 ⁱ —Tb1—O5	89.03 (10)	C3—C2—C1	118.6 (4)
O8 ⁱⁱ —Tb1—O10 ⁱⁱⁱ	81.37 (10)	C3—C2—C6	120.7 (4)
O2—Tb1—O10 ⁱⁱⁱ	109.81 (11)	C1—C2—C6	120.7 (4)
O6 ⁱ —Tb1—O10 ⁱⁱⁱ	85.00 (10)	C2—C3—C4	119.1 (4)

supplementary materials

O5—Tb1—O10 ⁱⁱⁱ	144.60 (10)	C2—C3—H3	120.5
O8 ⁱⁱ —Tb1—O1W	135.70 (10)	C4—C3—H3	120.5
O2—Tb1—O1W	71.23 (11)	C5—C4—C3	119.0 (4)
O6 ⁱ —Tb1—O1W	74.71 (10)	C5—C4—C7	120.2 (4)
O5—Tb1—O1W	73.14 (11)	C3—C4—C7	120.6 (4)
O10 ⁱⁱⁱ —Tb1—O1W	137.38 (11)	N1—C5—C4	122.3 (4)
O8 ⁱⁱ —Tb1—O9	125.23 (12)	N1—C5—H5	118.9
O2—Tb1—O9	75.56 (11)	C4—C5—H5	118.9
O6 ⁱ —Tb1—O9	79.71 (11)	O1—C6—O2	124.7 (4)
O5—Tb1—O9	146.28 (10)	O1—C6—C2	118.4 (4)
O10 ⁱⁱⁱ —Tb1—O9	66.38 (9)	O2—C6—C2	116.9 (4)
O1W—Tb1—O9	73.25 (11)	O4—C7—O3	126.2 (4)
O8 ⁱⁱ —Tb1—O2W	73.67 (11)	O4—C7—C4	124.1 (4)
O2—Tb1—O2W	147.82 (10)	O3—C7—C4	109.6 (4)
O6 ⁱ —Tb1—O2W	68.50 (10)	N2—C8—C9	122.3 (4)
O5—Tb1—O2W	70.60 (11)	N2—C8—H8	118.8
O10 ⁱⁱⁱ —Tb1—O2W	74.76 (11)	C9—C8—H8	118.8
O1W—Tb1—O2W	127.82 (11)	C8—C9—C10	118.9 (4)
O9—Tb1—O2W	131.32 (10)	C8—C9—C13	120.7 (4)
N2 ^{iv} —Ag1—N1	164.83 (14)	C10—C9—C13	120.4 (4)
N2 ^{iv} —Ag1—Ag1 ^{vii}	108.80 (10)	C11—C10—C9	119.4 (4)
N1—Ag1—Ag1 ^{vii}	86.10 (10)	C11—C10—H10	120.3
N2 ^{iv} —Ag1—O7 ^v	93.85 (11)	C9—C10—H10	120.3
N1—Ag1—O7 ^v	92.40 (13)	C12—C11—C10	117.9 (4)
N1—Ag1—O7 ^{vi}	83.19 (11)	C12—C11—C14	122.0 (4)
N2 ^{iv} —Ag1—O7 ^{vi}	107.77 (11)	C10—C11—C14	120.1 (4)
O7 ^v —Ag1—O7 ^{vi}	108.60 (9)	N2—C12—C11	123.2 (4)
Tb1—O1W—H1W	113.8	N2—C12—H12	118.4
Tb1—O1W—H2W	134.5	C11—C12—H12	118.4
H1W—O1W—H2W	111.6	O6—C13—O5	124.4 (4)
C6—O2—Tb1	129.6 (3)	O6—C13—C9	118.5 (3)
Tb1—O2W—H3W	114.5	O5—C13—C9	117.1 (4)
Tb1—O2W—H4W	131.1	O9—C15—O10	126.9 (4)
H3W—O2W—H4W	111.7	O9—C15—C15 ⁱⁱⁱ	117.3 (5)
C7—O3—H3A	113 (4)	O10—C15—C15 ⁱⁱⁱ	115.7 (4)
C13—O5—Tb1	133.9 (3)	C13—O6—Tb1 ⁱ	137.7 (3)
C15—O9—Tb1	118.8 (3)	O7—C14—O8	126.2 (4)
C5—N1—C1	118.3 (4)	O7—C14—C11	118.2 (4)
C5—N1—Ag1	125.6 (3)	O8—C14—C11	115.6 (4)
C1—N1—Ag1	116.1 (3)	C15—O10—Tb1 ⁱⁱⁱ	120.5 (2)
C8—N2—C12	118.2 (4)	C14—O8—Tb1 ^{viii}	155.4 (3)

Symmetry codes: (i) $-x+2, -y+1, -z$; (ii) $x, y-1, z$; (iii) $-x+1, -y, -z$; (iv) $-x+1, -y+1, -z+1$; (v) $x-1, y-1, z$; (vi) $-x+1, -y+2, -z+1$; (vii) $-x, -y+1, -z+1$; (viii) $x, y+1, z$.

Hydrogen-bond geometry (Å, °)

<i>D</i> —H··· <i>A</i>	<i>D</i> —H	H··· <i>A</i>	<i>D</i> ··· <i>A</i>	<i>D</i> —H··· <i>A</i>
O1W—H1W···O5 ⁱ	0.84	2.08	2.820 (5)	147
O1W—H1W···O2W ⁱ	0.84	2.55	3.221 (5)	138
O1W—H2W···O9 ^{ix}	0.84	2.05	2.855 (4)	159
O2W—H3W···O10 ^x	0.84	2.13	2.839 (4)	142
O2W—H4W···O1 ^x	0.84	2.04	2.873 (5)	173
O3—H3A···O1 ^{viii}	0.90 (6)	1.71 (7)	2.554 (5)	154 (6)
C10—H10···O2W ^{viii}	0.93	2.40	3.314 (6)	169

Symmetry codes: (i) $-x+2, -y+1, -z$; (ix) $-x+1, -y+1, -z$; (x) $x+1, y, z$; (viii) $x, y+1, z$.

Fig. 2

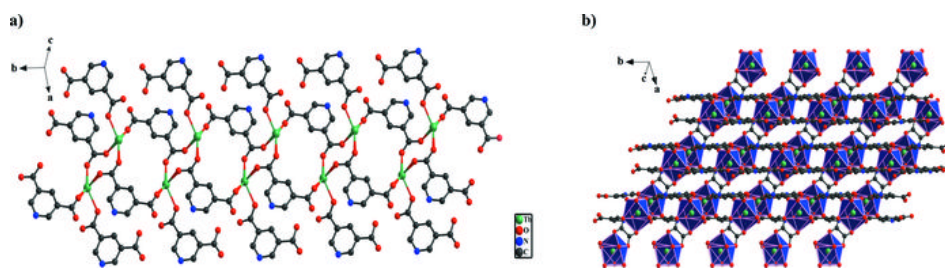


Fig. 3

