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Poly[[diaquabis(μ_2-isonicotinato-κ^2N:O)-bis(μ_3-isonicotinato-κ^3N:O:O')-neodymium(III)disilver(I)] nitrate monohydrate]

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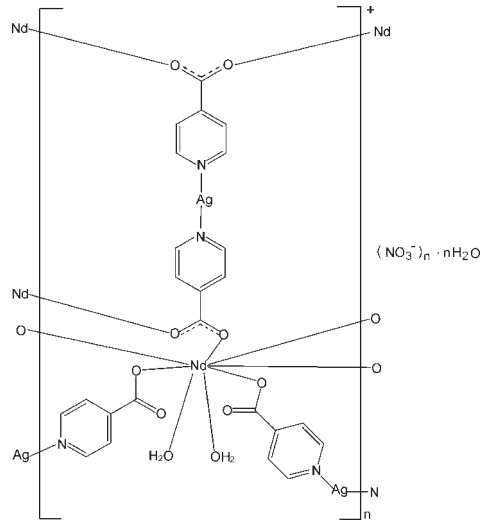
Key indicators: single-crystal X-ray study; T = 296 K; mean σ(C–C) = 0.007 Å; R factor = 0.032; wR factor = 0.067; data-to-parameter ratio = 11.8.

In the title complex, $\{[Ag_2Nd(C_6H_4NO_2)_4(H_2O)_2]NO_3\cdot H_2O\}_n$, the Nd^{III} ion is coordinated by eight O atoms from six isonicotinate ligands and two water molecules in a distorted square antiprismatic geometry. Each Ag^I ion is coordinated by two N atoms from two different isonicotinate ligands. The crystal structure exhibits a two-dimensional heterometallic polymeric layer. O—H···O hydrogen bonds involving the coordinated and uncoordinated water molecules and intralayer π–π interactions between the pyridine rings [centroid–centroid distances = 3.571 (2) and 3.569 (2) Å] are observed. Each layer interacts with two neighboring ones *via* Ag···O(H_2O) contacts and interlayer π–π interactions [centroid–centroid distances = 3.479 (3) to 3.530 (3) Å], leading to a three-dimensional supramolecular network.

Related literature

For general background to metal organic frameworks, see: Batten & Robson (1998); Min & Suh (2000). For 4*d*–4*f* heterometallic coordination frameworks, see: Cai *et al.* (2009).



Experimental

Crystal data

$[Ag_2Nd(C_6H_4NO_2)_4(H_2O)_2]NO_3\cdot H_2O$
M_r = 964.45
Monoclinic, $P2_1/c$
a = 16.9648 (19) Å
b = 24.793 (3) Å
c = 6.7770 (8) Å
β = 95.849 (1)°
V = 2835.7 (6) Å^3
Z = 4
Mo $K\alpha$ radiation
μ = 3.25 mm^{-1}
T = 296 K
0.23 × 0.20 × 0.18 mm

Data collection

Bruker APEXII CCD diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996)
T_{min} = 0.522, T_{max} = 0.592
14629 measured reflections
5092 independent reflections
4024 reflections with $I > 2\sigma(I)$
R_{int} = 0.043

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.032
$wR(F^2)$ = 0.067
S = 1.01
5092 reflections
433 parameters
9 restraints
H atoms treated by a mixture of independent and constrained refinement
$\Delta\rho_{max}$ = 0.57 e Å^{-3}
$\Delta\rho_{min}$ = −0.91 e Å^{-3}

Table 1
Selected bond lengths (Å).

Nd1—O1^{i}	2.381 (3)	Ag1—N1	2.155 (4)
Nd1—O2	2.502 (3)	Ag1—N2	2.155 (4)
Nd1—O3^{ii}	2.426 (3)	Ag1···O1W^{i}	2.888 (4)
Nd1—O4^{iii}	2.432 (3)	Ag1···O10	2.771 (5)
Nd1—O5	2.416 (3)	Ag2—N3^{iv}	2.200 (4)
Nd1—O7	2.406 (3)	Ag2—N4	2.184 (4)
Nd1—O2W	2.492 (4)	Ag2···O3W^{v}	2.741 (4)
Nd1—O3W	2.564 (3)	Ag2···O9^{vi}	2.950 (5)

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

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

D—H···A	D—H	H···A	D···A	D—H···A
O1W—H1A···O10^{vii}	0.85 (3)	1.96 (2)	2.796 (8)	167 (7)
O1W—H1B···O9	0.85 (4)	2.12 (5)	2.945 (8)	164 (6)
O2W—H2A···O6	0.85 (4)	2.06 (3)	2.799 (5)	145 (5)
O2W—H2B···O4^{iii}	0.84 (4)	2.21 (4)	3.033 (5)	166 (5)
O3W—H3A···O8	0.85 (3)	1.87 (2)	2.653 (5)	153 (4)
O3W—H3B···O6^{vii}	0.85 (3)	2.11 (3)	2.951 (5)	174 (5)

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

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: *DIAMOND* (Brandenburg, 1999); software used to prepare material for publication: *SHELXL97*.

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Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: HY2237).

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supplementary materials

Acta Cryst. (2009). E**65**, m1434-m1435 [**doi:10.1107/S1600536809042342**]

Poly[[diaquabis(μ_2-isonicotinato-κ^2N:O)bis(μ_3-isonicotinato-κ^3N:O:O')neodymium(III)disilver(I)] nitrate monohydrate]

Q.-G. Zhan, J.-X. Huang and R.-H. Zeng

Comment

In recent years, assembly processes directed by metal–ligand ligation have been extensively utilized to construct metal organic frameworks with novel topologies and potentially interesting functions in magnetism, photoluminescence, sorption, catalysis (Batten & Robson, 1998; Min & Suh, 2000). However, metal-directed assembly of 4d–4f heterometallic coordination frameworks with fascinating topological networks and potential applications have been few reported (Cai *et al.*, 2009). We utilized isonicotinate as multifunctional ligand with O and N atoms on opposite sites. Here, a new metal-directed assembly of 4d–4f coordination polymer, which was synthesized under hydrothermal conditions, is reported.

The asymmetric unit of the title complex contains one Nd^{III} ion, two Ag^{I} ions, four crystallographically unique isonicotinate ligands, one nitrate anion, two coordinated water molecules and one uncoordinated water molecule (Fig. 1). The Nd^{III} ion is in a distorted square antiprismatic geometry, defined by eight O atoms from six isonicotinate ligands and two water molecules. The Nd—O bond distances and O—Nd—O bond angles range from 2.381 (3) to 2.564 (3) Å and 71.79 (11) to 145.83 (12)°, respectively (Table 1). The Ag^{I} ion exhibits an approximatly linear or bow-like configuration, being coordinated by two N atoms from two different isonicotinate ligands. The isonicotinate ligands link Nd and Ag metal centers, forming a layer in the (010) plane, which are stabilized by O—H···O hydrogen bonds involving the coordinated and uncoordinated water molecules (Table 2) and intralayer π–π stacking interactions between the pyridine rings, with a centroid–centroid distances of 3.571 (2) and 3.569 (2) Å. These layers are further connected by Ag···O(H_2O) contacts and interlayer π–π stacking interactions [centroid–centroid distances = 3.479 (3) to 3.530 (3) Å] between the pyridine rings of two adjacent layers, assembling a three-dimensional supramolecular architecture (Fig. 2).

Experimental

A mixture of Nd_2O_3 (0.183 g, 0.5 mmol), $AgNO_3$ (0.170 g, 1 mmol), isonicotinic acid (0.135 g, 1.5 mmol), water (10 ml) in the presence of HNO_3(0.024 g, 0.385 mmol) was stirred vigorously for 20 min and then sealed in a Teflon-lined stainless-steel autoclave (20 ml capacity). The autoclave was heated and maintained at 443 K for 3 d, and then cooled to room temperature at 5 K h^{-1}. The colorless block crystals of the title compound were obtained.

Refinement

Water H atoms were tentatively located in difference Fourier maps and refined with distance restraints of O—H = 0.85 (1) Å and H···H = 1.35 (1) Å, and with U_{iso}(H) = 1.5U_{eq}(O). H atoms attached to C atoms were placed at calculated positions and treated as riding on their parent atoms, with C—H = 0.93 Å and with U_{iso}(H) = 1.2U_{eq}(C).

Figures

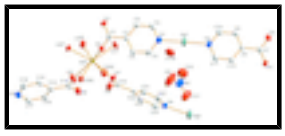

Fig. 1. The asymmetric unit of the title compound. Displacement ellipsoids are drawn at the 30% probability level. H atoms have been omitted for clarity. [Symmetry codes: (i) x, 3/2-y, -1/2+z; (ii) -1+x, y, z; (iii) -1+x, 3/2-y, -1/2+z.]

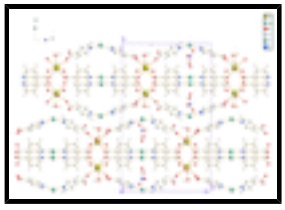

Fig. 2. A view of the layered networks in the title compound.

Poly[[diaquabis(μ$_2$-isonicotinato-κ^2*N*:*O*)bis(μ$_3$- isonicotinato-κ^3*N*:*O*:*O*')neodymium(III)disilver(I)] nitrate monohydrate]

Crystal data

$[Ag_2Nd(C_6H_4NO_2)_4(H_2O)_2]NO_3·H_2O$	F_{000} = 1868
M_r = 964.45	D_x = 2.259 Mg m^{-3}
Monoclinic, $P2_1/c$	Mo $K\alpha$ radiation, λ = 0.71073 Å
Hall symbol: -P 2ybc	Cell parameters from 3327 reflections
a = 16.9648 (19) Å	θ = 2.4–25.9º
b = 24.793 (3) Å	μ = 3.25 mm^{-1}
c = 6.7770 (8) Å	T = 296 K
β = 95.849 (1)º	Block, colorless
V = 2835.7 (6) Å^3	0.23 × 0.20 × 0.18 mm
Z = 4	

Data collection

Bruker APEXII CCD diffractometer	5092 independent reflections
Radiation source: fine-focus sealed tube	4024 reflections with $I > 2\sigma(I)$
Monochromator: graphite	R_{int} = 0.043
T = 296 K	θ_{max} = 25.2º
φ and ω scans	θ_{min} = 1.6º
Absorption correction: multi-scan (SADABS; Sheldrick, 1996)	h = −17→20
T_{min} = 0.522, T_{max} = 0.592	k = −29→29
14629 measured reflections	l = −8→5

Refinement

Refinement on F^2	Secondary atom site location: difference Fourier map
Least-squares matrix: full	Hydrogen site location: inferred from neighbouring sites

$R[F^2 > 2\sigma(F^2)] = 0.032$	H atoms treated by a mixture of independent and constrained refinement
$wR(F^2) = 0.067$	$w = 1/[\sigma^2(F_o^2) + (0.0268P)^2]$ where $P = (F_o^2 + 2F_c^2)/3$
$S = 1.01$	$(\Delta/\sigma)_{max} = 0.001$
5092 reflections	$\Delta\rho_{max} = 0.57$ e Å^{-3}
433 parameters	$\Delta\rho_{min} = -0.91$ e Å^{-3}
9 restraints	Extinction correction: none
Primary atom site location: structure-invariant direct methods	

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

	x	*y*	*z*	U_{iso}*/U_{eq}
Nd1	0.269306 (14)	0.662399 (10)	0.11749 (4)	0.01959 (8)
Ag1	0.77067 (2)	0.728604 (19)	0.49039 (7)	0.04705 (14)
Ag2	0.76495 (3)	0.510435 (19)	−0.09689 (7)	0.05046 (14)
O7	0.38451 (19)	0.60656 (13)	0.1017 (5)	0.0338 (9)
O2	0.35364 (18)	0.68568 (12)	0.4305 (5)	0.0289 (8)
O5	0.1656 (2)	0.60334 (15)	−0.0262 (5)	0.0456 (10)
C3	0.5223 (3)	0.77468 (17)	0.5011 (7)	0.0242 (11)
H3	0.4958	0.8074	0.5054	0.029*
C1	0.3912 (3)	0.72711 (19)	0.4857 (7)	0.0229 (11)
C2	0.4801 (3)	0.72666 (17)	0.4924 (6)	0.0197 (10)
N2	0.8974 (2)	0.72776 (16)	0.4834 (6)	0.0341 (10)
N1	0.6441 (2)	0.72777 (16)	0.4996 (6)	0.0327 (10)
C6	0.5224 (3)	0.67929 (18)	0.4894 (7)	0.0246 (11)
H6	0.4963	0.6462	0.4835	0.030*
C10	0.9388 (3)	0.77404 (19)	0.4767 (7)	0.0308 (12)
H10	0.9122	0.8067	0.4841	0.037*
C9	1.0183 (3)	0.77478 (18)	0.4595 (7)	0.0275 (12)
H9	1.0448	0.8076	0.4563	0.033*
C20	0.5069 (3)	0.56100 (17)	0.1414 (7)	0.0258 (11)
C19	0.4289 (3)	0.57592 (18)	0.2152 (8)	0.0259 (11)
O8	0.4127 (2)	0.55701 (14)	0.3746 (5)	0.0371 (9)
N4	0.6493 (2)	0.52916 (15)	0.0010 (6)	0.0316 (10)
C22	0.5972 (3)	0.56051 (19)	−0.1083 (8)	0.0337 (13)
H22	0.6094	0.5719	−0.2323	0.040*
C23	0.6300 (3)	0.5135 (2)	0.1793 (8)	0.0341 (13)
H23	0.6649	0.4912	0.2561	0.041*
C5	0.6032 (3)	0.6814 (2)	0.4951 (8)	0.0334 (13)
H5	0.6312	0.6491	0.4959	0.040*
C8	1.0594 (3)	0.72707 (18)	0.4469 (6)	0.0218 (11)
C12	1.0174 (3)	0.67961 (19)	0.4565 (7)	0.0279 (12)
H12	1.0430	0.6466	0.4493	0.033*
C14	0.0414 (3)	0.57066 (17)	−0.1642 (7)	0.0242 (11)
C15	0.0089 (3)	0.57587 (18)	0.0129 (7)	0.0308 (12)
H15	0.0389	0.5904	0.1228	0.037*

C13	0.1266 (3)	0.58696 (18)	−0.1849 (8)	0.0277 (12)
C18	−0.0059 (3)	0.54950 (18)	−0.3233 (7)	0.0291 (12)
H18	0.0130	0.5466	−0.4469	0.035*
O6	0.1513 (2)	0.58320 (14)	−0.3490 (5)	0.0413 (10)
C24	0.5615 (3)	0.52881 (19)	0.2536 (8)	0.0319 (12)
H24	0.5514	0.5176	0.3796	0.038*
C21	0.5267 (3)	0.57646 (18)	−0.0447 (8)	0.0299 (12)
H21	0.4919	0.5977	−0.1263	0.036*
C16	−0.0679 (3)	0.55962 (19)	0.0274 (8)	0.0348 (13)
H16	−0.0895	0.5645	0.1469	0.042*
C17	−0.0811 (3)	0.53274 (19)	−0.2966 (8)	0.0341 (13)
H17	−0.1117	0.5176	−0.4043	0.041*
C4	0.6027 (3)	0.77385 (19)	0.5035 (7)	0.0316 (12)
H4	0.6299	0.8064	0.5080	0.038*
C11	0.9378 (3)	0.6811 (2)	0.4766 (7)	0.0323 (12)
H11	0.9107	0.6487	0.4859	0.039*
O1	0.3610 (2)	0.76974 (13)	0.5428 (5)	0.0410 (10)
C7	1.1467 (3)	0.72688 (19)	0.4130 (7)	0.0249 (11)
O3	1.17260 (19)	0.68473 (13)	0.3448 (5)	0.0321 (8)
O4	1.1839 (2)	0.76939 (14)	0.4499 (6)	0.0419 (10)
O3W	0.2587 (2)	0.57863 (14)	0.3352 (5)	0.0308 (8)
H3B	0.2294 (19)	0.578 (2)	0.429 (4)	0.046*
H3A	0.3050 (10)	0.571 (2)	0.387 (6)	0.046*
O2W	0.2838 (2)	0.64789 (16)	−0.2408 (6)	0.0436 (10)
H2A	0.257 (2)	0.6245 (15)	−0.310 (7)	0.065*
H2B	0.251 (2)	0.6703 (17)	−0.205 (8)	0.065*
N5	0.7673 (3)	0.5865 (2)	0.3990 (10)	0.0570 (15)
O11	0.7991 (3)	0.5483 (2)	0.3274 (7)	0.0789 (15)
O9	0.7419 (3)	0.5845 (2)	0.5614 (7)	0.094 (2)
O10	0.7590 (3)	0.6295 (2)	0.3006 (8)	0.0892 (17)
N3	−0.1129 (2)	0.53684 (16)	−0.1258 (7)	0.0326 (10)
O1W	0.7704 (3)	0.65730 (16)	0.9046 (8)	0.0724 (14)
H1A	0.769 (5)	0.644 (2)	1.019 (4)	0.109*
H1B	0.763 (5)	0.6313 (17)	0.824 (7)	0.109*

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Nd1	0.01421 (13)	0.02069 (13)	0.02424 (15)	−0.00081 (11)	0.00374 (10)	0.00027 (11)
Ag1	0.0152 (2)	0.0632 (3)	0.0635 (3)	0.0000 (2)	0.00745 (19)	−0.0005 (2)
Ag2	0.0231 (2)	0.0605 (3)	0.0700 (4)	0.0006 (2)	0.0150 (2)	0.0039 (2)
O7	0.028 (2)	0.037 (2)	0.037 (2)	0.0145 (16)	0.0071 (16)	0.0030 (16)
O2	0.0205 (18)	0.0311 (18)	0.035 (2)	−0.0041 (15)	0.0004 (15)	−0.0064 (15)
O5	0.041 (2)	0.062 (2)	0.033 (2)	−0.028 (2)	0.0013 (18)	−0.0006 (19)
C3	0.024 (3)	0.019 (2)	0.030 (3)	0.001 (2)	0.002 (2)	−0.001 (2)
C1	0.017 (3)	0.032 (3)	0.021 (3)	0.003 (2)	0.006 (2)	0.003 (2)
C2	0.017 (2)	0.027 (2)	0.015 (3)	0.002 (2)	−0.0024 (19)	−0.0007 (19)
N2	0.021 (2)	0.040 (3)	0.042 (3)	0.005 (2)	0.0059 (19)	0.000 (2)

N1	0.022 (2)	0.036 (3)	0.040 (3)	0.003 (2)	0.0046 (19)	0.002 (2)
C6	0.020 (3)	0.025 (3)	0.029 (3)	−0.003 (2)	0.004 (2)	−0.003 (2)
C10	0.025 (3)	0.028 (3)	0.039 (3)	0.006 (2)	0.000 (2)	−0.001 (2)
C9	0.027 (3)	0.023 (3)	0.033 (3)	−0.002 (2)	0.003 (2)	−0.002 (2)
C20	0.025 (3)	0.018 (2)	0.034 (3)	0.000 (2)	0.001 (2)	−0.002 (2)
C19	0.024 (3)	0.020 (2)	0.034 (3)	0.003 (2)	0.003 (2)	−0.005 (2)
O8	0.035 (2)	0.046 (2)	0.032 (2)	0.0109 (18)	0.0120 (17)	0.0124 (18)
N4	0.024 (2)	0.028 (2)	0.044 (3)	−0.0003 (19)	0.007 (2)	−0.004 (2)
C22	0.031 (3)	0.030 (3)	0.042 (4)	0.003 (2)	0.010 (2)	0.005 (2)
C23	0.023 (3)	0.034 (3)	0.045 (4)	0.005 (2)	−0.001 (2)	0.002 (3)
C5	0.024 (3)	0.031 (3)	0.044 (4)	0.012 (2)	0.003 (2)	0.000 (2)
C8	0.019 (3)	0.029 (3)	0.017 (3)	−0.001 (2)	0.0016 (19)	−0.003 (2)
C12	0.022 (3)	0.025 (3)	0.037 (3)	0.002 (2)	0.003 (2)	−0.001 (2)
C14	0.024 (3)	0.019 (2)	0.029 (3)	−0.004 (2)	0.000 (2)	0.000 (2)
C15	0.035 (3)	0.028 (3)	0.029 (3)	−0.005 (2)	0.003 (2)	−0.006 (2)
C13	0.028 (3)	0.023 (3)	0.031 (3)	−0.008 (2)	0.000 (2)	−0.002 (2)
C18	0.029 (3)	0.030 (3)	0.029 (3)	−0.003 (2)	0.006 (2)	−0.002 (2)
O6	0.035 (2)	0.057 (3)	0.033 (2)	−0.0149 (19)	0.0110 (17)	−0.0100 (18)
C24	0.029 (3)	0.033 (3)	0.034 (3)	−0.001 (2)	0.001 (2)	0.001 (2)
C21	0.032 (3)	0.025 (3)	0.033 (3)	0.002 (2)	0.003 (2)	0.002 (2)
C16	0.032 (3)	0.038 (3)	0.035 (3)	0.006 (3)	0.012 (2)	−0.001 (2)
C17	0.030 (3)	0.035 (3)	0.036 (3)	−0.009 (2)	−0.005 (3)	0.003 (2)
C4	0.027 (3)	0.028 (3)	0.040 (3)	−0.007 (2)	0.002 (2)	0.000 (2)
C11	0.026 (3)	0.032 (3)	0.040 (3)	−0.006 (2)	0.004 (2)	0.004 (2)
O1	0.022 (2)	0.034 (2)	0.067 (3)	0.0073 (16)	0.0020 (17)	−0.0206 (19)
C7	0.020 (3)	0.032 (3)	0.022 (3)	0.001 (2)	0.000 (2)	0.003 (2)
O3	0.0211 (19)	0.037 (2)	0.040 (2)	0.0038 (16)	0.0118 (15)	−0.0043 (17)
O4	0.022 (2)	0.043 (2)	0.061 (3)	−0.0105 (17)	0.0040 (17)	−0.0183 (19)
O3W	0.026 (2)	0.034 (2)	0.033 (2)	0.0006 (17)	0.0093 (15)	0.0029 (16)
O2W	0.043 (2)	0.058 (3)	0.030 (2)	−0.010 (2)	0.0055 (18)	−0.0101 (18)
N5	0.033 (3)	0.068 (4)	0.066 (5)	0.011 (3)	−0.011 (3)	−0.016 (4)
O11	0.052 (3)	0.109 (4)	0.073 (4)	0.026 (3)	−0.003 (2)	−0.027 (3)
O9	0.082 (4)	0.167 (6)	0.035 (3)	0.062 (4)	0.013 (3)	0.004 (3)
O10	0.096 (5)	0.084 (4)	0.090 (4)	−0.013 (3)	0.021 (3)	−0.014 (3)
N3	0.027 (2)	0.030 (2)	0.041 (3)	−0.0025 (19)	0.006 (2)	0.002 (2)
O1W	0.071 (3)	0.041 (3)	0.106 (4)	−0.009 (3)	0.010 (3)	0.001 (2)

Geometric parameters (Å, °)

Nd1—O1^{i}	2.381 (3)	N4—C23	1.341 (6)
Nd1—O2	2.502 (3)	N4—C22	1.342 (6)
Nd1—O3^{ii}	2.426 (3)	C22—C21	1.370 (7)
Nd1—O4^{iii}	2.432 (3)	C22—H22	0.9300
Nd1—O5	2.416 (3)	C23—C24	1.366 (7)
Nd1—O7	2.406 (3)	C23—H23	0.9300
Nd1—O2W	2.492 (4)	C5—H5	0.9300
Nd1—O3W	2.564 (3)	C8—C12	1.381 (6)
Ag1—N1	2.155 (4)	C8—C7	1.521 (6)

Ag1—N2	2.155 (4)	C12—C11	1.372 (6)
Ag1—O1W^{i}	2.888 (4)	C12—H12	0.9300
Ag1—O10	2.771 (5)	C14—C15	1.377 (7)
Ag2—N3^{iv}	2.200 (4)	C14—C18	1.380 (6)
Ag2—N4	2.184 (4)	C14—C13	1.521 (7)
Ag2—O3W^{v}	2.741 (4)	C15—C16	1.378 (7)
Ag2—O9^{vi}	2.950 (5)	C15—H15	0.9300
O7—C19	1.272 (5)	C13—O6	1.232 (6)
O2—C1	1.246 (5)	C18—C17	1.372 (7)
O5—C13	1.271 (5)	C18—H18	0.9300
C3—C4	1.361 (6)	C24—H24	0.9300
C3—C2	1.387 (6)	C21—H21	0.9300
C3—H3	0.9300	C16—N3	1.348 (6)
C1—O1	1.253 (5)	C16—H16	0.9300
C1—C2	1.505 (6)	C17—N3	1.330 (7)
C2—C6	1.378 (6)	C17—H17	0.9300
N2—C11	1.348 (6)	C4—H4	0.9300
N2—C10	1.349 (6)	C11—H11	0.9300
N1—C5	1.342 (6)	C7—O4	1.241 (5)
N1—C4	1.343 (6)	C7—O3	1.241 (5)
C6—C5	1.369 (6)	O3W—H3B	0.85 (3)
C6—H6	0.9300	O3W—H3A	0.85 (3)
C10—C9	1.365 (7)	O2W—H2A	0.85 (4)
C10—H10	0.9300	O2W—H2B	0.84 (4)
C9—C8	1.381 (6)	N5—O11	1.215 (6)
C9—H9	0.9300	N5—O9	1.223 (7)
C20—C24	1.390 (6)	N5—O10	1.260 (7)
C20—C21	1.392 (7)	O1W—H1A	0.85 (3)
C20—C19	1.507 (7)	O1W—H1B	0.85 (4)
C19—O8	1.234 (6)		
O1^{i}—Nd1—O7	81.12 (12)	O8—C19—C20	118.6 (4)
O1^{i}—Nd1—O5	143.84 (12)	O7—C19—C20	115.6 (5)
O7—Nd1—O5	101.23 (13)	C23—N4—C22	117.1 (5)
O1^{i}—Nd1—O3^{ii}	118.20 (12)	C23—N4—Ag2	121.5 (3)
O7—Nd1—O3^{ii}	139.85 (11)	C22—N4—Ag2	121.2 (4)
O5—Nd1—O3^{ii}	83.25 (12)	N4—C22—C21	122.8 (5)
O1^{i}—Nd1—O4^{iii}	77.33 (11)	N4—C22—H22	118.6
O7—Nd1—O4^{iii}	145.83 (12)	C21—C22—H22	118.6
O5—Nd1—O4^{iii}	81.87 (13)	N4—C23—C24	123.2 (5)
O3^{ii}—Nd1—O4^{iii}	74.25 (12)	N4—C23—H23	118.4
O1^{i}—Nd1—O2W	76.30 (13)	C24—C23—H23	118.4
O7—Nd1—O2W	73.28 (12)	N1—C5—C6	123.1 (4)
O5—Nd1—O2W	70.13 (12)	N1—C5—H5	118.4
O3^{ii}—Nd1—O2W	142.39 (11)	C6—C5—H5	118.4
O4^{iii}—Nd1—O2W	76.03 (13)	C9—C8—C12	117.4 (4)

O1^{i}—Nd1—O2	71.79 (11)	C9—C8—C7	121.2 (4)
O7—Nd1—O2	76.91 (11)	C12—C8—C7	121.3 (4)
O5—Nd1—O2	144.23 (11)	C11—C12—C8	120.0 (4)
O3^{ii}—Nd1—O2	76.96 (11)	C11—C12—H12	120.0
O4^{iii}—Nd1—O2	119.84 (11)	C8—C12—H12	120.0
O2W—Nd1—O2	138.99 (12)	C15—C14—C18	117.7 (5)
O1^{i}—Nd1—O3W	141.28 (11)	C15—C14—C13	121.5 (4)
O7—Nd1—O3W	70.39 (11)	C18—C14—C13	120.7 (5)
O5—Nd1—O3W	69.53 (11)	C14—C15—C16	120.0 (5)
O3^{ii}—Nd1—O3W	74.22 (11)	C14—C15—H15	120.0
O4^{iii}—Nd1—O3W	139.34 (12)	C16—C15—H15	120.0
O2W—Nd1—O3W	117.61 (12)	O6—C13—O5	126.3 (5)
O2—Nd1—O3W	76.51 (10)	O6—C13—C14	118.5 (4)
O1^{i}—Nd1—H2B	75.9 (13)	O5—C13—C14	115.2 (5)
O7—Nd1—H2B	92.3 (10)	C17—C18—C14	119.1 (5)
O5—Nd1—H2B	68.0 (13)	C17—C18—H18	120.4
O3^{ii}—Nd1—H2B	125.2 (6)	C14—C18—H18	120.4
O4^{iii}—Nd1—H2B	56.7 (5)	C23—C24—C20	120.2 (5)
O2W—Nd1—H2B	19.3 (10)	C23—C24—H24	119.9
O2—Nd1—H2B	147.1 (13)	C20—C24—H24	119.9
O3W—Nd1—H2B	129.5 (12)	C22—C21—C20	120.3 (5)
N2—Ag1—N1	178.82 (16)	C22—C21—H21	119.9
N4—Ag2—N3^{iv}	147.86 (15)	C20—C21—H21	119.9
C19—O7—Nd1	138.6 (3)	N3—C16—C15	122.2 (5)
C1—O2—Nd1	132.5 (3)	N3—C16—H16	118.9
C13—O5—Nd1	146.1 (3)	C15—C16—H16	118.9
C4—C3—C2	119.9 (4)	N3—C17—C18	123.8 (5)
C4—C3—H3	120.0	N3—C17—H17	118.1
C2—C3—H3	120.0	C18—C17—H17	118.1
O2—C1—O1	125.1 (4)	N1—C4—C3	122.5 (4)
O2—C1—C2	118.9 (4)	N1—C4—H4	118.7
O1—C1—C2	115.9 (4)	C3—C4—H4	118.7
C6—C2—C3	117.7 (4)	N2—C11—C12	122.4 (5)
C6—C2—C1	121.9 (4)	N2—C11—H11	118.8
C3—C2—C1	120.4 (4)	C12—C11—H11	118.8
C11—N2—C10	117.4 (4)	C1—O1—Nd1^{vii}	163.4 (3)
C11—N2—Ag1	121.4 (3)	O4—C7—O3	126.7 (5)
C10—N2—Ag1	121.1 (3)	O4—C7—C8	116.7 (4)
C5—N1—C4	117.4 (4)	O3—C7—C8	116.5 (4)
C5—N1—Ag1	121.4 (3)	C7—O3—Nd1^{iv}	135.8 (3)
C4—N1—Ag1	121.2 (3)	C7—O4—Nd1^{viii}	162.1 (3)
C5—C6—C2	119.3 (4)	Nd1—O3W—H3B	122 (3)
C5—C6—H6	120.4	Nd1—O3W—H3A	108 (3)
C2—C6—H6	120.4	H3B—O3W—H3A	105.7 (17)
N2—C10—C9	122.5 (4)	Nd1—O2W—H2A	122 (4)
N2—C10—H10	118.8	Nd1—O2W—H2B	59 (4)

C9—C10—H10	118.8	H2A—O2W—H2B	106 (4)
C10—C9—C8	120.3 (4)	O11—N5—O9	122.7 (7)
C10—C9—H9	119.9	O11—N5—O10	118.7 (7)
C8—C9—H9	119.9	O9—N5—O10	118.6 (6)
C24—C20—C21	116.4 (5)	C17—N3—C16	117.0 (5)
C24—C20—C19	121.2 (5)	C17—N3—Ag2^{ii}	121.6 (3)
C21—C20—C19	122.3 (4)	C16—N3—Ag2^{ii}	121.4 (4)
O8—C19—O7	125.8 (5)	H1A—O1W—H1B	106 (5)

Symmetry codes: (i) *x*, −*y*+3/2, *z*−1/2; (ii) *x*−1, *y*, *z*; (iii) *x*−1, −*y*+3/2, *z*−1/2; (iv) *x*+1, *y*, *z*; (v) −*x*+1, −*y*+1, −*z*; (vi) *x*, *y*, *z*−1; (vii) *x*, −*y*+3/2, *z*+1/2; (viii) *x*+1, −*y*+3/2, *z*+1/2.

Hydrogen-bond geometry (Å, °)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
O1W—H1A···O10^{ix}	0.85 (3)	1.96 (2)	2.796 (8)	167 (7)
O1W—H1B···O9	0.85 (4)	2.12 (5)	2.945 (8)	164 (6)
O2W—H2A···O6	0.85 (4)	2.06 (3)	2.799 (5)	145 (5)
O2W—H2B···O4^{iii}	0.84 (4)	2.21 (4)	3.033 (5)	166 (5)
O3W—H3A···O8	0.85 (3)	1.87 (2)	2.653 (5)	153 (4)
O3W—H3B···O6^{ix}	0.85 (3)	2.11 (3)	2.951 (5)	174 (5)

Symmetry codes: (ix) *x*, *y*, *z*+1; (iii) *x*−1, −*y*+3/2, *z*−1/2.

Fig. 1

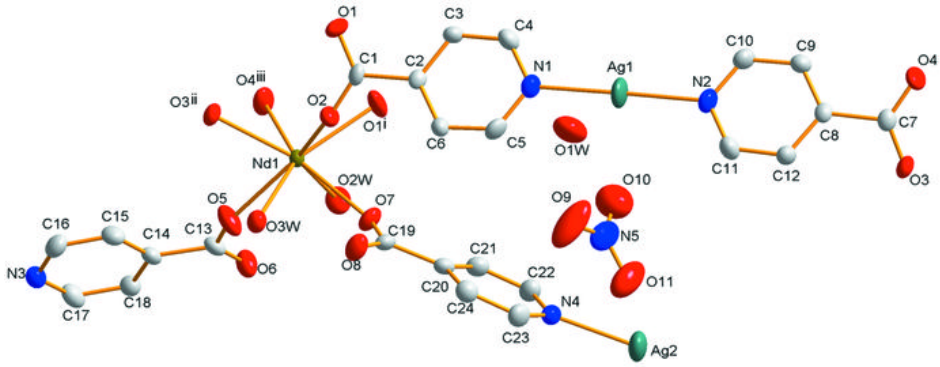
O1
C3
C4
C1
C2
N1
Ag1
C10
C9
O4
O4iii
O3ii
O2
O1i
N2
C7
C6
C5
O1W
C8
Nd1
C11
C12
O3
O2W
O10
O5
O7
O9
C16
C15
C14
C13
O3W
C19
N5
C21
N3
O8
C22
O11
C20
C18
C24
N4
C17
C23
Ag2
O6

Fig. 2