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Retraction of articles by H. Zhong *et al.*

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A series of 41 papers by H. Zhong *et al.* are retracted.

As a result of problems with the data sets and incorrect atom assignments, 41 papers by H. Zhong *et al.* are retracted. Full details of all the articles are given in Table 1.

Table 1
Details of articles to be retracted, in order of publication.

Title	Reference	DOI	Refcode
Aquachlorobis(1,10-phenanthroline)cobalt(II) chloride thiourea solvate	Zhong, Zeng, Liu & Luo (2006*a*)	10.1107/S1600536806041122	KERQEE
cis-Dichlorobis(1,10-phenanthroline)cobalt(II)	Zhong, Zeng & Luo (2006)	10.1107/S1600536806047295	MEQFOE
Tris(quinolin-8-olato-κ^2N,O)cobalt(III) glyoxal hemisolvate monohydrate	Zhong, Zeng, Liu & Luo (2006*b*)	10.1107/S1600536806050240	MEQHEW
(8-Quinolinol-κ^2N,O)bis(8-quinolinolato-κ^2N,O)nickel(II) glyoxal hemisolvate monohydrate	Zhong, Zeng, Liu & Luo (2007)	10.1107/S1600536806053232	METVUD
Aquachlorobis(1,10-phenanthroline)cobalt(II) chloride thioacetamide solvate	Zhong, Zeng & Luo (2007)	10.1107/S1600536806053530	METQIM
(8-Quinolinol-κ^2N,O)-bis(8-quinolinolato-κ^2N,O)zinc(II) glyoxal hemisolvate monohydrate	Zhong, Zeng, Luo, Li & Xiao (2007)	10.1107/S1600536807001171	DEXTEG
(Dimethylglyoxime-κ^2N,N')bis(1,10-phenanthroline-κ^2N,N')nickel(II) dinitrate dihydrate	Zhong, Zeng, Yang, Luo & Li (2007*a*)	10.1107/S1600536807004102	YEYGOZ
(Dimethylglyoxime-κ^2N,N')bis(1,10-phenanthroline-κ^2N,N')zinc(II) dinitrate dihydrate	Zhong, Zeng, Yang, Luo & Li (2007*b*)	10.1107/S1600536807004096	YEYGUF
Chloridobis(1,10-phenanthroline-$\kappa N,N'$)copper(I) hexahydrate	Zhong, Zeng, Yang, Luo & Xiao (2007)	10.1107/S160053680700791X	HEGKOU01
Tetrakis(pyridine-κN)bis(thiocyanato-κN)cobalt(II)	Zhong, Zeng, Yang & Luo (2007*a*)	10.1107/S1600536807017461	ITCPCO01
Tetrakis(pyridine-κN)bis(thiocyanato-κN)copper(II)	Zhong, Zeng, Yang & Luo (2007*b*)	10.1107/S160053680701879X	AVUJEG02
Tetrakis(nitrato-κ^2O,O')bis(4-phenylpyridine-κN)cerium(IV)	Zhong, Zeng, Yang & Luo (2007*c*)	10.1107/S1600536807018831	CICDOI
Bis(4,4′-bipyridine-κ^2N,N')tetrakis(nitrato-κ^2O,O')cerium(IV)	Zhong, Zeng, Yang & Luo (2007*d*)	10.1107/S1600536807021502	YIDNEF
(1,10-Phenanthroline)tris(phenoxyacetato)lanthanum(III)	Zhong, Zeng, Yang, Luo & Xu (2007)	10.1107/S1600536807027171	EDUROL
(1,10-Phenanthroline)tris(phenoxyacetato)cerium(III)	Zhong, Yang, Luo & Xu (2007*a*)	10.1107/S1600536807028061	EDUTUT
(1,10-Phenanthroline)tri(3-phenylpropanoato)lanthanum(III)	Zhong, Yang, Luo & Xu (2007*b*)	10.1107/S1600536807028693	RIGQEE
(1,10-Phenanthroline-κ^2N,N')tris(phenoxyacetato)-$\kappa O;\kappa O;\kappa O,O'$-neodymium(III)	Zhong, Yang, Luo & Xu (2007*c*)	10.1107/S1600536807030371	UDUMEM
Bis(2,2′-bipyridyl-κ^2N,N')bis(thiocyanato-κN)nickel(II)	Zhong, Yang, Luo & Xu (2007*d*)	10.1107/S1600536807031613	YEJGOJ01
Bis(2,2′-bipyridyl-κ^2N,N')bis(isothiocyanato-κN)copper(II)	Zhong, Yang, Luo & Xu (2007*e*)	10.1107/S1600536807033181	UFAPOH
Bis(2,2′-bipyridyl-κ^2N,N')bis(thiocyanato-κN)zinc(II)	Zhong, Yang, Luo & Xu (2007*f*)	10.1107/S1600536807035337	TIGFAR
(1,10-Phenanthroline-κ^2N,N')tris(3-phenylpropanoato-κO)neodymium(III)	Zhong, Yang, Luo & Xu (2007*g*)	10.1107/S1600536807035350	TIGFEV
2-Fluoro-3,5-dinitrobenzamide monohydrate	Zhong, Yang, Xie & Luo (2007*j*)	10.1107/S1600536807038676	VIKGAY
2-Fluoro-3,5-dinitrobenzoic acid-ammonia (1/1)	Zhong, Yang, Xie & Luo (2007*k*)	10.1107/S1600536807039724	KILKIA
1-Hydroxy-4,6-dinitropyridine-2-carboxamide monohydrate	Zhong, Yang, Xie & Luo (2007*l*)	10.1107/S1600536807040779	AFETAH
N-(2-Hydroxyphenyl)carbamic acid-ammonia (1/1)	Zhong, Yang, Xie & Luo (2007*m*)	10.1107/S160053680704086X	AFINAF
catena-Poly[[bis(μ-anilinoacetato-$\kappa^2O:O'$)bis(μ-anilinoacetato-$\kappa^3O,O':O$)bis[(1,10-phenanthroline-κ^2N,N')samarium(III)]-μ-anilinoacetato-$\kappa^2O:O'$]	Zhong, Yang, Xie & Luo (2007*a*)	10.1107/S1600536807043528	PILDAQ
2-Hydroxy-5-nitrobenzene-1,3-dicarboxylic acid monohydrate	Zhong, Yang, Xie & Luo (2007*n*)	10.1107/S1600536807045199	XILWIZ
catena-Poly[[tetra-μ-anilinoacetato-bis(1,10-phenanthroline)-dineodymium(III)]-di-μ-anilinoacetato]	Zhong, Yang, Xie & Luo (2007*b*)	10.1107/S1600536807048489	WIMWEV
Hexaaquacopper(II) bis(4-methylbenzenesulfonate)	Zhong, Yang, Xie & Luo (2007*c*)	10.1107/S1600536807049525	TOLSCV01

Table 1 (continued)

Title	Reference	DOI	Refcode
catena-Poly[[tetra-μ-anilinoacetato-bis(1,10-phenanthroline)-dilanthanum(III)]-di-μ-anilinoacetato]	Zhong, Yang, Xie & Luo (2007*d*)	10.1107/S1600536807051240	GIMZEI
Hexaaquachromium(II) bis(4-methylbenzenesulfonate)	Zhong, Yang, Xie & Luo (2007*e*)	10.1107/S1600536807051227	GIMZIM
Hexaaquamanganese(II) bis(4-methylbenzenesulfonate)	Zhong, Yang, Xie & Luo (2007*f*)	10.1107/S1600536807052051	QUKQES01
catena-Poly[[(acetato-κO)(1,10-phenanthroline-κ^2N,N')cobalt(II)]-μ-acetato-$\kappa^2O:O'$]	Zhong, Yang, Xie & Luo (2007*g*)	10.1107/S1600536807053494	NIQLAB
Hexaaquanickel(II) bis(4-aminobenzenesulfonate)	Zhong, Zhong, Xie & Luo (2007*a*)	10.1107/S1600536807054372	HIPZOW
catena-Poly[[(acetato-κO)(1,10-phenanthroline-κ^2N,N')copper(II)]-μ-acetato-$\kappa^2O:O'$]	Zhong, Yang, Xie & Luo (2007*h*)	10.1107/S160053680705622X	XIRGOV
Hexaaquazinc(II) bis(4-aminobenzenesulfonate)	Zhong, Zhong, Xie & Luo (2007*b*)	10.1107/S1600536807056498	XIRJEO
catena-Poly[[(acetato-κO)(1,10-phenanthroline-κ^2N,N')nickel(II)]-μ-acetato-$\kappa^2O:O'$]	Zhong, Yang, Xie & Luo (2007*i*)	10.1107/S1600536807058540	HIQJOH
Hexaaquacobalt(II) bis(4-aminobenzenesulfonate)	Zhong, Xie & Luo (2007)	10.1107/S1600536807058527	HIQJUN
catena-Poly[[tetra-μ-anilinoacetato-bis(1,10-phenanthroline)-dieuropium(III)]-di-μ-anilinoacetato]	Zhong, Yang, Duan & Hong (2007)	10.1107/S1600536807060643	YIQMAN
(Dimethylglyoxime-κ^2N,N')bis(1,10-phenanthroline-κ^2N,N')copper(II) dinitrate dihydrate	Zhong, Yang, Luo & Li (2007)	10.1107/S1600536807061193	YIQNUI
catena-Poly[[(1,10-phenanthroline-κ^2N,N')praseodymium(III)]-di-μ-phenoxyacetato-$\kappa^4O:O'$-[(1,10-phenanthroline-κ^2N,N')-praseodymium(III)]-di-μ-phenoxyacetato-$\kappa^4O:O'$-di-μ-phenoxyacetato-$\kappa^3O,O':O;\kappa^3O:O,O'$]	Zhong, Yang, Luo & Xu (2008)	10.1107/S1600536807068614	GISJIC

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Bis(4,4′-bipyridine-κ^2N,N')tetrakis(nitrato-κ^2O,O')cerium(IV)

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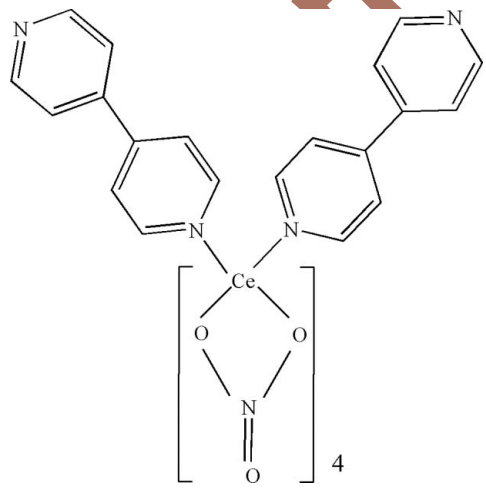
Key indicators: single-crystal X-ray study; T = 273 K; mean σ(C–C) = 0.005 Å; R factor = 0.024; wR factor = 0.074; data-to-parameter ratio = 13.9.

The asymmetric unit of the title compound, $[Ce(NO_3)_4(C_{10}H_8N_2)_2]$, contains one half-molecule. The Ce^{IV} atom, lying on a crystallographic twofold rotation axis, is ten-coordinated by two N atoms of 4,4′-bipyridine and eight O atoms of four NO_3^- ligands. In the crystal structure, intra- and intermolecular C—H···O hydrogen bonds link the molecules into a supramolecular network.

Related literature

For general background, see: Allen *et al.* (1987); Benelli *et al.* (1992); Deborah *et al.* (2000); Farrugia *et al.* (2000); Miller & Drillon (2001*a*,*b*, 2002); Modolo & Odoj (1998).



4

Experimental

Crystal data

$[Ce(NO_3)_4(C_{10}H_8N_2)_2]$
M_r = 700.53
Monoclinic, $C2/c$
a = 19.106 (2) Å
b = 7.8107 (8) Å
c = 19.000 (7) Å
β = 116.004 (2)°
V = 2548.4 (10) Å^3
Z = 4
Mo $K\alpha$ radiation
μ = 1.87 mm^{-1}
T = 273 (2) K
0.40 × 0.33 × 0.21 mm

Data collection

Bruker APEXII area-detector diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996)
T_{min} = 0.491, T_{max} = 0.675
8401 measured reflections
2593 independent reflections
2537 reflections with $I > 2\sigma(I)$
R_{int} = 0.015

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.024
$wR(F^2)$ = 0.074
S = 1.07
2593 reflections
186 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 0.42 e Å^{-3}
$\Delta\rho_{min}$ = −0.54 e Å^{-3}

Table 1
Selected geometric parameters (Å, °).

Ce1—O1	2.591 (3)	Ce1—O6	2.385 (2)
Ce1—O3	2.604 (3)	Ce1—N3	2.585 (3)
Ce1—O4	2.596 (3)		
O1—Ce1—O3	46.95 (8)	O4—Ce1—O6	49.94 (8)
O1—Ce1—O4	143.55 (9)	O1—Ce1—N3	72.52 (9)
O1—Ce1—O6	118.27 (8)	O3—Ce1—N3	69.32 (9)
O3—Ce1—O4	105.94 (9)	O4—Ce1—N3	126.48 (9)
O3—Ce1—O6	71.80 (9)	O6—Ce1—N3	80.59 (9)

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

D—H···A	D—H	H···A	D···A	D—H···A
C3—H3···O6	0.93	2.391	3.030 (4)	125.71
C8—H8···O1^{i}	0.93	2.451	3.009 (3)	118.54
C9—H9···O2^{ii}	0.93	2.415	3.292 (4)	157.25
C10—H10···O3^{iii}	0.93	2.252	3.149 (3)	161.36

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

Data collection: *SMART* (Siemens, 1996); cell refinement: *SAINT* (Siemens, 1996); data reduction: *SAINT*; program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *SHELXTL* (Siemens, 1996); 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: HK2243).

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supplementary materials

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Bis(4,4'-bipyridine-κ^2N,N')tetrakis(nitrato-κ^2O,O')cerium(IV)

H. Zhong, X.-R. Zeng, X.-M. Yang and Q.-Y. Luo

Comment

Molecular magnetic compounds, such as molecular ferro- and ferrimagnets, organic magnets, single-molecule magnets and high-spin molecules, have recently attracted attention (Miller & Drillon, 2001*a*,b, 2002). Owing to lanthanide metals unique physical and chemical properties, lanthanide complexes play an important role in special materials having optical, electronic, magnetic and biological importance (Benelli *et al.*, 1992; Deborah *et al.*, 2000; Farrugia *et al.*, 2000). More importantly, since the removal of lanthanides from radioactive high level liquid waste (HLLW) has been shown to improve the transmutation of long-lived transuranic elements to shortlived or even stable nuclides (Modolo & Odoj, 1998), the coordination chemistry of the 4f metals continues to attract interest. We herein report the crystal structure of the title compound, (I).

The asymmetric unit of the title compound, (I), contains one-half molecule (Fig. 1). The bond lengths and angles (Table 1) are within normal ranges (Allen *et al.*, 1987). The irregular ten-coordinate environment of the Ce^{IV} atom, lying on a crystallographic twofold rotation axis, is completed by the two N atoms of 4,4'-bipyridine and eight O atoms of four NO_3^- ligands (Table 1). The Ce—O bonds are between 2.385 (2)–2.604 (3) Å, while the Ce—N bond length is 2.585 (3) Å.

Rings A (N3/C1—C5) and B (N4/C6—C10) are, of course, planar and the dihedral angle between them is A/B = 37.56 (2)°.

As can be seen from the packing diagram (Fig. 2), the intra- and intermolecular C—H···O hydrogen bonds (Table 2) link the molecules into a supramolecular network structure, in which they may be effective in the stabilization of the crystal structure. Dipol-dipol and van der Waals interactions are also effective in the molecular packing.

Experimental

For the preparation of the title compound, ammonium cerium(IV) nitrate (109.6 mg, 0.2 mmol), 4,4'-bipyridine (62.4 mg, 0.4 mmol), and distilled water (4000.0 mg) were placed into a Teflon-lined Parr bomb (23 ml) and sealed. The bomb was then heated under autogenous pressure for 7 d at 413 K and allowed to cool at room temperature for 24 h. Upon opening the bomb, a clear colorless solution was decanted from small colorless crystals, which were washed with distilled water followed by ethanol, and allowed to air-dry at room temperature (yield; 58.6 mg, 34%).

Refinement

H atoms were positioned geometrically, with C—H = 0.93 Å for aromatic H and constrained to ride on their parent atoms, with $U_{iso}(H) = 1.2U_{eq}(C)$.

Figures

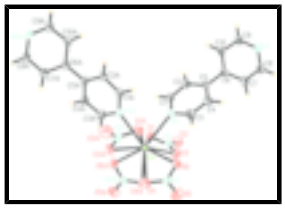

Fig. 1. The molecular structure of the title molecule, with the atom-numbering scheme. Displacement ellipsoids are drawn at the 30% probability level [symmetry code (A): 2 − *x*, *y*, 1 − *z*].

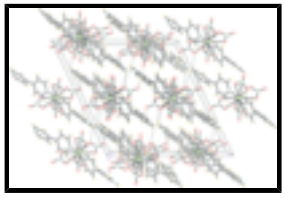

Fig. 2. A packing diagram of (I). Hydrogen bonds are shown as dashed lines.

Bis(4,4'-bipyridine-κ^2*N*,*N*')tetrakis(nitrato-κ^2*O*,*O*')cerium(IV)

Crystal data

$[Ce(NO_3)_4(C_{10}H_8N_2)_2]$	F_{000} = 1384
M_r = 700.53	D_x = 1.826 Mg m^{-3}
Monoclinic, *C*2/*c*	Mo *K*α radiation λ = 0.71073 Å
Hall symbol: -C 2yc	Cell parameters from 8351 reflections
a = 19.106 (2) Å	θ = 2.5–29.5°
b = 7.8107 (8) Å	μ = 1.87 mm^{-1}
c = 19.000 (7) Å	*T* = 273 (2) K
β = 116.004 (2)°	Plane, colorless
V = 2548.4 (10) Å^3	0.40 × 0.33 × 0.21 mm
Z = 4	

Data collection

Bruker APEXII area-detector diffractometer	2593 independent reflections
Radiation source: fine-focus sealed tube	2537 reflections with $I > 2\sigma(I)$
Monochromator: graphite	R_{int} = 0.015
T = 273(2) K	θ_{max} = 26.7°
φ and ω scans	θ_{min} = 2.4°
Absorption correction: multi-scan (SADABS; Sheldrick, 1996)	*h* = −23→24
T_{min} = 0.491, T_{max} = 0.675	*k* = −9→9
8401 measured reflections	*l* = −24→24

Refinement

Refinement on F^2	Secondary atom site location: difference Fourier map

Least-squares matrix: full

$R[F^2 > 2\sigma(F^2)] = 0.024$

$wR(F^2) = 0.074$

$S = 1.07$

2593 reflections

186 parameters

Primary atom site location: structure-invariant direct methods

Hydrogen site location: inferred from neighbouring sites

H-atom parameters constrained

$w = 1/[\sigma^2(F_o^2) + (0.0526P)^2 + 3.3178P]$ where $P = (F_o^2 + 2F_c^2)/3$

$(\Delta/\sigma)_{max} < 0.001$

$\Delta\rho_{max} = 0.42$ e Å^{-3}

$\Delta\rho_{min} = -0.54$ e Å^{-3}

Extinction correction: none

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 (Å^2)

	x	*y*	*z*	U_{iso}*/U_{eq}
Ce1	1.0000	0.33854 (2)	0.7500	0.03153 (9)
O1	1.09207 (13)	0.4419 (3)	0.88993 (15)	0.0569 (6)
O2	1.0829 (2)	0.4126 (4)	1.00244 (16)	0.0779 (8)
O3	0.99750 (16)	0.3044 (3)	0.88522 (16)	0.0573 (6)
O4	0.92877 (16)	0.0719 (3)	0.66851 (18)	0.0669 (7)
O5	0.81807 (17)	−0.0040 (4)	0.65285 (18)	0.0730 (8)
O6	0.87813 (15)	0.2149 (3)	0.72864 (16)	0.0571 (6)
N1	1.05818 (17)	0.3858 (4)	0.92901 (17)	0.0504 (6)
N2	0.87324 (16)	0.0902 (3)	0.68201 (17)	0.0485 (6)
N3	0.93573 (16)	0.6018 (4)	0.78013 (17)	0.0477 (6)
C1	0.9748 (2)	0.7369 (4)	0.8261 (2)	0.0500 (7)
H1	1.0263	0.7512	0.8348	0.060*
C2	0.9466 (2)	0.8530 (4)	0.8604 (2)	0.0475 (7)
H2	0.9768	0.9434	0.8901	0.057*
C3	0.8644 (2)	0.5861 (5)	0.7672 (2)	0.0526 (7)
H3	0.8344	0.4991	0.7344	0.063*
C4	0.8317 (2)	0.6939 (4)	0.8003 (2)	0.0496 (7)
H4	0.7800	0.6774	0.7904	0.060*
C5	0.8740 (2)	0.8308 (3)	0.8494 (2)	0.0419 (7)
C6	0.84260 (17)	0.9442 (4)	0.89068 (17)	0.0421 (6)
C7	0.7947 (2)	0.8785 (4)	0.9185 (2)	0.0478 (7)
H7	0.7817	0.7629	0.9126	0.057*

C8	0.7657 (2)	0.9864 (4)	0.9555 (2)	0.0531 (7)
H8	0.7325	0.9414	0.9749	0.064*
N4	0.7822 (2)	1.1529 (3)	0.9655 (2)	0.0545 (7)
C9	0.8276 (3)	1.2173 (5)	0.9398 (3)	0.0669 (10)
H9	0.8389	1.3337	0.9463	0.080*
C10	0.8600 (2)	1.1175 (5)	0.9028 (3)	0.0609 (10)
H10	0.8942	1.1661	0.8855	0.073*

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Ce1	0.03102 (14)	0.02770 (13)	0.04625 (14)	0.000	0.02651 (10)	0.000
O1	0.0442 (12)	0.0573 (14)	0.0749 (15)	−0.0090 (10)	0.0314 (11)	0.0003 (12)
O2	0.097 (2)	0.078 (2)	0.0546 (14)	−0.0085 (18)	0.0294 (14)	−0.0023 (14)
O3	0.0553 (15)	0.0614 (13)	0.0687 (15)	−0.0134 (12)	0.0397 (13)	−0.0034 (12)
O4	0.0621 (16)	0.0520 (14)	0.105 (2)	−0.0035 (12)	0.0533 (15)	−0.0174 (14)
O5	0.0616 (16)	0.0654 (16)	0.0906 (19)	−0.0287 (13)	0.0321 (14)	−0.0171 (14)
O6	0.0552 (14)	0.0488 (12)	0.0831 (16)	−0.0098 (11)	0.0449 (13)	−0.0164 (12)
N1	0.0530 (16)	0.0455 (13)	0.0567 (15)	0.0008 (13)	0.0277 (13)	0.0032 (12)
N2	0.0481 (15)	0.0409 (13)	0.0605 (15)	−0.0058 (12)	0.0277 (12)	−0.0031 (12)
N3	0.0499 (15)	0.0440 (14)	0.0641 (15)	0.0027 (12)	0.0386 (13)	−0.0034 (12)
C1	0.0507 (18)	0.0407 (16)	0.077 (2)	−0.0029 (13)	0.0447 (16)	−0.0034 (15)
C2	0.0475 (18)	0.0409 (16)	0.069 (2)	−0.0060 (12)	0.0389 (17)	−0.0078 (13)
C3	0.0469 (17)	0.0502 (18)	0.0668 (19)	−0.0022 (14)	0.0306 (15)	−0.0151 (15)
C4	0.0412 (17)	0.0516 (16)	0.0623 (18)	0.0015 (13)	0.0284 (15)	−0.0098 (15)
C5	0.0434 (17)	0.0405 (16)	0.0520 (16)	0.0037 (11)	0.0302 (14)	0.0013 (11)
C6	0.0404 (14)	0.0412 (14)	0.0527 (15)	0.0023 (12)	0.0278 (12)	−0.0028 (12)
C7	0.0444 (17)	0.0458 (15)	0.0639 (18)	−0.0028 (13)	0.0336 (15)	−0.0062 (14)
C8	0.0475 (17)	0.0573 (19)	0.0694 (19)	−0.0006 (14)	0.0393 (15)	−0.0059 (16)
N4	0.0531 (18)	0.0536 (18)	0.0732 (19)	0.0049 (11)	0.0428 (16)	−0.0106 (12)
C9	0.079 (3)	0.0452 (18)	0.105 (3)	−0.0039 (18)	0.068 (2)	−0.015 (2)
C10	0.072 (2)	0.0422 (16)	0.099 (3)	−0.0057 (16)	0.065 (2)	−0.0103 (18)

Geometric parameters (Å, °)

Ce1—O1	2.591 (3)	C1—C2	1.359 (4)
Ce1—O3	2.604 (3)	C1—H1	0.9300
Ce1—O4	2.596 (3)	C2—C5	1.319 (5)
Ce1—O6	2.385 (2)	C2—H2	0.9300
Ce1—N3	2.585 (3)	C3—C4	1.356 (4)
Ce1—O6^{i}	2.386 (2)	C3—H3	0.9300
Ce1—N3^{i}	2.585 (3)	C4—C5	1.417 (5)
Ce1—O1^{i}	2.591 (3)	C4—H4	0.9300
Ce1—O4^{i}	2.596 (3)	C5—C6	1.474 (4)
Ce1—O3^{i}	2.604 (3)	C6—C7	1.344 (4)
Ce1—N2^{i}	2.925 (3)	C6—C10	1.388 (5)
O1—N1	1.258 (4)	C7—C8	1.362 (4)

O2—N1	1.279 (4)	C7—H7	0.9300
O3—N1	1.263 (4)	C8—N4	1.332 (4)
O4—N2	1.204 (4)	C8—H8	0.9300
O5—N2	1.203 (4)	N4—C9	1.272 (5)
O6—N2	1.292 (4)	C9—C10	1.368 (5)
N3—C3	1.280 (4)	C9—H9	0.9300
N3—C1	1.365 (5)	C10—H10	0.9300
O1—Ce1—O3	46.95 (8)	O1—Ce1—N2^{i}	72.25 (8)
O1—Ce1—O4	143.55 (9)	O4—Ce1—N2^{i}	81.22 (8)
O1—Ce1—O6	118.27 (8)	O4^{i}—Ce1—N2^{i}	24.28 (8)
O3—Ce1—O4	105.94 (9)	O3—Ce1—N2^{i}	82.31 (9)
O3—Ce1—O6	71.80 (9)	O3^{i}—Ce1—N2^{i}	89.89 (8)
O4—Ce1—O6	49.94 (8)	N1—O1—Ce1	101.74 (19)
O1—Ce1—N3	72.52 (9)	N1—O3—Ce1	100.94 (18)
O3—Ce1—N3	69.32 (9)	N2—O4—Ce1	93.31 (19)
O4—Ce1—N3	126.48 (9)	N2—O6—Ce1	101.16 (18)
O6—Ce1—N3	80.59 (9)	O1—N1—O3	110.4 (3)
O6—Ce1—O6^{i}	132.25 (13)	O1—N1—O2	123.1 (3)
O6—Ce1—N3^{i}	143.85 (9)	O3—N1—O2	126.5 (3)
O6^{i}—Ce1—N3^{i}	80.59 (9)	O5—N2—O4	120.3 (3)
O6^{i}—Ce1—N3	143.85 (10)	O5—N2—O6	124.2 (3)
N3^{i}—Ce1—N3	74.59 (12)	O4—N2—O6	115.5 (3)
O6—Ce1—O1^{i}	77.21 (9)	C3—N3—C1	115.8 (3)
O6^{i}—Ce1—O1^{i}	118.27 (8)	C3—N3—Ce1	116.8 (2)
N3^{i}—Ce1—O1^{i}	72.52 (9)	C1—N3—Ce1	125.2 (2)
N3—Ce1—O1^{i}	78.74 (9)	C2—C1—N3	127.0 (3)
O6^{i}—Ce1—O1	77.21 (9)	C2—C1—H1	116.5
N3^{i}—Ce1—O1	78.74 (9)	N3—C1—H1	116.5
O1^{i}—Ce1—O1	143.71 (12)	C5—C2—C1	116.6 (3)
O6^{i}—Ce1—O4	89.66 (9)	C5—C2—H2	121.7
N3^{i}—Ce1—O4	133.00 (9)	C1—C2—H2	121.7
O1^{i}—Ce1—O4	72.27 (9)	N3—C3—C4	121.3 (3)
O6—Ce1—O4^{i}	89.66 (9)	N3—C3—H3	119.3
O6^{i}—Ce1—O4^{i}	49.94 (8)	C4—C3—H3	119.3
N3^{i}—Ce1—O4^{i}	126.48 (9)	C3—C4—C5	121.9 (3)
N3—Ce1—O4^{i}	133.00 (9)	C3—C4—H4	119.1
O1^{i}—Ce1—O4^{i}	143.55 (9)	C5—C4—H4	119.1
O1—Ce1—O4^{i}	72.27 (9)	C2—C5—C4	117.4 (3)
O4—Ce1—O4^{i}	73.30 (14)	C2—C5—C6	118.8 (3)
O6^{i}—Ce1—O3	103.27 (9)	C4—C5—C6	123.8 (3)
N3^{i}—Ce1—O3	121.06 (8)	C7—C6—C10	117.6 (3)
O1^{i}—Ce1—O3	138.28 (8)	C7—C6—C5	119.1 (3)

O4^{i}—Ce1—O3	63.97 (9)	C10—C6—C5	123.3 (3)
O6—Ce1—O3^{i}	103.27 (9)	C6—C7—C8	117.9 (3)
O6^{i}—Ce1—O3^{i}	71.80 (9)	C6—C7—H7	121.1
N3^{i}—Ce1—O3^{i}	69.32 (9)	C8—C7—H7	121.1
N3—Ce1—O3^{i}	121.06 (8)	N4—C8—C7	123.7 (3)
O1^{i}—Ce1—O3^{i}	46.95 (8)	N4—C8—H8	118.2
O1—Ce1—O3^{i}	138.27 (8)	C7—C8—H8	118.2
O4—Ce1—O3^{i}	63.97 (9)	C9—N4—C8	119.3 (3)
O4^{i}—Ce1—O3^{i}	105.94 (9)	N4—C9—C10	120.8 (4)
O3—Ce1—O3^{i}	168.25 (12)	N4—C9—H9	119.6
O6—Ce1—N2^{i}	111.37 (9)	C10—C9—H9	119.6
O6^{i}—Ce1—N2^{i}	25.69 (8)	C9—C10—C6	120.7 (3)
N3^{i}—Ce1—N2^{i}	104.09 (8)	C9—C10—H10	119.6
N3—Ce1—N2^{i}	144.26 (9)	C6—C10—H10	119.6
O1^{i}—Ce1—N2^{i}	135.89 (7)		

Symmetry codes: (i) −*x*+2, *y*, −*z*+3/2.

Table 2

Table 1. Hydrogen-bond geometry (Å, °).

D—H···A	D—H	H···A	D···A	D—H···A
C3—H3···O6	0.93	2.391	3.030 (4)	125.71
C8—H8···O1^{i}	0.93	2.451	3.009 (3)	118.54
C9—H9···O2^{ii}	0.93	2.415	3.292 (4)	157.25
C10—H10···O3^{iii}	0.93	2.252	3.149 (3)	161.36

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

Fig. 1

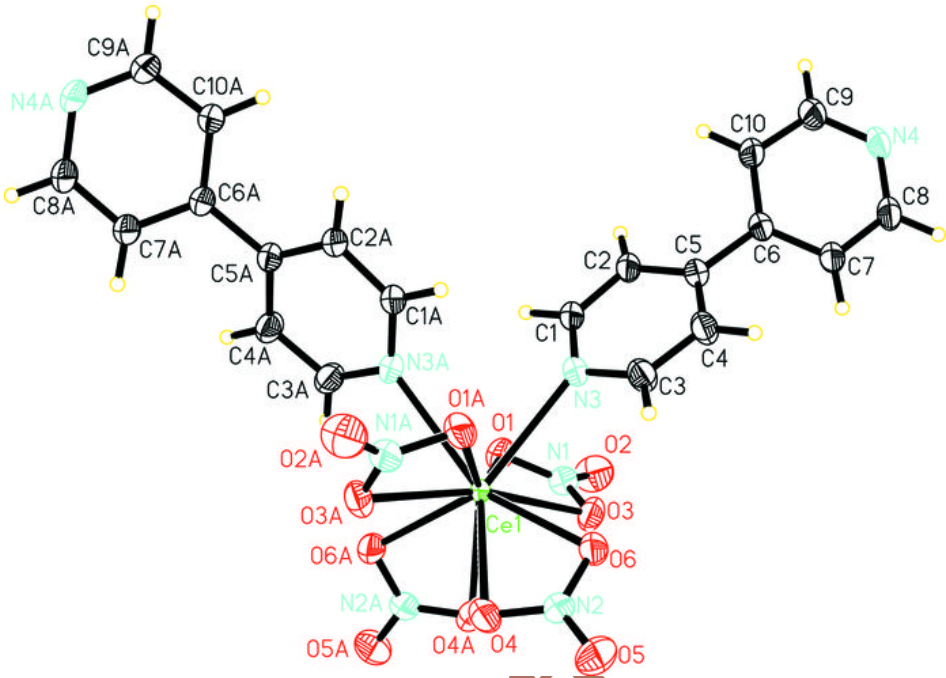

Fig. 2