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Poly[μ_3 -hydroxido- μ -(pyridine-2,4,6-tricarboxylato)-dilead(II)]

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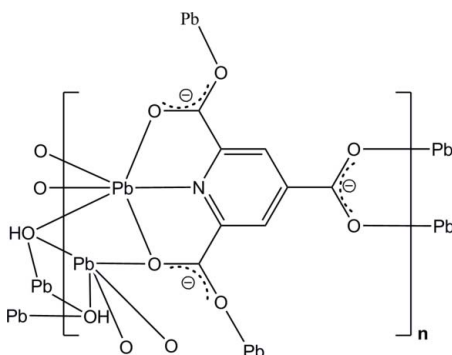
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 Key indicators: single-crystal X-ray study; $T = 291$ K; mean $\sigma(\text{C}-\text{C}) = 0.011$ Å; R factor = 0.028; wR factor = 0.069; data-to-parameter ratio = 12.8.

The asymmetric unit of the title coordination polymer, $[\text{Pb}_2(\text{C}_8\text{H}_2\text{NO}_6)(\text{OH})]_n$, contains two crystallographically independent Pb^{II} ions, one pyridine-2,4,6-tricarboxylate (ptc) trianion and one hydroxide anion. One of the Pb^{II} atoms is coordinated by one pyridine N and four carboxylate O atoms from the ptc trianion and a hydroxide O atom in a distorted octahedral geometry. The other Pb^{II} atom is five-coordinated by three carboxylate O atoms and two hydroxide O atoms in a distorted tetragonal-pyramidal geometry. Four neighbouring Pb^{II} atoms are bridged through two μ_3 -hydroxide ligands, forming the centrosymmetric $\text{Pb}_4(\text{OH})_2$ core. The three-dimensional structure is further achieved through bridging carboxylate groups. There are also $\text{O}-\text{H}\cdots\text{O}$ hydrogen bonds between the hydroxide ligand and the carboxylate group.

Related literature

For general background to pyridine-2,4,6-tricarboxylic acid complexes and their derivatives, see: Das *et al.* (2009); Ding *et al.* (2009); Ghosh *et al.* (2006); O'Keeffe *et al.* (2008); Shi *et al.* (2010); Xu *et al.* (2010); Yigit *et al.* (2005); Zhang *et al.* (2009); Zhao *et al.* (2009). For our previous work on metal complexes, see: Zhou *et al.* (2007); Wu *et al.* (2007).



Experimental

Crystal data

$[\text{Pb}_2(\text{C}_8\text{H}_2\text{NO}_6)(\text{OH})]$
 $M_r = 639.49$
 Monoclinic, $P2_1/c$
 $a = 7.5391$ (9) Å
 $b = 14.1845$ (17) Å
 $c = 10.3084$ (12) Å
 $\beta = 100.468$ (1)°

$V = 1084.0$ (2) Å³
 $Z = 4$
 Mo $K\alpha$ radiation
 $\mu = 31.05$ mm⁻¹
 $T = 291$ K
 $0.38 \times 0.26 \times 0.25$ mm

Data collection

Bruker SMART APEX CCD area-detector diffractometer
 Absorption correction: multi-scan (SADABS; Sheldrick, 1996)
 $T_{\text{min}} = 0.030$, $T_{\text{max}} = 0.047$

7870 measured reflections
 2014 independent reflections
 1903 reflections with $I > 2\sigma(I)$
 $R_{\text{int}} = 0.036$

Refinement

$R[F^2 > 2\sigma(F^2)] = 0.028$
 $wR(F^2) = 0.069$
 $S = 1.08$
 2014 reflections

157 parameters
 H-atom parameters constrained
 $\Delta\rho_{\text{max}} = 1.64$ e Å⁻³
 $\Delta\rho_{\text{min}} = -2.07$ e Å⁻³

Table 1

Selected bond lengths (Å).

Pb1—O5 ⁱ	2.422 (6)	Pb2—O1	2.600 (6)
Pb1—O1	2.489 (6)	Pb2—O2 ^{iv}	2.836 (7)
Pb1—N1	2.554 (6)	Pb2—O4 ^v	2.541 (6)
Pb1—O7 ⁱⁱ	2.627 (5)	Pb2—O7	2.318 (5)
Pb1—O3 ⁱⁱⁱ	2.697 (6)	Pb2—O7 ⁱⁱ	2.393 (5)
Pb1—O6	2.716 (6)		

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

Table 2

Hydrogen-bond geometry (Å, °).

$D-\text{H}\cdots A$	$D-\text{H}$	$\text{H}\cdots A$	$D\cdots A$	$D-\text{H}\cdots A$
$\text{O7}-\text{H7}\cdots\text{O6}^{\text{vi}}$	0.83	2.58	2.989 (8)	112
$\text{O7}-\text{H7}\cdots\text{O4}^{\text{iii}}$	0.83	2.49	2.884 (8)	110

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

Data collection: SMART (Bruker, 1997); cell refinement: SAINT (Bruker, 1997); 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); software used to prepare material for publication: SHELXTL.

We are grateful to the Natural Science Foundation of Anhui province (No. 090416234) for funding this study. We also thank the Doctoral Startup Foundation of Anhui Normal University.

Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: IS2628).

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supporting information

Acta Cryst. (2011). E67, m15–m16 [https://doi.org/10.1107/S1600536810049275]

Poly[μ_3 -hydroxido- μ -(pyridine-2,4,6-tricarboxylato)-dilead(II)]

Ying-Hua Zhou, Jian Chen, Yong Cheng and Nian-Rong Zhang

S1. Comment

Until recently, the construction of coordination polymers has been an active area because of the properties of catalysis and molecular magnetism (Shi *et al.*, 2010; O’Keeffe *et al.*, 2008; Zhang *et al.*, 2009). Pyridine-2,4,6-tricarboxylic acid (H_3ptc) is an effective ligand for coordinating to metal cations to generate diverse interesting coordination polymer architectures (Zhao *et al.*, 2009; Yigit *et al.*, 2005). However, the coordination polymers containing H_3ptc ligands are seldom high-dimensional complexes (Das *et al.*, 2009; Ghosh *et al.*, 2006). Because of the relatively large ionic radius of the Pb(II) cation, the lead complex should form some interesting frameworks (Ding *et al.*, 2009). Herein, we report the lead polymeric complex $[Pb_2(C_8H_2NO_6)(OH)]_n$, (I), which is a unique homometallic three-dimensional framework compound.

The asymmetric unit of (I) consists of two Pb(II) cations, one ptc trianion and one coordinated hydroxyl anion. As shown in Fig. 1, atom Pb1 is six-coordinated by two carboxylate O and one N atoms from a ligand ptc and one hydroxide anion O in a distorted square-planar geometry, and two carboxylate O atoms from the other two ligand ptc in the axial positions (Table 1). The $PbNO_5$ octahedron is distorted, with the O—Pb1—O(N) bond angles ranging from 64.0 (2) to 147.70 (19)°. Whereas atom Pb2 is five-coordinated by three carboxylate O atoms from two ptc and two μ_3 -hydroxide O atoms in a distorted tetragonal pyramid geometry. The Pb—O and Pb—N distances (Table 1) are comparable with those observed for $[Pb_2(bdc)_2(piphen)_2]_n$ (bdc is benzene-1,4-dicarboxylate and $piphen$ is 6-(4-pyridyl)-5*H*-imidazo[4,5-*f*][1,10]phenanthroline; Xu *et al.*, 2010). Each ptc molecule employs its three carboxylate groups and one N atom to chelate and bridge six Pb(II) cations. Two neighbouring Pb2 atoms are bis-bridged by two hydroxide O atoms (O7 and O7ⁱⁱ) to form a centrosymmetric $[Pb_2(OH)_2]^{2+}$ core which is linked by two Pb1 atoms through Pb1—O7ⁱⁱ and Pb1ⁱⁱ—O7 bonds to form $[Pb_1Pb_2(OH)_2]^{6+}$ unit (Fig. 2). The bonds of Pb2—O4^{iv}, Pb2—O1, Pb2ⁱⁱ—O1ⁱⁱ and Pb2ⁱⁱ—O4ⁱⁱⁱ bonds surrounding the $[Pb_2(OH)_2]^{2+}$ unit are contributed to forming a two-dimensional structure which is further tightened by the atoms of Pb1ⁱ, Pb1ⁱⁱⁱ, Pb1^{iv}, Pb1^v, Pb1^{vi} and Pb1^{viii} with joining neighbouring ptc ligands. Also, the two adjacent pyridine rings of ptc ligands are involved in π – π stacking interactions with offset face-to-face mode [centroid-to-centroid distance 3.5486 (4) Å] (Fig. 2). Furthermore, the two-dimensional structure are linked through Pb1—O5ⁱ and Pb1ⁱⁱ—O5^v bonds to generate a three-dimensional stereo structure. There are some hydrogen bonds O—H \cdots O in (I) between the hydroxide H atom and carboxylic O4ⁱⁱⁱ with an O \cdots O distance of 2.884 (8) Å (Table 2). Hydrogen bonds are helpful to enhance the stability of the molecular structure. A remarkable feature of this structure is the arrangement of $[Pb_1Pb_2(OH)_2]^{6+}$ units with infinite helices extending along the crystallographic *b* axis with intervening ptc ligands (Fig. 3). The helical structure is a comprehensive result of metal-ligand interactions and the π – π stacking interactions of pyridine rings of ptc ligands.

S2. Experimental

A solution of pyridine-2,4,6-tricarboxylic acid (208 mg, 1.0 mmol) and KOH (224 mg, 4.0 mmol) in anhydrous methanol (10 ml) was added slowly to a solution of $Pb(CH_3COO)_2$ (672 mg, 2.0 mmol) in anhydrous methanol (10 ml). The

resulting mixture was stirred for about 1 h at room temperature, sealed in a 25 ml Teflon-lined stainless steel autoclave and heated at 393 K for five days under autogenous pressure. The reaction system was cooled gradually to room temperature and colorless block-shaped crystals suitable for X-ray diffraction were collected.

S3. Refinement

H atoms were positioned geometrically ($C-H = 0.93 \text{ \AA}$ and $O-H = 0.83 \text{ \AA}$) and included in the refinement in the riding-model approximation, with $U_{iso}(H) = 1.2U_{eq}(C)$ and $1.5U_{eq}(O)$. The highest peak and the deepest hole in the difference Fourier map are located 0.78 and 0.97 \AA , respectively, from atom Pb2.

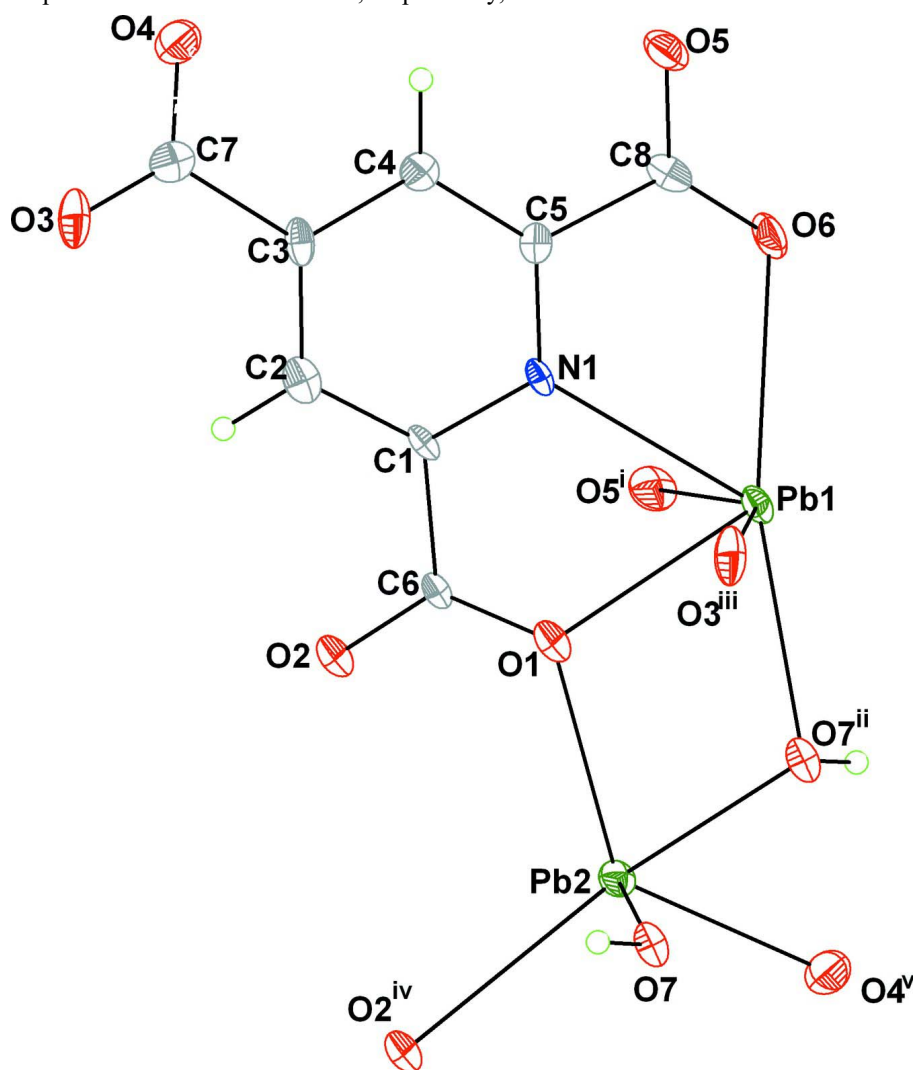


Figure 1

A view of the local coordination of the Pb^{II} atoms in the title compound, showing the atom-numbering scheme.

Displacement ellipsoids are drawn at the 50% probability level. H atoms are shown as small spheres of arbitrary radii.

[Symmetry codes: (i) $x, -y + 3/2, z - 1/2$; (ii) $-x, -y + 2, -z$; (iii) $-x + 1, -y + 2, -z + 1$; (iv) $-x + 1, -y + 2, -z$; (v) $x - 1, y, z - 1$.]

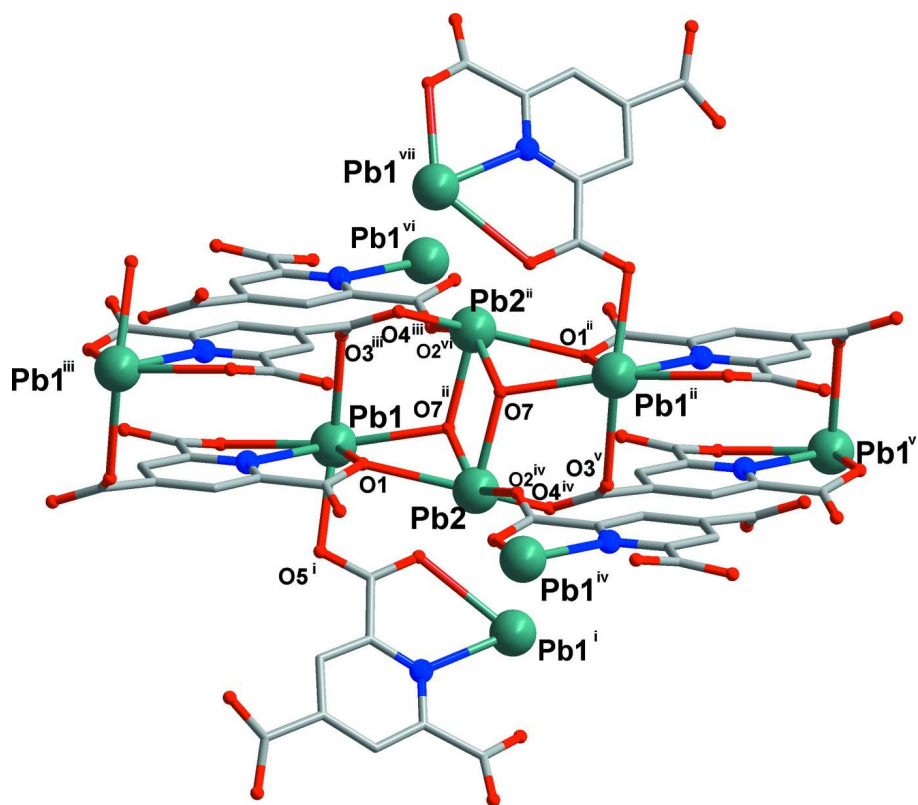


Figure 2

A view of the $[\text{Pb}_1\text{Pb}_2(\text{OH})_2]^{6+}$ unit, surrounded by four Pb1 atoms. [Symmetry codes: (i) $x, -y + 3/2, z - 1/2$; (ii) $-x, -y + 2, -z$; (iii) $-x + 1, -y + 2, -z + 1$; (iv) $-x + 1, -y + 2, -z$; (v) $x - 1, y, z - 1$.]

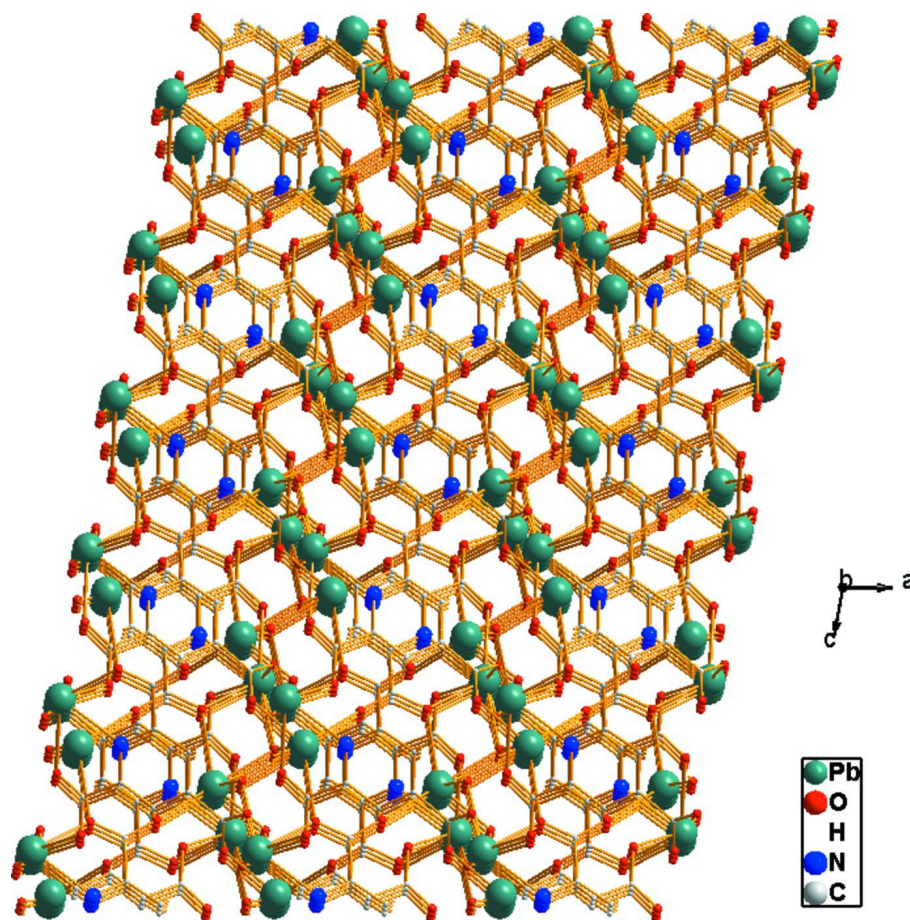


Figure 3

A packing diagram of the title compound viewed along the *b* axis.

Poly[μ_3 -hydroxido- μ -(pyridine-2,4,6-tricarboxylato)-dilead(II)]

Crystal data

[Pb₂(C₈H₂NO₆)(OH)]

$M_r = 639.49$

Monoclinic, $P2_1/c$

Hall symbol: -P 2ybc

$a = 7.5391$ (9) Å

$b = 14.1845$ (17) Å

$c = 10.3084$ (12) Å

$\beta = 100.468$ (1)°

$V = 1084.0$ (2) Å³

$Z = 4$

$F(000) = 1112$

$D_x = 3.918$ Mg m⁻³

Mo $K\alpha$ radiation, $\lambda = 0.71073$ Å

Cell parameters from 5542 reflections

$\theta = 2.5$ – 28.2 °

$\mu = 31.05$ mm⁻¹

$T = 291$ K

Block, white

$0.38 \times 0.26 \times 0.25$ mm

Data collection

Bruker SMART APEX CCD area-detector
diffractometer

Radiation source: fine-focus sealed tube

Graphite monochromator

φ and ω scans

Absorption correction: multi-scan
(*SADABS*; Sheldrick, 1996)

$T_{\min} = 0.030$, $T_{\max} = 0.047$

7870 measured reflections

2014 independent reflections

1903 reflections with $I > 2\sigma(I)$

$R_{\text{int}} = 0.036$
 $\theta_{\text{max}} = 25.5^\circ$, $\theta_{\text{min}} = 2.5^\circ$
 $h = -9 \rightarrow 9$

$k = -17 \rightarrow 17$
 $l = -12 \rightarrow 12$

Refinement

Refinement on F^2
 Least-squares matrix: full
 $R[F^2 > 2\sigma(F^2)] = 0.028$
 $wR(F^2) = 0.069$
 $S = 1.08$
 2014 reflections
 157 parameters
 0 restraints
 Primary atom site location: structure-invariant
 direct methods

Secondary atom site location: difference Fourier
 map
 Hydrogen site location: inferred from
 neighbouring sites
 H-atom parameters constrained
 $w = 1/[\sigma^2(F_o^2) + (0.0382P)^2 + 7.726P]$
 where $P = (F_o^2 + 2F_c^2)/3$
 $(\Delta/\sigma)_{\text{max}} = 0.001$
 $\Delta\rho_{\text{max}} = 1.64 \text{ e } \text{\AA}^{-3}$
 $\Delta\rho_{\text{min}} = -2.07 \text{ e } \text{\AA}^{-3}$

Special details

Geometry. All e.s.d.'s (except the e.s.d. in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell e.s.d.'s are taken into account individually in the estimation of e.s.d.'s in distances, angles and torsion angles; correlations between e.s.d.'s in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell e.s.d.'s is used for estimating e.s.d.'s involving l.s. planes.

Refinement. Refinement of F^2 against ALL reflections. The weighted R -factor wR and goodness of fit S are based on F^2 , conventional R -factors R are based on F , with F set to zero for negative F^2 . The threshold expression of $F^2 > \sigma(F^2)$ is used only for calculating R -factors(gt) *etc.* and is not relevant to the choice of reflections for refinement. R -factors based on F^2 are statistically about twice as large as those based on F , and R -factors based on ALL data will be even larger.

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

	<i>x</i>	<i>y</i>	<i>z</i>	$U_{\text{iso}}^*/U_{\text{eq}}$
Pb1	0.06507 (4)	0.84421 (2)	0.28447 (3)	0.01366 (11)
Pb2	0.18306 (4)	0.93099 (2)	-0.06649 (3)	0.01411 (11)
O1	0.2977 (9)	0.9297 (5)	0.1872 (6)	0.0289 (11)
O2	0.5925 (8)	0.9461 (5)	0.1816 (6)	0.0289 (11)
O3	0.9877 (8)	0.9721 (4)	0.6667 (6)	0.0225 (13)
O4	0.9167 (8)	0.8519 (4)	0.7875 (6)	0.0250 (14)
O5	0.2690 (8)	0.7768 (4)	0.7342 (6)	0.0213 (12)
O6	0.1106 (8)	0.7676 (4)	0.5298 (5)	0.0229 (13)
O7	0.0597 (7)	1.0796 (4)	-0.0536 (5)	0.0152 (11)
H7	0.1117	1.1285	-0.0232	0.023*
N1	0.3717 (8)	0.8650 (4)	0.4344 (6)	0.0105 (12)
C1	0.5100 (10)	0.9033 (5)	0.3862 (7)	0.0112 (14)
C2	0.6798 (11)	0.9170 (5)	0.4616 (8)	0.0162 (16)
H2	0.7720	0.9438	0.4249	0.019*
C3	0.7094 (10)	0.8896 (5)	0.5943 (8)	0.0140 (15)
C4	0.5682 (11)	0.8484 (5)	0.6457 (8)	0.0175 (17)
H4	0.5847	0.8288	0.7331	0.021*
C5	0.4032 (10)	0.8379 (5)	0.5626 (8)	0.0116 (15)
C6	0.4651 (11)	0.9281 (5)	0.2410 (8)	0.0150 (16)
C7	0.8872 (11)	0.9068 (6)	0.6901 (8)	0.0163 (16)

C8 0.2459 (11) 0.7909 (5) 0.6105 (7) 0.0147 (16)

Atomic displacement parameters (Å²)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Pb1	0.01119 (17)	0.01504 (17)	0.01652 (18)	-0.00022 (11)	0.00723 (12)	0.00207 (10)
Pb2	0.01304 (18)	0.01647 (18)	0.01407 (17)	0.00281 (11)	0.00580 (12)	0.00070 (10)
O1	0.018 (2)	0.048 (3)	0.021 (2)	-0.010 (2)	0.0067 (19)	0.010 (2)
O2	0.018 (2)	0.048 (3)	0.021 (2)	-0.010 (2)	0.0067 (19)	0.010 (2)
O3	0.013 (3)	0.022 (3)	0.032 (3)	-0.007 (3)	0.004 (3)	-0.010 (3)
O4	0.019 (3)	0.037 (4)	0.019 (3)	0.003 (3)	0.002 (2)	0.002 (3)
O5	0.023 (3)	0.025 (3)	0.018 (3)	-0.003 (3)	0.010 (2)	0.003 (2)
O6	0.021 (3)	0.030 (3)	0.019 (3)	-0.017 (3)	0.006 (3)	-0.002 (2)
O7	0.014 (3)	0.013 (3)	0.021 (3)	-0.002 (2)	0.008 (2)	-0.001 (2)
N1	0.010 (3)	0.008 (3)	0.016 (3)	-0.002 (2)	0.006 (3)	0.001 (2)
C1	0.012 (4)	0.009 (3)	0.014 (4)	-0.001 (3)	0.008 (3)	0.001 (3)
C2	0.016 (4)	0.012 (4)	0.023 (4)	0.001 (3)	0.008 (3)	-0.002 (3)
C3	0.011 (4)	0.008 (3)	0.024 (4)	-0.003 (3)	0.005 (3)	-0.004 (3)
C4	0.017 (4)	0.019 (4)	0.016 (4)	-0.002 (3)	0.002 (3)	0.001 (3)
C5	0.011 (4)	0.009 (4)	0.016 (4)	0.000 (3)	0.003 (3)	-0.003 (3)
C6	0.012 (4)	0.019 (4)	0.015 (4)	-0.005 (3)	0.005 (3)	0.003 (3)
C7	0.017 (4)	0.017 (4)	0.016 (4)	0.009 (3)	0.005 (3)	-0.002 (3)
C8	0.023 (4)	0.008 (3)	0.015 (4)	0.000 (3)	0.009 (3)	-0.001 (3)

Geometric parameters (Å, °)

Pb1—O5 ⁱ	2.422 (6)	O5—C8	1.272 (9)
Pb1—O1	2.489 (6)	O5—Pb1 ^{vii}	2.422 (6)
Pb1—N1	2.554 (6)	O6—C8	1.238 (10)
Pb1—O7 ⁱⁱ	2.627 (5)	O7—Pb2 ⁱⁱ	2.393 (5)
Pb1—O3 ⁱⁱⁱ	2.697 (6)	O7—Pb1 ⁱⁱ	2.627 (5)
Pb1—O6	2.716 (6)	O7—H7	0.8286
Pb2—O1	2.600 (6)	N1—C1	1.348 (10)
Pb2—O2 ^{iv}	2.836 (7)	N1—C5	1.355 (10)
Pb2—O4 ^v	2.541 (6)	C1—C2	1.385 (11)
Pb2—O7	2.318 (5)	C1—C6	1.515 (10)
Pb2—O7 ⁱⁱ	2.393 (5)	C2—C3	1.401 (11)
O1—C6	1.283 (10)	C2—H2	0.9300
O2—C6	1.256 (10)	C3—C4	1.400 (12)
O3—C7	1.247 (11)	C3—C7	1.533 (11)
O3—Pb1 ⁱⁱⁱ	2.698 (6)	C4—C5	1.384 (11)
O4—C7	1.258 (10)	C4—H4	0.9300
O4—Pb2 ^{vi}	2.541 (6)	C5—C8	1.519 (11)
O5 ⁱ —Pb1—O1	74.8 (2)	Pb2—O7—H7	127.9
O5 ⁱ —Pb1—N1	70.8 (2)	Pb2 ⁱⁱ —O7—H7	102.2
O1—Pb1—N1	64.0 (2)	Pb1 ⁱⁱ —O7—H7	93.8
O5 ⁱ —Pb1—O7 ⁱⁱ	103.54 (18)	C1—N1—C5	117.6 (6)

O1—Pb1—O7 ⁱⁱ	66.24 (19)	C1—N1—Pb1	119.9 (5)
N1—Pb1—O7 ⁱⁱ	129.54 (18)	C5—N1—Pb1	122.5 (5)
O5 ⁱ —Pb1—O3 ⁱⁱⁱ	147.70 (19)	N1—C1—C2	123.2 (7)
O1—Pb1—O3 ⁱⁱⁱ	75.1 (2)	N1—C1—C6	114.1 (6)
N1—Pb1—O3 ⁱⁱⁱ	85.62 (18)	C2—C1—C6	122.6 (7)
O7 ⁱⁱ —Pb1—O3 ⁱⁱⁱ	74.41 (17)	C1—C2—C3	118.4 (7)
O5 ⁱ —Pb1—O6	86.45 (19)	C1—C2—H2	120.8
O1—Pb1—O6	126.23 (19)	C3—C2—H2	120.8
N1—Pb1—O6	62.30 (18)	C4—C3—C2	119.2 (7)
O7 ⁱⁱ —Pb1—O6	166.35 (17)	C4—C3—C7	117.3 (7)
O3 ⁱⁱⁱ —Pb1—O6	102.15 (18)	C2—C3—C7	123.4 (7)
O7—Pb2—O7 ⁱⁱ	71.0 (2)	C5—C4—C3	118.1 (7)
O7—Pb2—O4 ^v	98.8 (2)	C5—C4—H4	121.0
O7 ⁱⁱ —Pb2—O4 ^v	71.47 (19)	C3—C4—H4	121.0
O7—Pb2—O1	90.7 (2)	N1—C5—C4	123.5 (7)
O7 ⁱⁱ —Pb2—O1	67.99 (19)	N1—C5—C8	115.6 (7)
O4 ^v —Pb2—O1	132.45 (19)	C4—C5—C8	120.9 (7)
C6—O1—Pb1	121.8 (5)	O2—C6—O1	124.4 (7)
C6—O1—Pb2	123.8 (5)	O2—C6—C1	118.4 (7)
Pb1—O1—Pb2	106.2 (2)	O1—C6—C1	117.2 (7)
C7—O3—Pb1 ⁱⁱⁱ	124.4 (5)	O3—C7—O4	126.0 (8)
C7—O4—Pb2 ^{vi}	101.9 (5)	O3—C7—C3	119.0 (7)
C8—O5—Pb1 ^{vii}	110.5 (5)	O4—C7—C3	115.0 (7)
C8—O6—Pb1	117.9 (5)	O6—C8—O5	125.3 (7)
Pb2—O7—Pb2 ⁱⁱ	108.9 (2)	O6—C8—C5	119.7 (7)
Pb2—O7—Pb1 ⁱⁱ	113.8 (2)	O5—C8—C5	115.0 (7)
Pb2 ⁱⁱ —O7—Pb1 ⁱⁱ	108.2 (2)		
O5 ⁱ —Pb1—O1—C6	-61.3 (6)	C5—N1—C1—C6	177.8 (6)
N1—Pb1—O1—C6	14.5 (6)	Pb1—N1—C1—C6	-1.6 (8)
O7 ⁱⁱ —Pb1—O1—C6	-173.9 (7)	N1—C1—C2—C3	0.1 (11)
O3 ⁱⁱⁱ —Pb1—O1—C6	106.9 (6)	C6—C1—C2—C3	-178.4 (7)
O6—Pb1—O1—C6	12.5 (7)	C1—C2—C3—C4	0.8 (11)
O5 ⁱ —Pb1—O1—Pb2	88.2 (3)	C1—C2—C3—C7	-175.9 (7)
N1—Pb1—O1—Pb2	163.9 (3)	C2—C3—C4—C5	-0.9 (11)
O7 ⁱⁱ —Pb1—O1—Pb2	-24.43 (19)	C7—C3—C4—C5	175.9 (7)
O3 ⁱⁱⁱ —Pb1—O1—Pb2	-103.7 (3)	C1—N1—C5—C4	0.6 (11)
O6—Pb1—O1—Pb2	162.02 (19)	Pb1—N1—C5—C4	180.0 (6)
O7—Pb2—O1—C6	-115.5 (6)	C1—N1—C5—C8	-177.3 (6)
O7 ⁱⁱ —Pb2—O1—C6	175.3 (7)	Pb1—N1—C5—C8	2.1 (8)
O4 ^v —Pb2—O1—C6	141.8 (6)	C3—C4—C5—N1	0.2 (11)
O7—Pb2—O1—Pb1	95.8 (3)	C3—C4—C5—C8	178.0 (7)
O7 ⁱⁱ —Pb2—O1—Pb1	26.6 (2)	Pb1—O1—C6—O2	159.2 (7)
O4 ^v —Pb2—O1—Pb1	-6.8 (4)	Pb2—O1—C6—O2	15.2 (11)
O5 ⁱ —Pb1—O6—C8	82.5 (6)	Pb1—O1—C6—C1	-21.2 (9)
O1—Pb1—O6—C8	14.3 (7)	Pb2—O1—C6—C1	-165.2 (5)
N1—Pb1—O6—C8	12.3 (5)	N1—C1—C6—O2	-165.9 (7)
O7 ⁱⁱ —Pb1—O6—C8	-139.9 (7)	C2—C1—C6—O2	12.7 (12)

O3 ⁱⁱⁱ —Pb1—O6—C8	-66.1 (6)	N1—C1—C6—O1	14.5 (10)
O7 ⁱⁱ —Pb2—O7—Pb2 ⁱⁱ	0.001 (1)	C2—C1—C6—O1	-167.0 (7)
O4 ^v —Pb2—O7—Pb2 ⁱⁱ	66.8 (2)	Pb1 ⁱⁱⁱ —O3—C7—O4	-100.9 (9)
O1—Pb2—O7—Pb2 ⁱⁱ	-66.4 (2)	Pb1 ⁱⁱⁱ —O3—C7—C3	78.7 (8)
O7 ⁱⁱ —Pb2—O7—Pb1 ⁱⁱ	-120.9 (3)	Pb2 ^{vi} —O4—C7—O3	11.2 (9)
O4 ^v —Pb2—O7—Pb1 ⁱⁱ	-54.0 (2)	Pb2 ^{vi} —O4—C7—C3	-168.5 (5)
O1—Pb2—O7—Pb1 ⁱⁱ	172.7 (2)	C4—C3—C7—O3	-152.7 (7)
O5 ⁱ —Pb1—N1—C1	76.4 (5)	C2—C3—C7—O3	24.0 (11)
O1—Pb1—N1—C1	-5.6 (5)	C4—C3—C7—O4	27.0 (10)
O7 ⁱⁱ —Pb1—N1—C1	-15.5 (6)	C2—C3—C7—O4	-156.3 (7)
O3 ⁱⁱⁱ —Pb1—N1—C1	-81.2 (5)	Pb1—O6—C8—O5	165.4 (6)
O6—Pb1—N1—C1	172.7 (6)	Pb1—O6—C8—C5	-16.6 (9)
O5 ⁱ —Pb1—N1—C5	-103.0 (5)	Pb1 ^{viii} —O5—C8—O6	18.5 (10)
O1—Pb1—N1—C5	175.0 (6)	Pb1 ^{viii} —O5—C8—C5	-159.6 (5)
O7 ⁱⁱ —Pb1—N1—C5	165.1 (5)	N1—C5—C8—O6	10.3 (10)
O3 ⁱⁱⁱ —Pb1—N1—C5	99.5 (5)	C4—C5—C8—O6	-167.6 (7)
O6—Pb1—N1—C5	-6.7 (5)	N1—C5—C8—O5	-171.5 (6)
C5—N1—C1—C2	-0.7 (11)	C4—C5—C8—O5	10.6 (11)
Pb1—N1—C1—C2	179.8 (6)		

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

Hydrogen-bond geometry ($\text{\AA}, ^\circ$)

$D-H\cdots A$	$D-H$	$H\cdots A$	$D\cdots A$	$D-H\cdots A$
O7—H7 \cdots O6 ^{viii}	0.83	2.58	2.989 (8)	112
O7—H7 \cdots O4 ⁱⁱⁱ	0.83	2.49	2.884 (8)	110

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