Acta Crystallographica Section E
Structure Reports Online
ISSN 1600-5368

Tetrakis[μ-3-(3-pyridyl)acrylato-κ^2O:O']-bis{(1,10-phenanthroline-κ^2N,N')[3-(3-pyridyl)acrylato-κ^2O,O']europium(III)} pentahydrate

Chong-Bo Liu,[a] Hui-Liang Wen,[b]* Fang Deng[a] and Jun-Hui Zuo[b]

[a]College of Environmental and Chemical Engineering, Nanchang University of Aeronautics, Nanchang 330063, People's Republic of China, and [b]State Key Laboratory of Food Science and Technology, Nanchang University, Nanchang 330047, People's Republic of China
Correspondence e-mail: hlwen70@163.com

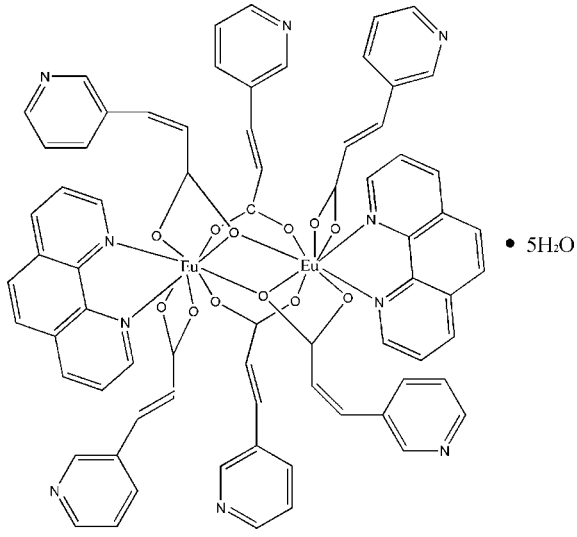
Received 8 November 2007; accepted 9 December 2007

Key indicators: single-crystal X-ray study; T = 293 K; mean σ(C–C) = 0.004 Å; disorder in solvent or counterion; R factor = 0.019; wR factor = 0.044; data-to-parameter ratio = 14.1.

The europium^{III} ion in the title compound, $[Eu_2(C_8H_6NO_2)_6(C_{12}H_8N_2)_2]\cdot 5H_2O$, is coordinated by seven carboxylate O atoms and two N atoms from one phenanthroline molecule. The carboxylate groups of 3-(3-pyridyl)acrylate link pairs of europium(III) ions, forming centrosymmetric dinuclear units, which further assemble into a sheet parallel to the (001) plane through hydrogen-bonding interactions involving the uncoordinated water molecules. One water molecule is disordered.

Related literature

For related literature, see: Gunning & Cahill (2005); Liu *et al.* (2006); Ye *et al.* (2005).



Experimental

Crystal data

$[Eu_2(C_8H_6NO_2)_6(C_{12}H_8N_2)_2]\cdot 5H_2O$
M_r = 1643.24
Monoclinic, $C2/c$
a = 25.434 (2) Å
b = 12.320 (10) Å
c = 22.595 (19) Å
β = 100.330 (10)°
V = 6965.4 (10) Å^3
Z = 4
Mo $K\alpha$ radiation
μ = 1.86 mm^{-1}
T = 293 (2) K
0.32 × 0.27 × 0.13 mm

Data collection

Bruker SMART CCD area-detector diffractometer
Absorption correction: multi-scan (*SADABS*; Sheldrick, 1996)
T_{min} = 0.585, T_{max} = 0.791
25928 measured reflections
6480 independent reflections
5721 reflections with $I > 2\sigma(I)$
R_{int} = 0.022

Refinement

$R[F^2 > 2\sigma(F^2)]$ = 0.019
$wR(F^2)$ = 0.044
S = 1.03
6480 reflections
460 parameters
H-atom parameters constrained
$\Delta\rho_{max}$ = 0.34 e Å^{-3}
$\Delta\rho_{min}$ = −0.25 e Å^{-3}

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

D—H···A	D—H	H···A	D···A	D—H···A
O1W—H11W···O6	0.85	1.94	2.775 (3)	171
O1W—H12W···N2^{i}	0.85	2.02	2.856 (3)	167
O2W—H21W···O1W^{ii}	0.82	2.48	2.851 (4)	109
O3W—H31W···O2W^{iii}	0.82	2.20	2.655 (7)	116

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

Data collection: *SMART* (Bruker, 1998); cell refinement: *SAINT* (Bruker, 1998); data reduction: *SAINT*; program(s) used to solve structure: *SHELXS97* (Sheldrick, 1997); program(s) used to refine structure: *SHELXL97* (Sheldrick, 1997); molecular graphics: *ORTEPIII* (Burnett & Johnson, 1996)and *ORTEP-3 for Windows* (Farrugia, 1997); software used to prepare material for publication: *SHELXL97*.

This work is supported by the National Natural Science Foundation of China (20662007) and Nanchang University of Aeronautics (EA20072195).

Supplementary data and figures for this paper are available from the IUCr electronic archives (Reference: DN2276).

References

Bruker (1998). *SAINT* (Version 5.10) and *SMART* (Version 5.0). Bruker AXS Inc., Madison, Wisconsin, USA.
Burnett, M. N. & Johnson, C. K. (1996). *ORTEPIII*. Report ORNL-6895. Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA.
Farrugia, L. J. (1997). *J. Appl. Cryst.* **30**, 565.
Gunning, N. S. & Cahill, C. L. (2005). *J. Chem. Soc. Dalton Trans.* pp. 2788–2792.
Liu, C.-B., Nie, X.-L., Ding, L., Xie, M.-Y. & Wen, H.-L. (2006). *Acta Cryst.* E**62**, m2319–m2320.
Sheldrick, G. M. (1996). *SADABS*. University of Göttingen, Germany.
Sheldrick, G. M. (1997). *SHELXS97* and *SHELXL97*, University of Göttingen, Germany.
Ye, B.-H., Tong, M.-L. & Chen, X.-M. (2005). *Coord. Chem. Rev.* **249**, 545–565.

 doi:10.1107/S1600536807066263

supplementary materials

Acta Cryst. (2008). E**64**, m201 [**doi:10.1107/S1600536807066263**]

Tetrakis[μ-3-(3-pyridyl)acrylato-κ^2O:O']bis{(1,10-phenanthroline-κ^2N,N')[3-(3-pyridyl)acrylato-κ^2O,O']europium(III)} pentahydrate

C.-B. Liu, H.-L. Wen, F. Deng and J.-H. Zuo

Comment

Recently, assembly of high-dimensional supramolecular coordination polymers have attracted considerable attention by exploiting coordination bonds, hydrogen bondings, and π-π stacks [Ye *et al.*, 2005], not only because of their intriguing sructural diversity, but also for their potential application as smart opotoelectronic, magnetic, and porous materials. 1,10-phenanthroline has been widely used to construct stable supramolecular structures *via* C—H···O or C—H···N hydrogen bonds and π-π stackings, and 3-pyridylacrylic acid (HTPA) is a potential multidentate ligand, (Gunning *et al.*, 2005; Liu *et al.*, 2006). Here, we report the synthesis and structure of a europium supramolecular complex with 3-(3-pyridyl)acrylato and 1,10-phenanthroline, $[Eu_2(C_8H_6NO_2)_6(C_{12}H_8N_2)]_2.(H_2O)_5$ (I).

Each Eu^{III} centre is coordinated by seven carboxylate oxygen atoms and two nitrogen atoms from one phenanthroline molecule; the carboxylate groups of 3-(3-pyridyl)acrylato adopt bridging bidentate, chelating and bridging-chlelating tridentate modes respectively (Fig. 1). the dihedral angles between them are 59.229 (73), 84.724 (65) and 72.190 (56) ° respectively. The carboxylate groups of 3-(3-pyridyl)acrylato link pairs of europium(III) ions to form dinuclear units, which further build up a sheet parallel to the (0 0 1) plane through hydrogen bondings involving the uncoordinated water molecules (Table 1).

Experimental

A mixture of $EuCl_3.6H_2O$ (0.1 mmol), 3-pyridylacrylic acid (0.1 mmol), 1,10-phenanthroline (0.1 mmol), H_2O (10 ml), and 0.65 *M* NaOH aqueous solution (0.1 mmol) was sealed in a 25 ml Teflon-lined stainless reactor and heated at 393 K for 72 h under autogenous pressure, then cooled to room temperature, when a few colourless crystals were obtained. Analysis: found C 52.33, H 3.96, N 8.73%; $C_{72}H_{62}Eu_2N_{10}O_{17}$ requires C 52.01, H 3.85, N 8.43%.

Refinement

All H atoms attached to C atoms were fixed geometrically and treated as riding with C—H = 0.93 Å with U_{iso}(H) = 1.2U_{eq}(C). H atoms of water molecule were located in difference Fourier maps and included in the subsequent refinement using restraints (O—H= 0.82 (1)Å and H···H= 1.39 (2) Å) with U_{iso}(H) = 1.5U_{eq}(O). In the last stage of refinement they were treated as riding on their parent O atoms.

Figures

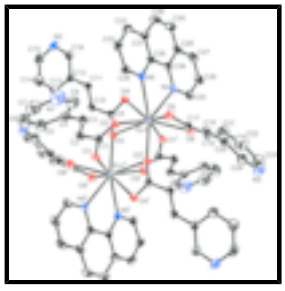


Fig. 1. : The molecular structure of complex (I), showing the atom-labelling scheme. Displacement ellipsoids are drawn at the 30% probability level and H atoms are represented as small spheres of arbitrary radius. [Symmetry code: (i) 1 - *x*, 1 - *y*, 1 - *z*.]

tetrakis[μ-3-(3-pyridyl)acrylato-κ^2O:O']bis{(1,10-phenanthroline- κ^2N,N')[3-(3-pyridyl)acrylato-κ^2O,O']europium(III)] pentahydrate

Crystal data

$[Eu_2(C_8H_6NO_2)_6(C_{12}H_8N_2)_2]\cdot 5H_2O$	F_{000} = 3304
M_r = 1643.24	D_x = 1.567 Mg m^{-3}
Monoclinic, *C*2/*c*	Mo *K*α radiation λ = 0.71073 Å
Hall symbol: -C 2yc	Cell parameters from 7048 reflections
a = 25.434 (2) Å	θ = 2.7–28.1º
b = 12.320 (10) Å	μ = 1.86 mm^{-1}
c = 22.595 (19) Å	*T* = 293 (2) K
β = 100.330 (10)º	Block, colorless
V = 6965.4 (10) Å^3	0.32 × 0.27 × 0.13 mm
Z = 4	

Data collection

Bruker SMART CCD area-detector diffractometer	6480 independent reflections
Radiation source: fine-focus sealed tube	5721 reflections with $I > 2\sigma(I)$
Monochromator: graphite	R_{int} = 0.022
T = 293(2) K	θ_{max} = 25.5º
φ and ω scans	θ_{min} = 2.5º
Absorption correction: multi-scan (SADABS; Sheldrick, 1996)	*h* = −30→30
T_{min} = 0.585, T_{max} = 0.791	*k* = −14→14
25928 measured reflections	*l* = −27→27

Refinement

Refinement on F^2	Secondary atom site location: difference Fourier map
Least-squares matrix: full	Hydrogen site location: inferred from neighbouring sites
$R[F^2 > 2\sigma(F^2)]$ = 0.019	H-atom parameters constrained

$wR(F^2) = 0.044$	$w = 1/[\sigma^2(F_o^2) + (0.0183P)^2 + 8.1685P]$ where $P = (F_o^2 + 2F_c^2)/3$
$S = 1.03$	$(\Delta/\sigma)_{max} = 0.006$
6480 reflections	$\Delta\rho_{max} = 0.34$ e Å^{-3}
460 parameters	$\Delta\rho_{min} = -0.25$ e Å^{-3}
Primary atom site location: structure-invariant direct methods	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}	Occ. (<1)
Eu1	0.528205 (4)	0.611291 (8)	0.562535 (4)	0.02456 (4)	
O5	0.58593 (7)	0.57165 (15)	0.66055 (7)	0.0457 (4)	
O6	0.62759 (6)	0.62061 (13)	0.58772 (7)	0.0417 (4)	
N3	0.82161 (9)	0.3750 (2)	0.77152 (12)	0.0627 (7)	
N4	0.55055 (7)	0.81740 (14)	0.56748 (8)	0.0312 (4)	
N5	0.48983 (7)	0.72683 (15)	0.64279 (8)	0.0311 (4)	
C17	0.62845 (9)	0.58151 (19)	0.63974 (11)	0.0375 (6)	
C18	0.68033 (10)	0.5427 (2)	0.67463 (12)	0.0442 (6)	
H18	0.7110	0.5515	0.6581	0.053*	
C19	0.68467 (10)	0.4966 (2)	0.72778 (11)	0.0430 (6)	
H19	0.6538	0.4954	0.7444	0.052*	
C20	0.73241 (10)	0.4467 (2)	0.76421 (11)	0.0415 (6)	
C21	0.73315 (12)	0.4186 (3)	0.82349 (13)	0.0589 (8)	
H21	0.7035	0.4319	0.8412	0.071*	
C22	0.77820 (14)	0.3705 (3)	0.85628 (14)	0.0729 (10)	
H22	0.7796	0.3521	0.8964	0.087*	
C23	0.82070 (13)	0.3506 (3)	0.82849 (15)	0.0664 (9)	
H23	0.8508	0.3179	0.8509	0.080*	
C24	0.77778 (10)	0.4222 (2)	0.74091 (12)	0.0500 (7)	
H24	0.7777	0.4400	0.7009	0.060*	
C25	0.58064 (10)	0.8617 (2)	0.53183 (11)	0.0418 (6)	
H25	0.5997	0.8160	0.5106	0.050*	
C26	0.58516 (12)	0.9740 (2)	0.52446 (12)	0.0531 (7)	
H26	0.6067	1.0017	0.4988	0.064*	
C27	0.55780 (12)	1.0418 (2)	0.55515 (13)	0.0562 (7)	

H27	0.5599	1.1165	0.5501	0.067*
C28	0.52609 (10)	0.99896 (19)	0.59464 (12)	0.0450 (6)
C29	0.49626 (13)	1.0650 (2)	0.62910 (15)	0.0629 (8)
H29	0.4973	1.1401	0.6255	0.076*
C30	0.46693 (12)	1.0205 (2)	0.66633 (15)	0.0611 (8)
H30	0.4485	1.0655	0.6886	0.073*
C31	0.46320 (10)	0.9054 (2)	0.67276 (12)	0.0435 (6)
C32	0.43288 (10)	0.8555 (2)	0.71132 (12)	0.0505 (7)
H32	0.4134	0.8978	0.7338	0.061*
C33	0.43197 (10)	0.7457 (2)	0.71572 (11)	0.0472 (6)
H33	0.4124	0.7120	0.7415	0.057*
C34	0.46102 (9)	0.6843 (2)	0.68077 (10)	0.0395 (6)
H34	0.4602	0.6091	0.6842	0.047*
C35	0.49140 (8)	0.83702 (18)	0.63913 (10)	0.0318 (5)
C36	0.52348 (9)	0.88490 (17)	0.59938 (10)	0.0331 (5)
O1	0.44766 (7)	0.35404 (12)	0.53195 (7)	0.0375 (4)
O2	0.47138 (6)	0.48567 (12)	0.60014 (7)	0.0389 (4)
O3	0.44546 (6)	0.55841 (12)	0.47089 (7)	0.0367 (4)
O4	0.44788 (6)	0.71259 (12)	0.51991 (7)	0.0382 (4)
N1	0.40521 (14)	0.2529 (3)	0.83252 (12)	0.0830 (9)
N2	0.21675 (9)	0.92111 (19)	0.44666 (11)	0.0541 (6)
C1	0.44874 (9)	0.39752 (17)	0.58251 (10)	0.0328 (5)
C2	0.42104 (10)	0.33633 (19)	0.62482 (10)	0.0395 (5)
H2	0.3976	0.2814	0.6090	0.047*
C3	0.42757 (10)	0.35487 (19)	0.68318 (11)	0.0390 (6)
H3	0.4495	0.4129	0.6979	0.047*
C4	0.40369 (11)	0.2931 (2)	0.72740 (11)	0.0428 (6)
C5	0.36142 (13)	0.2224 (2)	0.71075 (14)	0.0632 (8)
H5	0.3466	0.2118	0.6704	0.076*
C6	0.34154 (17)	0.1676 (3)	0.75602 (19)	0.0866 (12)
H6	0.3129	0.1199	0.7466	0.104*
C7	0.36502 (18)	0.1855 (3)	0.81466 (18)	0.0882 (12)
H7	0.3516	0.1473	0.8442	0.106*
C8	0.42271 (12)	0.3066 (3)	0.78849 (12)	0.0584 (8)
H8	0.4498	0.3571	0.7997	0.070*
C9	0.42372 (9)	0.64675 (17)	0.48230 (9)	0.0295 (5)
C10	0.36825 (9)	0.67176 (18)	0.45216 (10)	0.0336 (5)
H10	0.3514	0.6266	0.4216	0.040*
C11	0.34228 (9)	0.75715 (18)	0.46803 (10)	0.0346 (5)
H11	0.3607	0.7998	0.4989	0.041*
C12	0.28771 (9)	0.79227 (19)	0.44256 (11)	0.0392 (6)
C13	0.25486 (11)	0.7384 (3)	0.39657 (14)	0.0658 (9)
H13	0.2674	0.6777	0.3789	0.079*
C14	0.20331 (12)	0.7750 (3)	0.37698 (17)	0.0795 (11)
H14	0.1807	0.7390	0.3464	0.095*
C15	0.18612 (11)	0.8654 (3)	0.40342 (15)	0.0651 (9)
H15	0.1512	0.8888	0.3904	0.078*
C16	0.26665 (10)	0.8837 (2)	0.46531 (12)	0.0457 (6)
H16	0.2886	0.9220	0.4956	0.055*

O1W	0.69847 (9)	0.61683 (17)	0.50760 (12)	0.0848 (8)	
H11W	0.6788	0.6122	0.5340	0.127*	
H12W	0.6986	0.5565	0.4895	0.127*	
O2W	0.30658 (11)	0.1792 (3)	0.55009 (14)	0.1219 (11)	
H21W	0.2805	0.2095	0.5594	0.183*	
H22W	0.2973	0.1433	0.5193	0.183*	
O3W	0.3341 (3)	0.9915 (5)	0.6047 (3)	0.133 (2)	0.50
H32W	0.3035	1.0082	0.6078	0.199*	0.50
H31W	0.3521	1.0410	0.5944	0.199*	0.50

Atomic displacement parameters (Å^2)

	U^{11}	U^{22}	U^{33}	U^{12}	U^{13}	U^{23}
Eu1	0.02668 (6)	0.02120 (6)	0.02471 (6)	−0.00104 (4)	0.00168 (4)	−0.00081 (4)
O5	0.0382 (10)	0.0595 (11)	0.0366 (9)	0.0112 (8)	−0.0010 (8)	0.0015 (8)
O6	0.0356 (9)	0.0442 (10)	0.0416 (10)	−0.0015 (7)	−0.0026 (7)	0.0035 (8)
N3	0.0460 (14)	0.0697 (17)	0.0676 (17)	0.0169 (12)	−0.0031 (12)	0.0009 (13)
N4	0.0331 (10)	0.0262 (10)	0.0332 (10)	−0.0044 (8)	0.0026 (8)	−0.0031 (8)
N5	0.0327 (10)	0.0322 (10)	0.0270 (9)	−0.0002 (8)	0.0018 (8)	−0.0025 (8)
C17	0.0348 (13)	0.0324 (13)	0.0411 (14)	0.0016 (10)	−0.0045 (11)	−0.0092 (10)
C18	0.0327 (13)	0.0459 (15)	0.0499 (15)	0.0015 (11)	−0.0033 (11)	−0.0014 (12)
C19	0.0366 (13)	0.0420 (14)	0.0471 (15)	0.0007 (11)	−0.0016 (11)	−0.0039 (12)
C20	0.0400 (14)	0.0367 (13)	0.0431 (14)	0.0008 (11)	−0.0057 (11)	−0.0026 (11)
C21	0.0577 (18)	0.068 (2)	0.0492 (17)	0.0100 (15)	0.0041 (14)	0.0027 (14)
C22	0.079 (2)	0.084 (2)	0.0483 (18)	0.0120 (19)	−0.0102 (17)	0.0169 (16)
C23	0.0566 (19)	0.0612 (19)	0.070 (2)	0.0155 (15)	−0.0192 (16)	0.0079 (16)
C24	0.0455 (15)	0.0541 (16)	0.0469 (15)	0.0046 (13)	−0.0013 (12)	0.0001 (12)
C25	0.0464 (15)	0.0380 (14)	0.0418 (14)	−0.0111 (11)	0.0102 (11)	−0.0053 (11)
C26	0.0648 (18)	0.0425 (15)	0.0533 (17)	−0.0208 (14)	0.0140 (14)	0.0019 (13)
C27	0.0678 (19)	0.0272 (14)	0.072 (2)	−0.0109 (13)	0.0082 (16)	0.0033 (13)
C28	0.0483 (15)	0.0273 (12)	0.0564 (16)	−0.0001 (11)	0.0012 (12)	−0.0037 (11)
C29	0.070 (2)	0.0292 (14)	0.090 (2)	0.0054 (14)	0.0161 (18)	−0.0103 (15)
C30	0.0621 (19)	0.0410 (16)	0.082 (2)	0.0117 (14)	0.0170 (17)	−0.0203 (15)
C31	0.0387 (14)	0.0424 (15)	0.0483 (15)	0.0069 (11)	0.0048 (11)	−0.0116 (11)
C32	0.0383 (14)	0.0632 (18)	0.0511 (16)	0.0081 (13)	0.0110 (12)	−0.0178 (14)
C33	0.0389 (14)	0.0665 (19)	0.0373 (14)	−0.0032 (13)	0.0099 (11)	−0.0062 (13)
C34	0.0429 (14)	0.0412 (14)	0.0346 (13)	−0.0038 (11)	0.0077 (11)	−0.0019 (10)
C35	0.0298 (11)	0.0306 (12)	0.0322 (12)	0.0016 (9)	−0.0025 (9)	−0.0049 (10)
C36	0.0326 (12)	0.0288 (12)	0.0348 (12)	0.0001 (10)	−0.0024 (9)	−0.0040 (10)
O1	0.0497 (10)	0.0332 (8)	0.0308 (8)	−0.0102 (7)	0.0099 (7)	−0.0043 (7)
O2	0.0511 (10)	0.0324 (9)	0.0353 (9)	−0.0135 (8)	0.0136 (8)	−0.0048 (7)
O3	0.0388 (9)	0.0252 (8)	0.0454 (9)	0.0047 (7)	0.0059 (7)	−0.0021 (7)
O4	0.0359 (9)	0.0310 (8)	0.0426 (9)	0.0043 (7)	−0.0074 (7)	−0.0062 (7)
N1	0.102 (2)	0.097 (2)	0.0588 (17)	0.014 (2)	0.0373 (17)	0.0253 (17)
N2	0.0400 (13)	0.0515 (14)	0.0725 (16)	0.0131 (11)	0.0148 (12)	0.0069 (12)
C1	0.0365 (12)	0.0291 (12)	0.0329 (12)	−0.0023 (10)	0.0064 (10)	0.0012 (10)
C2	0.0475 (14)	0.0341 (13)	0.0392 (13)	−0.0128 (11)	0.0136 (11)	−0.0034 (11)
C3	0.0453 (14)	0.0330 (13)	0.0413 (14)	−0.0038 (11)	0.0145 (11)	0.0005 (10)

C4	0.0541 (16)	0.0347 (13)	0.0443 (15)	0.0045 (11)	0.0215 (12)	0.0046 (11)
C5	0.085 (2)	0.0511 (18)	0.0599 (19)	−0.0153 (16)	0.0310 (17)	0.0009 (14)
C6	0.110 (3)	0.063 (2)	0.099 (3)	−0.032 (2)	0.053 (3)	0.003 (2)
C7	0.121 (3)	0.080 (3)	0.079 (3)	0.008 (2)	0.060 (3)	0.028 (2)
C8	0.0684 (19)	0.068 (2)	0.0432 (16)	0.0044 (15)	0.0209 (14)	0.0110 (14)
C9	0.0330 (12)	0.0250 (11)	0.0299 (11)	0.0008 (9)	0.0038 (9)	0.0039 (9)
C10	0.0329 (12)	0.0299 (12)	0.0354 (12)	−0.0021 (10)	−0.0011 (10)	−0.0044 (10)
C11	0.0327 (12)	0.0337 (12)	0.0354 (12)	−0.0028 (10)	0.0009 (10)	−0.0018 (10)
C12	0.0321 (13)	0.0388 (13)	0.0456 (14)	0.0026 (10)	0.0045 (11)	0.0012 (11)
C13	0.0437 (16)	0.065 (2)	0.080 (2)	0.0141 (14)	−0.0149 (15)	−0.0226 (17)
C14	0.0462 (18)	0.082 (2)	0.098 (3)	0.0138 (17)	−0.0224 (17)	−0.025 (2)
C15	0.0340 (15)	0.072 (2)	0.085 (2)	0.0112 (14)	−0.0021 (15)	0.0104 (18)
C16	0.0371 (13)	0.0432 (14)	0.0565 (16)	0.0046 (12)	0.0078 (12)	0.0001 (12)
O1W	0.0709 (15)	0.0684 (15)	0.128 (2)	−0.0128 (12)	0.0522 (15)	−0.0190 (14)
O2W	0.093 (2)	0.123 (3)	0.140 (3)	−0.0135 (19)	−0.0045 (19)	0.010 (2)
O3W	0.139 (5)	0.103 (5)	0.133 (5)	−0.017 (4)	−0.036 (4)	0.009 (4)

Geometric parameters (Å, °)

Eu1—O3^{i}	2.3604 (15)	C32—H32	0.9300
Eu1—O1^{i}	2.3638 (15)	C33—C34	1.397 (3)
Eu1—O2	2.3763 (15)	C33—H33	0.9300
Eu1—O4	2.4400 (15)	C34—H34	0.9300
Eu1—O5	2.4765 (16)	C35—C36	1.443 (3)
Eu1—O6	2.4922 (16)	O1—C1	1.258 (3)
Eu1—N4	2.6001 (18)	O1—Eu1^{i}	2.3638 (15)
Eu1—N5	2.6272 (18)	O2—C1	1.260 (3)
Eu1—O3	2.7530 (16)	O3—C9	1.268 (3)
Eu1—C17	2.843 (2)	O3—Eu1^{i}	2.3604 (15)
Eu1—C9	2.969 (2)	O4—C9	1.253 (3)
Eu1—Eu1^{i}	4.0137 (3)	N1—C7	1.322 (5)
O5—C17	1.260 (3)	N1—C8	1.336 (4)
O6—C17	1.267 (3)	N2—C15	1.327 (4)
N3—C23	1.326 (4)	N2—C16	1.345 (3)
N3—C24	1.335 (3)	C1—C2	1.490 (3)
N4—C25	1.324 (3)	C2—C3	1.319 (3)
N4—C36	1.365 (3)	C2—H2	0.9300
N5—C34	1.332 (3)	C3—C4	1.471 (3)
N5—C35	1.361 (3)	C3—H3	0.9300
C17—C18	1.489 (3)	C4—C5	1.382 (4)
C18—C19	1.315 (3)	C4—C8	1.388 (4)
C18—H18	0.9300	C5—C6	1.394 (4)
C19—C20	1.474 (3)	C5—H5	0.9300
C19—H19	0.9300	C6—C7	1.370 (5)
C20—C21	1.380 (4)	C6—H6	0.9300
C20—C24	1.385 (4)	C7—H7	0.9300
C21—C22	1.381 (4)	C8—H8	0.9300
C21—H21	0.9300	C9—C10	1.485 (3)

C22—C23	1.366 (5)	C10—C11	1.325 (3)
C22—H22	0.9300	C10—H10	0.9300
C23—H23	0.9300	C11—C12	1.469 (3)
C24—H24	0.9300	C11—H11	0.9300
C25—C26	1.400 (3)	C12—C13	1.381 (4)
C25—H25	0.9300	C12—C16	1.385 (3)
C26—C27	1.355 (4)	C13—C14	1.382 (4)
C26—H26	0.9300	C13—H13	0.9300
C27—C28	1.408 (4)	C14—C15	1.371 (4)
C27—H27	0.9300	C14—H14	0.9300
C28—C36	1.412 (3)	C15—H15	0.9300
C28—C29	1.434 (4)	C16—H16	0.9300
C29—C30	1.338 (4)	O1W—H11W	0.8462
C29—H29	0.9300	O1W—H12W	0.8481
C30—C31	1.431 (4)	O2W—H21W	0.8204
C30—H30	0.9300	O2W—H22W	0.8227
C31—C32	1.404 (4)	O3W—H32W	0.8204
C31—C35	1.413 (3)	O3W—H31W	0.8198
C32—C33	1.357 (4)		
$O3^{i}$—Eu1—$O1^{i}$	74.72 (5)	N3—C24—H24	117.5
$O3^{i}$—Eu1—O2	76.31 (5)	C20—C24—H24	117.5
$O1^{i}$—Eu1—O2	135.54 (5)	N4—C25—C26	123.3 (2)
$O3^{i}$—Eu1—O4	126.32 (5)	N4—C25—H25	118.4
$O1^{i}$—Eu1—O4	83.44 (6)	C26—C25—H25	118.4
O2—Eu1—O4	87.38 (6)	C27—C26—C25	119.2 (3)
$O3^{i}$—Eu1—O5	87.40 (6)	C27—C26—H26	120.4
$O1^{i}$—Eu1—O5	129.42 (6)	C25—C26—H26	120.4
O2—Eu1—O5	81.54 (6)	C26—C27—C28	119.9 (2)
O4—Eu1—O5	140.72 (5)	C26—C27—H27	120.1
$O3^{i}$—Eu1—O6	77.26 (5)	C28—C27—H27	120.1
$O1^{i}$—Eu1—O6	77.34 (6)	C27—C28—C36	117.5 (2)
O2—Eu1—O6	127.26 (6)	C27—C28—C29	123.4 (2)
O4—Eu1—O6	144.08 (5)	C36—C28—C29	119.1 (3)
O5—Eu1—O6	52.45 (6)	C30—C29—C28	121.2 (3)
$O3^{i}$—Eu1—N4	143.74 (6)	C30—C29—H29	119.4
$O1^{i}$—Eu1—N4	76.83 (5)	C28—C29—H29	119.4
O2—Eu1—N4	139.73 (5)	C29—C30—C31	121.6 (3)
O4—Eu1—N4	71.25 (5)	C29—C30—H30	119.2
O5—Eu1—N4	93.68 (6)	C31—C30—H30	119.2
O6—Eu1—N4	74.94 (6)	C32—C31—C35	117.5 (2)
$O3^{i}$—Eu1—N5	149.61 (6)	C32—C31—C30	123.4 (2)
$O1^{i}$—Eu1—N5	135.59 (5)	C35—C31—C30	119.1 (3)
O2—Eu1—N5	77.35 (5)	C33—C32—C31	120.0 (2)
O4—Eu1—N5	66.85 (5)	C33—C32—H32	120.0
O5—Eu1—N5	73.95 (6)	C31—C32—H32	120.0
O6—Eu1—N5	107.73 (5)	C32—C33—C34	118.8 (2)

N4—Eu1—N5	63.04 (6)	C32—C33—H33	120.6
O3^{i}—Eu1—O3	76.84 (5)	C34—C33—H33	120.6
O1^{i}—Eu1—O3	69.55 (5)	N5—C34—C33	124.0 (2)
O2—Eu1—O3	71.51 (5)	N5—C34—H34	118.0
O4—Eu1—O3	49.54 (5)	C33—C34—H34	118.0
O5—Eu1—O3	151.25 (6)	N5—C35—C31	122.6 (2)
O6—Eu1—O3	142.18 (5)	N5—C35—C36	118.14 (19)
N4—Eu1—O3	113.28 (5)	C31—C35—C36	119.3 (2)
N5—Eu1—O3	108.60 (5)	N4—C36—C28	122.1 (2)
O3^{i}—Eu1—C17	78.89 (6)	N4—C36—C35	118.33 (19)
O1^{i}—Eu1—C17	103.18 (7)	C28—C36—C35	119.6 (2)
O2—Eu1—C17	103.45 (7)	C1—O1—Eu1^{i}	140.95 (14)
O4—Eu1—C17	154.62 (6)	C1—O2—Eu1	136.14 (14)
O5—Eu1—C17	26.26 (6)	C9—O3—Eu1^{i}	169.88 (14)
O6—Eu1—C17	26.44 (6)	C9—O3—Eu1	86.92 (12)
N4—Eu1—C17	86.25 (6)	Eu1^{i}—O3—Eu1	103.16 (5)
N5—Eu1—C17	92.85 (6)	C9—O4—Eu1	102.16 (13)
O3—Eu1—C17	155.71 (6)	C7—N1—C8	115.2 (3)
O3^{i}—Eu1—C9	102.08 (6)	C15—N2—C16	116.7 (2)
O1^{i}—Eu1—C9	76.75 (6)	O1—C1—O2	126.1 (2)
O2—Eu1—C9	77.23 (6)	O1—C1—C2	115.56 (19)
O4—Eu1—C9	24.37 (5)	O2—C1—C2	118.4 (2)
O5—Eu1—C9	153.82 (6)	C3—C2—C1	124.4 (2)
O6—Eu1—C9	153.25 (6)	C3—C2—H2	117.8
N4—Eu1—C9	92.72 (6)	C1—C2—H2	117.8
N5—Eu1—C9	86.51 (6)	C2—C3—C4	126.6 (2)
O3—Eu1—C9	25.25 (5)	C2—C3—H3	116.7
C17—Eu1—C9	178.95 (6)	C4—C3—H3	116.7
O3^{i}—Eu1—Eu1^{i}	41.90 (4)	C5—C4—C8	117.5 (2)
O1^{i}—Eu1—Eu1^{i}	66.76 (4)	C5—C4—C3	122.5 (2)
O2—Eu1—Eu1^{i}	69.10 (4)	C8—C4—C3	120.0 (2)
O4—Eu1—Eu1^{i}	84.45 (4)	C4—C5—C6	118.2 (3)
O5—Eu1—Eu1^{i}	125.08 (4)	C4—C5—H5	120.9
O6—Eu1—Eu1^{i}	114.34 (4)	C6—C5—H5	120.9
N4—Eu1—Eu1^{i}	138.18 (4)	C7—C6—C5	118.6 (3)
N5—Eu1—Eu1^{i}	136.55 (4)	C7—C6—H6	120.7
O3—Eu1—Eu1^{i}	34.93 (3)	C5—C6—H6	120.7
C17—Eu1—Eu1^{i}	120.79 (5)	N1—C7—C6	125.1 (3)
C9—Eu1—Eu1^{i}	60.18 (4)	N1—C7—H7	117.4
C17—O5—Eu1	93.33 (14)	C6—C7—H7	117.4
C17—O6—Eu1	92.42 (14)	N1—C8—C4	125.3 (3)
C23—N3—C24	116.3 (3)	N1—C8—H8	117.4
C25—N4—C36	118.12 (19)	C4—C8—H8	117.4
C25—N4—Eu1	121.48 (15)	O4—C9—O3	120.99 (19)
C36—N4—Eu1	119.38 (14)	O4—C9—C10	119.13 (19)

C34—N5—C35	117.2 (2)	O3—C9—C10	119.86 (19)
C34—N5—Eu1	123.15 (15)	O4—C9—Eu1	53.47 (10)
C35—N5—Eu1	118.67 (14)	O3—C9—Eu1	67.83 (11)
O5—C17—O6	120.7 (2)	C10—C9—Eu1	169.61 (15)
O5—C17—C18	120.6 (2)	C11—C10—C9	121.3 (2)
O6—C17—C18	118.6 (2)	C11—C10—H10	119.4
O5—C17—Eu1	60.41 (12)	C9—C10—H10	119.4
O6—C17—Eu1	61.14 (12)	C10—C11—C12	127.6 (2)
C18—C17—Eu1	168.00 (16)	C10—C11—H11	116.2
C19—C18—C17	122.9 (2)	C12—C11—H11	116.2
C19—C18—H18	118.5	C13—C12—C16	116.6 (2)
C17—C18—H18	118.5	C13—C12—C11	123.7 (2)
C18—C19—C20	128.0 (3)	C16—C12—C11	119.7 (2)
C18—C19—H19	116.0	C12—C13—C14	119.7 (3)
C20—C19—H19	116.0	C12—C13—H13	120.2
C21—C20—C24	116.6 (2)	C14—C13—H13	120.2
C21—C20—C19	120.9 (2)	C15—C14—C13	119.0 (3)
C24—C20—C19	122.5 (2)	C15—C14—H14	120.5
C20—C21—C22	119.6 (3)	C13—C14—H14	120.5
C20—C21—H21	120.2	N2—C15—C14	123.4 (3)
C22—C21—H21	120.2	N2—C15—H15	118.3
C23—C22—C21	118.6 (3)	C14—C15—H15	118.3
C23—C22—H22	120.7	N2—C16—C12	124.6 (3)
C21—C22—H22	120.7	N2—C16—H16	117.7
N3—C23—C22	123.9 (3)	C12—C16—H16	117.7
N3—C23—H23	118.0	H11W—O1W—H12W	109.4
C22—C23—H23	118.0	H21W—O2W—H22W	109.8
N3—C24—C20	125.0 (3)	H32W—O3W—H31W	115.1

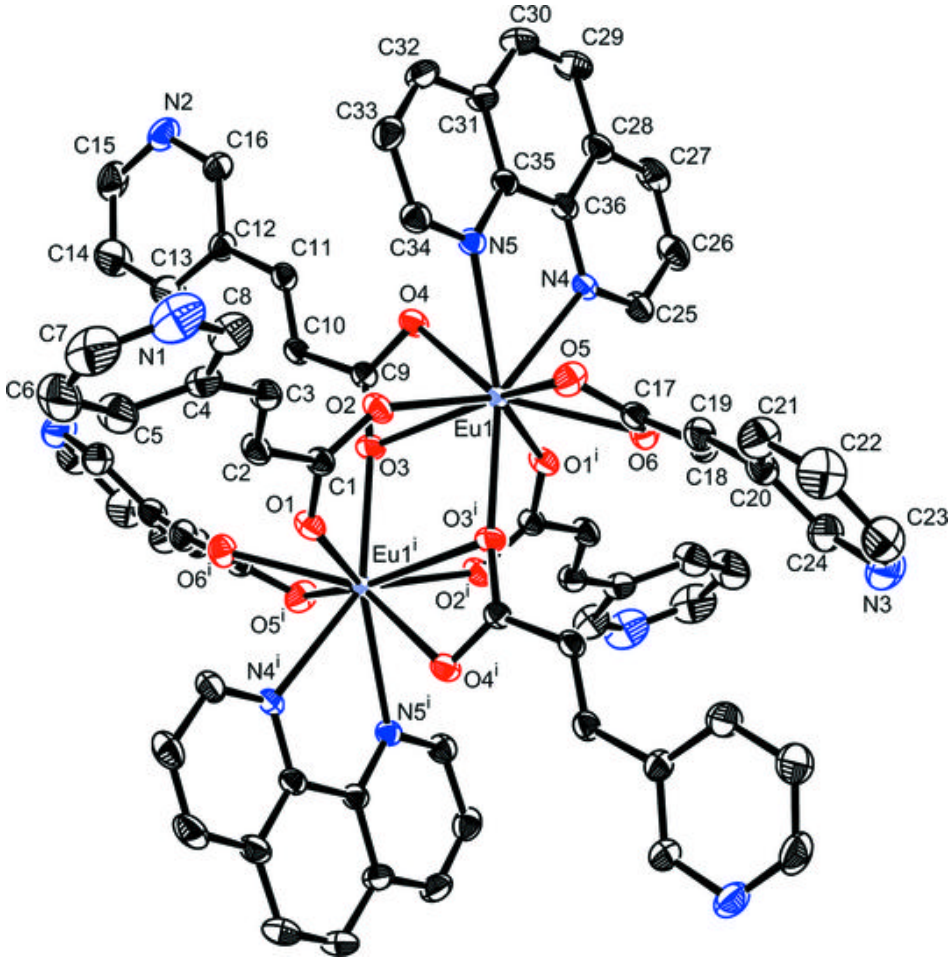
Symmetry codes: (i) −*x*+1, −*y*+1, −*z*+1.

Hydrogen-bond geometry (Å, °)

D—H···*A*	*D*—H	H···*A*	*D*···*A*	*D*—H···*A*
O1W—H11W···O6	0.85	1.94	2.775 (3)	171
O1W—H12W···N2^{ii}	0.85	2.02	2.856 (3)	167
O2W—H21W···O1W^{iii}	0.82	2.48	2.851 (4)	109
O3W—H31W···O2W^{iv}	0.82	2.20	2.655 (7)	116

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

Fig. 1


C30
C29
C32
C33
C31
C28
N2
C15
C16
C35
C27
C36
C12
C14
C13
C11
C34
N5
C26
N4
C8
O4
C25
C7
C10
O5
N1
C9
C6
C4
C3
O2
C17
C19
C21
C5
Eu1
C22
C2
O3
O1i
O6
C18
C1
C20
O1
O3i
C23
Eu1i
C24
O6i
O2i
N3
O5i
N4i
O4i
N5i