Acta Crystallographica Section E
Structure Reports Online
ISSN 1600-5368

Tetra-μ-acetato-$\kappa^4O{:}O';\kappa^3O,O'{:}O';\kappa^3O{:}O,O'$-bis[(acetato-$\kappa^2O,O'$)(1,10-phenanthroline-$\kappa^2N,N'$)europium(III)]

Wen-Jing Liu, Zhao-Yang Li, Zhi-Qiang Wei and Shan-Tang Yue*

School of Chemistry and Environment, South China Normal University, Guangzhou 510006, People's Republic of China
Correspondence e-mail: yuesht@scnu.edu.cn

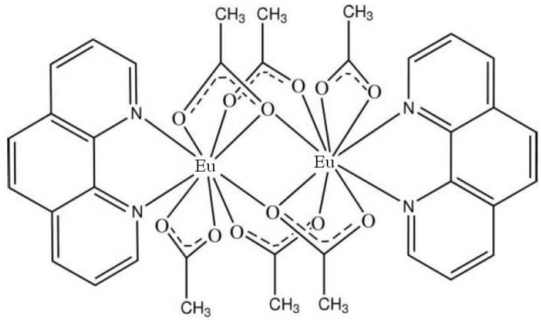
Received 26 April 2010; accepted 28 April 2010

Key indicators: single-crystal X-ray study; T = 298 K; mean σ(C–C) = 0.008 Å; R factor = 0.030; wR factor = 0.062; data-to-parameter ratio = 14.1.

In the title centrosymmetric dinuclear Eu^{III} complex, $[Eu_2(CH_3COO)_6(C_{12}H_8N_2)_2]$, each Eu^{III} cation is coordinated by seven O atoms from five acetate anions and two N atoms from one phenanthroline ligand in a distorted tricapped trigonal-prismatic geometry. Four acetate anions bridge two Eu^{III} cations to form the dinuclear complex, with an Eu···Eu distance of 3.9409 (8) Å. Weak intermolecular C—H···O hydrogen bonding is present in the crystal structure.

Related literature

For related lanthanide complexes with 1,10-phenanthroline and acetate ligands, see: Hu *et al.* (2006); Panagiotopoulos *et al.* (1995).



Experimental

Crystal data

$[Eu_2(C_2H_3O_2)_6(C_{12}H_8N_2)_2]$
M_r = 1018.61
Triclinic, $P\overline{1}$
a = 8.7671 (19) Å
b = 8.9265 (19) Å
c = 12.992 (3) Å
α = 103.631 (2)°
β = 109.254 (2)°
γ = 98.300 (3)°
V = 905.1 (3) Å^3
Z = 1
Mo $K\alpha$ radiation
μ = 3.50 mm^{-1}
T = 298 K
0.20 × 0.19 × 0.18 mm

Data collection

Bruker SMART CCD diffractometer
Absorption correction: multi-scan (*SADABS*; Bruker, 2001)
T_{min} = 0.541, T_{max} = 0.571
5010 measured reflections
3474 independent reflections
3062 reflections with $I > 2\sigma(I)$
R_{int} = 0.021

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.030
$wR(F^2)$ = 0.062
S = 1.05
3474 reflections
247 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 0.80 e Å^{-3}
$\Delta\rho_{min}$ = −0.64 e Å^{-3}

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

D—H···A	D—H	H···A	D···A	D—H···A
C2—H2···O2^{i}	0.93	2.57	3.287 (6)	135
C12—H8···O6^{ii}	0.93	2.44	3.078 (6)	126
C16—H10*C*···O1^{iii}	0.96	2.45	3.390 (6)	165

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

Data collection: *SMART* (Bruker, 2001); cell refinement: *SAINT* (Bruker, 2001); data reduction: *SAINT*; program(s) used to solve structure: *SHELXTL* (Sheldrick, 2008); program(s) used to refine structure: *SHELXTL*; molecular graphics: *SHELXTL*; software used to prepare material for publication: *SHELXTL*.

This work was supported financially by Guangdong Provincial Science and Technology Bureau (grant No. 2008B010600009) and the NSFC (grant Nos. 20971047 and U0734005).

Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: XU2753).

References

Bruker (2001). *SMART*, *SAINT* and *SADABS*. Bruker AXS Inc., Madison, Wisconsin, USA.
Hu, X.-L., Qiu, L., Sun, W.-B. & Chen, Z. (2006). *Acta Cryst.* E**62**, m3213–m3214.
Panagiotopoulos, A., Zafiropoulos, T. F., Perlepes, S. P., Bakalbassis, E., Masson-Ramade, I., Kahn, O., Terzis, A. & Raptopoulou, C. P. (1995). *Inorg. Chem.* **34**, 4918–4923.
Sheldrick, G. M. (2008). *Acta Cryst.* A**64**, 112–122.

supplementary materials

Acta Cryst. (2010). E**66**, m606 [**doi:10.1107/S1600536810015680**]

Tetra-μ-acetato-$\kappa^4O:O';\kappa^3O,O':O';\kappa^3O:O,O'$-bis[(acetato-$\kappa^2O,O'$)(1,10-phenanthroline-$\kappa^2N,N'$)europium(III)]

W.-J. Liu, Z.-Y. Li, Z.-Q. Wei and S.-T. Yue

Comment

Dinuclear lanthanide complexes with 1,10-phenanthroline and acetate ligands had previously been reported (Panagiotopoulos *et al.*, 1995; Hu *et al.*, 2006). In this title complex, each Eu atom is coordinated by two N atoms from one chelating phenanthroline ligand and seven oxygen atoms from acetate ions, to form a distorted tricapped trigonal prism, giving a dimeric structure with an inversion center (Fig.1). The result of the dinuclear centrosymmetric molecule with the Eu···Eu distance of 3.9409 (8) Å was that acetate ions exhibit three different coordination modes: common bidentate chelating mode, bidentate bridging mode and tridentate bridging mode. The Eu1—O bond distances vary from 2.359 (3) Å to 2.586 (3) Å and the Eu1—N bond length are 2.594 (3) Å and 2.649 (4) Å. The C—O distances of CH_3COO^- are within the range of 1.257 (5)Å to 1.273 (5) Å. This complex exhibits a three-dimensional structure via C—H···O hydrogen-bonds (Table 1).

Experimental

A stoichiometric amount of acetic acid and a quantitative amount of 1,10-phenanthroline (0.5 mmol) were mixed and then dissolved in 95% ethanol solution (20 ml). The pH value of the solution was adjusted to 6.5 by adding 1.0 M NaOH solution, and then added dropwise to the ethanol solution (20 ml) of $Eu(NO_3)_3.6H_2O$ (0.5 mmol). The solution mixture was stirred continuously for 2 h at room temperature and then filtered. Single crystals were obtained by evaporation after one week.

Refinement

H atoms were positioned in calculated positions, with C—H = 0.93 (aromatic) and 0.96 Å (methyl), and refined in riding mode with $U_{iso}(H) = 1.5U_{eq}(C)$ for methyl and $1.2U_{eq}(C)$ for the others.

Figures

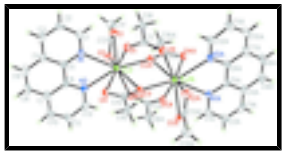


Fig. 1. Displacement ellipsoid plot (40% probability level) of the title compound [symmetry code: (A) -x+1, -y+2, -z+1].

Tetra-μ-acetato-$\kappa^4O:O';\kappa^3O,O':O'$; $\kappa^3O:O,O'$-bis[(acetato-κ^2O,O')(1,10- phenanthroline-κ^2N,N')europium(III)]

Crystal data

$[Eu_2(C_2H_3O_2)_6(C_{12}H_8N_2)_2]$ $Z = 1$

M_r = 1018.61	F(000) = 500
Triclinic, $P\overline{1}$	D_x = 1.869 Mg m^{-3}
Hall symbol: -P 1	Mo $K\alpha$ radiation, λ = 0.71073 Å
a = 8.7671 (19) Å	Cell parameters from 2079 reflections
b = 8.9265 (19) Å	θ = 0.7–25.2°
c = 12.992 (3) Å	μ = 3.50 mm^{-1}
α = 103.631 (2)°	T = 298 K
β = 109.254 (2)°	Block, colorless
γ = 98.300 (3)°	0.20 × 0.19 × 0.18 mm
V = 905.1 (3) Å^3	

Data collection

Bruker SMART CCD diffractometer	3474 independent reflections
Radiation source: fine-focus sealed tube	3062 reflections with $I > 2\sigma(I)$
graphite	R_{int} = 0.021
ω scans	θ_{max} = 26.0°, θ_{min} = 1.7°
Absorption correction: multi-scan (SADABS; Bruker, 2001)	h = −10→10
T_{min} = 0.541, T_{max} = 0.571	k = −8→10
5010 measured reflections	l = −14→15

Refinement

Refinement on F^2	Primary atom site location: structure-invariant direct methods
Least-squares matrix: full	Secondary atom site location: difference Fourier map
$R[F^2 > 2\sigma(F^2)]$ = 0.030	Hydrogen site location: inferred from neighbouring sites
$wR(F^2)$ = 0.062	H-atom parameters constrained
S = 1.05	$w = 1/[\sigma^2(F_o^2) + (0.025P)^2]$ where $P = (F_o^2 + 2F_c^2)/3$
3474 reflections	$(\Delta/\sigma)_{max} < 0.001$
247 parameters	$\Delta\rho_{max}$ = 0.80 e Å^{-3}
0 restraints	$\Delta\rho_{min}$ = −0.64 e Å^{-3}

Special details

Geometry. All esds (except the esd in the dihedral angle between two l.s. planes) are estimated using the full covariance matrix. The cell esds are taken into account individually in the estimation of esds in distances, angles and torsion angles; correlations between esds in cell parameters are only used when they are defined by crystal symmetry. An approximate (isotropic) treatment of cell esds is used for estimating esds 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}
Eu1	0.47430 (3)	0.84412 (3)	0.356229 (17)	0.02341 (8)
O3	0.5788 (4)	1.1409 (4)	0.4756 (2)	0.0312 (7)
O4	0.6208 (4)	1.0735 (4)	0.3157 (2)	0.0336 (7)
O2	0.2565 (4)	0.5955 (4)	0.2687 (3)	0.0419 (8)
O1	0.5000 (4)	0.5829 (4)	0.3834 (3)	0.0373 (8)
O5	0.7449 (4)	0.8969 (4)	0.4988 (2)	0.0310 (7)
N1	0.6375 (4)	0.7194 (4)	0.2384 (3)	0.0277 (8)
C1	0.7671 (6)	0.6658 (5)	0.2863 (4)	0.0362 (11)
H1	0.7915	0.6637	0.3612	0.043*
C2	0.8702 (6)	0.6116 (6)	0.2307 (4)	0.0423 (12)
H2	0.9609	0.5753	0.2678	0.051*
C3	0.8341 (6)	0.6134 (6)	0.1215 (4)	0.0450 (13)
H3	0.9007	0.5782	0.0829	0.054*
C4	0.6972 (6)	0.6680 (6)	0.0664 (4)	0.0368 (11)
C7	0.4176 (6)	0.7809 (6)	−0.0387 (4)	0.0421 (13)
C6	0.4559 (6)	0.7750 (5)	0.0747 (3)	0.0294 (10)
N2	0.3612 (5)	0.8179 (4)	0.1353 (3)	0.0323 (9)
C12	0.2280 (6)	0.8637 (6)	0.0849 (4)	0.0437 (13)
H8	0.1601	0.8895	0.1249	0.052*
C11	0.1825 (7)	0.8757 (7)	−0.0271 (4)	0.0565 (16)
H7	0.0883	0.9110	−0.0592	0.068*
C10	0.2789 (7)	0.8348 (7)	−0.0871 (4)	0.0524 (15)
H6	0.2516	0.8431	−0.1607	0.063*
C5	0.6006 (6)	0.7203 (5)	0.1290 (4)	0.0299 (10)
C15	0.6463 (5)	1.1743 (5)	0.4079 (4)	0.0284 (10)
C13	0.3479 (6)	0.5207 (5)	0.3230 (4)	0.0327 (11)
C8	0.5223 (7)	0.7281 (7)	−0.0976 (4)	0.0534 (15)
H5	0.4986	0.7328	−0.1718	0.064*
O6	0.7627 (4)	1.0478 (4)	0.6690 (2)	0.0336 (7)
C14	0.2753 (7)	0.3534 (6)	0.3168 (5)	0.0506 (14)
H9A	0.1575	0.3255	0.2737	0.076*
H9B	0.2959	0.3470	0.3927	0.076*
H9C	0.3264	0.2814	0.2800	0.076*
C16	0.7559 (6)	1.3374 (6)	0.4417 (4)	0.0422 (12)
H10A	0.8097	1.3412	0.3886	0.063*
H10B	0.8385	1.3612	0.5172	0.063*
H10C	0.6894	1.4140	0.4409	0.063*
C9	0.6513 (7)	0.6730 (7)	−0.0494 (4)	0.0539 (15)
H4	0.7136	0.6367	−0.0914	0.065*
C18	0.9975 (5)	0.9554 (6)	0.6560 (4)	0.0395 (12)
H11A	1.0003	0.8457	0.6445	0.059*
H11B	1.0414	1.0106	0.7365	0.059*
H11C	1.0636	1.0025	0.6206	0.059*
C17	0.8220 (5)	0.9669 (5)	0.6038 (4)	0.0277 (10)

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Eu1	0.02392 (12)	0.02795 (13)	0.02150 (12)	0.00926 (9)	0.01093 (9)	0.00800 (9)
O3	0.0368 (18)	0.0376 (18)	0.0297 (16)	0.0146 (15)	0.0192 (14)	0.0159 (15)
O4	0.0410 (19)	0.0386 (19)	0.0242 (16)	0.0079 (15)	0.0181 (14)	0.0077 (15)
O2	0.039 (2)	0.038 (2)	0.045 (2)	0.0085 (16)	0.0110 (16)	0.0142 (17)
O1	0.038 (2)	0.0360 (19)	0.0442 (19)	0.0151 (15)	0.0170 (16)	0.0167 (16)
O5	0.0288 (17)	0.0393 (19)	0.0243 (16)	0.0108 (14)	0.0111 (13)	0.0056 (14)
N1	0.030 (2)	0.028 (2)	0.0260 (19)	0.0091 (16)	0.0132 (16)	0.0064 (16)
C1	0.044 (3)	0.038 (3)	0.032 (3)	0.017 (2)	0.019 (2)	0.011 (2)
C2	0.034 (3)	0.047 (3)	0.050 (3)	0.018 (2)	0.018 (2)	0.013 (3)
C3	0.046 (3)	0.047 (3)	0.048 (3)	0.016 (3)	0.031 (3)	0.004 (3)
C4	0.043 (3)	0.037 (3)	0.032 (3)	0.011 (2)	0.021 (2)	0.003 (2)
C7	0.050 (3)	0.048 (3)	0.025 (2)	0.007 (3)	0.014 (2)	0.010 (2)
C6	0.036 (3)	0.027 (2)	0.022 (2)	0.004 (2)	0.011 (2)	0.0032 (19)
N2	0.034 (2)	0.035 (2)	0.027 (2)	0.0104 (18)	0.0096 (17)	0.0088 (18)
C12	0.039 (3)	0.061 (4)	0.031 (3)	0.024 (3)	0.011 (2)	0.012 (3)
C11	0.064 (4)	0.074 (4)	0.033 (3)	0.033 (3)	0.009 (3)	0.021 (3)
C10	0.069 (4)	0.060 (4)	0.027 (3)	0.018 (3)	0.013 (3)	0.016 (3)
C5	0.037 (3)	0.025 (2)	0.028 (2)	0.005 (2)	0.015 (2)	0.005 (2)
C15	0.027 (2)	0.034 (3)	0.031 (2)	0.012 (2)	0.014 (2)	0.015 (2)
C13	0.043 (3)	0.033 (3)	0.029 (2)	0.012 (2)	0.024 (2)	0.006 (2)
C8	0.067 (4)	0.071 (4)	0.029 (3)	0.018 (3)	0.027 (3)	0.015 (3)
O6	0.0333 (18)	0.0416 (19)	0.0257 (16)	0.0171 (15)	0.0109 (14)	0.0052 (15)
C14	0.064 (4)	0.033 (3)	0.057 (3)	0.004 (3)	0.027 (3)	0.016 (3)
C16	0.049 (3)	0.036 (3)	0.046 (3)	0.007 (2)	0.027 (3)	0.009 (2)
C9	0.063 (4)	0.066 (4)	0.037 (3)	0.017 (3)	0.030 (3)	0.008 (3)
C18	0.030 (3)	0.044 (3)	0.041 (3)	0.013 (2)	0.009 (2)	0.009 (2)
C17	0.027 (2)	0.028 (2)	0.034 (3)	0.0086 (19)	0.014 (2)	0.014 (2)

Geometric parameters (Å, °)

Eu1—O3^{i}	2.358 (3)	C7—C10	1.384 (7)
Eu1—O6^{i}	2.374 (3)	C7—C6	1.415 (6)
Eu1—O5	2.377 (3)	C7—C8	1.438 (7)
Eu1—O2	2.453 (3)	C6—N2	1.355 (5)
Eu1—O1	2.470 (3)	C6—C5	1.448 (6)
Eu1—O4	2.513 (3)	N2—C12	1.311 (6)
Eu1—O3	2.586 (3)	C12—C11	1.411 (7)
Eu1—N1	2.594 (3)	C12—H8	0.9300
Eu1—N2	2.649 (4)	C11—C10	1.358 (7)
Eu1—C13	2.815 (5)	C11—H7	0.9300
Eu1—C15	2.920 (4)	C10—H6	0.9300
Eu1—Eu1^{i}	3.9409 (8)	C15—C16	1.500 (6)
O3—C15	1.276 (5)	C13—C14	1.508 (6)
O3—Eu1^{i}	2.358 (3)	C8—C9	1.324 (8)

O4—C15	1.245 (5)	C8—H5	0.9300
O2—C13	1.262 (6)	O6—C17	1.273 (5)
O1—C13	1.262 (5)	O6—Eu1^{i}	2.374 (3)
O5—C17	1.256 (5)	C14—H9A	0.9600
N1—C1	1.319 (6)	C14—H9B	0.9600
N1—C5	1.351 (5)	C14—H9C	0.9600
C1—C2	1.402 (6)	C16—H10A	0.9600
C1—H1	0.9300	C16—H10B	0.9600
C2—C3	1.352 (7)	C16—H10C	0.9600
C2—H2	0.9300	C9—H4	0.9300
C3—C4	1.399 (7)	C18—C17	1.492 (6)
C3—H3	0.9300	C18—H11A	0.9600
C4—C5	1.410 (6)	C18—H11B	0.9600
C4—C9	1.437 (7)	C18—H11C	0.9600
O3^{i}—Eu1—O6^{i}	75.03 (10)	C5—N1—Eu1	120.7 (3)
O3^{i}—Eu1—O5	76.96 (10)	N1—C1—C2	123.7 (4)
O6^{i}—Eu1—O5	137.07 (10)	N1—C1—H1	118.2
O3^{i}—Eu1—O2	86.29 (10)	C2—C1—H1	118.2
O6^{i}—Eu1—O2	81.08 (11)	C3—C2—C1	118.2 (5)
O5—Eu1—O2	128.67 (11)	C3—C2—H2	120.9
O3^{i}—Eu1—O1	77.36 (10)	C1—C2—H2	120.9
O6^{i}—Eu1—O1	127.36 (11)	C2—C3—C4	120.5 (4)
O5—Eu1—O1	75.84 (10)	C2—C3—H3	119.8
O2—Eu1—O1	53.10 (11)	C4—C3—H3	119.8
O3^{i}—Eu1—O4	125.07 (10)	C3—C4—C5	117.4 (4)
O6^{i}—Eu1—O4	90.28 (11)	C3—C4—C9	123.4 (5)
O5—Eu1—O4	79.96 (10)	C5—C4—C9	119.2 (5)
O2—Eu1—O4	144.17 (10)	C10—C7—C6	117.6 (5)
O1—Eu1—O4	141.79 (10)	C10—C7—C8	123.9 (5)
O3^{i}—Eu1—O3	74.40 (11)	C6—C7—C8	118.5 (5)
O6^{i}—Eu1—O3	72.72 (10)	N2—C6—C7	122.5 (4)
O5—Eu1—O3	68.79 (10)	N2—C6—C5	118.0 (4)
O2—Eu1—O3	150.59 (10)	C7—C6—C5	119.5 (4)
O1—Eu1—O3	138.62 (10)	C12—N2—C6	117.9 (4)
O4—Eu1—O3	50.80 (9)	C12—N2—Eu1	122.8 (3)
O3^{i}—Eu1—N1	143.33 (11)	C6—N2—Eu1	118.7 (3)
O6^{i}—Eu1—N1	139.90 (10)	N2—C12—C11	123.2 (5)
O5—Eu1—N1	77.84 (10)	N2—C12—H8	118.4
O2—Eu1—N1	89.07 (11)	C11—C12—H8	118.4
O1—Eu1—N1	70.92 (11)	C10—C11—C12	118.8 (5)
O4—Eu1—N1	75.40 (10)	C10—C11—H7	120.6
O3—Eu1—N1	119.64 (10)	C12—C11—H7	120.6
O3^{i}—Eu1—N2	149.00 (11)	C11—C10—C7	120.0 (5)
O6^{i}—Eu1—N2	77.11 (11)	C11—C10—H6	120.0
O5—Eu1—N2	133.80 (10)	C7—C10—H6	120.0

O2—Eu1—N2	76.19 (11)	N1—C5—C4	122.1 (4)
O1—Eu1—N2	110.07 (11)	N1—C5—C6	118.6 (4)
O4—Eu1—N2	67.99 (10)	C4—C5—C6	119.3 (4)
O3—Eu1—N2	109.76 (10)	O4—C15—O3	120.4 (4)
N1—Eu1—N2	62.79 (11)	O4—C15—C16	121.0 (4)
O3^{i}—Eu1—C13	79.18 (11)	O3—C15—C16	118.5 (4)
O6^{i}—Eu1—C13	103.79 (13)	O4—C15—Eu1	58.8 (2)
O5—Eu1—C13	102.11 (13)	O3—C15—Eu1	62.3 (2)
O2—Eu1—C13	26.59 (12)	C16—C15—Eu1	172.3 (3)
O1—Eu1—C13	26.61 (12)	O2—C13—O1	121.4 (4)
O4—Eu1—C13	154.90 (11)	O2—C13—C14	119.9 (4)
O3—Eu1—C13	153.35 (11)	O1—C13—C14	118.8 (5)
N1—Eu1—C13	80.57 (12)	O2—C13—Eu1	60.5 (2)
N2—Eu1—C13	94.65 (12)	O1—C13—Eu1	61.3 (2)
O3^{i}—Eu1—C15	99.99 (11)	C14—C13—Eu1	173.6 (3)
O6^{i}—Eu1—C15	82.87 (11)	C9—C8—C7	122.1 (5)
O5—Eu1—C15	70.72 (11)	C9—C8—H5	119.0
O2—Eu1—C15	160.62 (12)	C7—C8—H5	119.0
O1—Eu1—C15	146.09 (11)	C17—O6—Eu1^{i}	136.1 (3)
O4—Eu1—C15	25.08 (10)	C13—C14—H9A	109.5
O3—Eu1—C15	25.89 (10)	C13—C14—H9B	109.5
N1—Eu1—C15	96.31 (11)	H9A—C14—H9B	109.5
N2—Eu1—C15	89.71 (11)	C13—C14—H9C	109.5
C13—Eu1—C15	172.71 (13)	H9A—C14—H9C	109.5
O3^{i}—Eu1—Eu1^{i}	39.20 (7)	H9B—C14—H9C	109.5
O6^{i}—Eu1—Eu1^{i}	69.54 (7)	C15—C16—H10A	109.5
O5—Eu1—Eu1^{i}	68.14 (7)	C15—C16—H10B	109.5
O2—Eu1—Eu1^{i}	122.20 (8)	H10A—C16—H10B	109.5
O1—Eu1—Eu1^{i}	111.19 (7)	C15—C16—H10C	109.5
O4—Eu1—Eu1^{i}	85.93 (7)	H10A—C16—H10C	109.5
O3—Eu1—Eu1^{i}	35.19 (6)	H10B—C16—H10C	109.5
N1—Eu1—Eu1^{i}	143.56 (8)	C8—C9—C4	121.4 (5)
N2—Eu1—Eu1^{i}	137.30 (8)	C8—C9—H4	119.3
C13—Eu1—Eu1^{i}	118.30 (9)	C4—C9—H4	119.3
C15—Eu1—Eu1^{i}	60.89 (9)	C17—C18—H11A	109.5
C15—O3—Eu1^{i}	160.5 (3)	C17—C18—H11B	109.5
C15—O3—Eu1	91.8 (3)	H11A—C18—H11B	109.5
Eu1^{i}—O3—Eu1	105.60 (10)	C17—C18—H11C	109.5
C15—O4—Eu1	96.1 (2)	H11A—C18—H11C	109.5
C13—O2—Eu1	92.9 (3)	H11B—C18—H11C	109.5
C13—O1—Eu1	92.1 (3)	O5—C17—O6	125.1 (4)
C17—O5—Eu1	139.2 (3)	O5—C17—C18	117.4 (4)
C1—N1—C5	118.2 (4)	O6—C17—C18	117.5 (4)
C1—N1—Eu1	120.9 (3)		

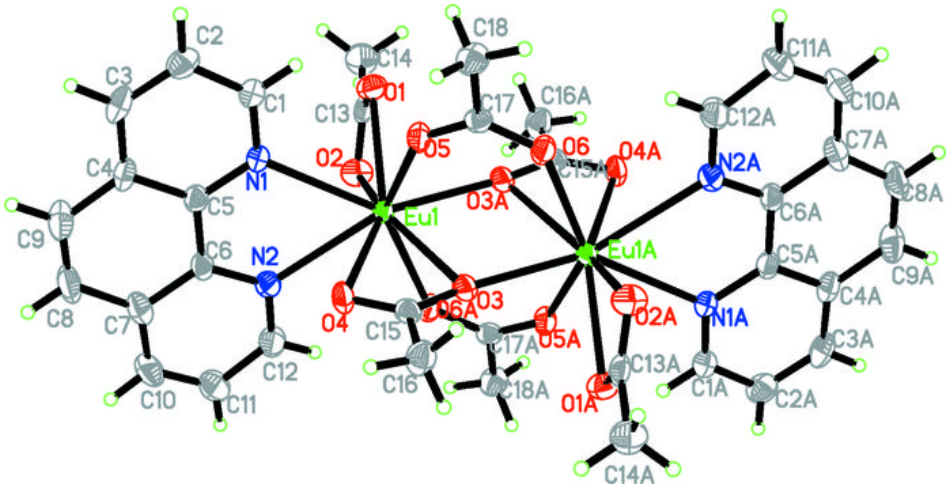
Symmetry codes: (i) −*x*+1, −*y*+2, −*z*+1.

Hydrogen-bond geometry (Å, °)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
C2—H2···O2^{ii}	0.93	2.57	3.287 (6)	135
C12—H8···O6^{i}	0.93	2.44	3.078 (6)	126
C16—H10C···O1^{iii}	0.96	2.45	3.390 (6)	165

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

Fig. 1


C2
C3
C1
C14
C18
C11A
C10A
C13
O1
C17
C16A
C12A
C7A
O2
O5
O6
O4A
N2A
C4
N1
C5
O3A
C8A
C9
C6
Eu1
Eu1A
C6A
N2
C5A
C9A
O4
O6A
O3
O2A
N1A
C4A
C8
C7
C15
O5A
C3A
C12
C17A
C13A
C16
C18A
O1A
C1A
C2A
C10
C11
C14A