

Supporting Information

Ferromagnetically Coupled Chiral Dysprosium Hydroxysulfate and Centrosymmetric Dysprosium Hydroxysulfate-oxalate: $\text{Dy}_4(\text{OH})_4$ Cubane Based High-Connected Networks via In Situ Conversion of Organosulfur to Sulfate

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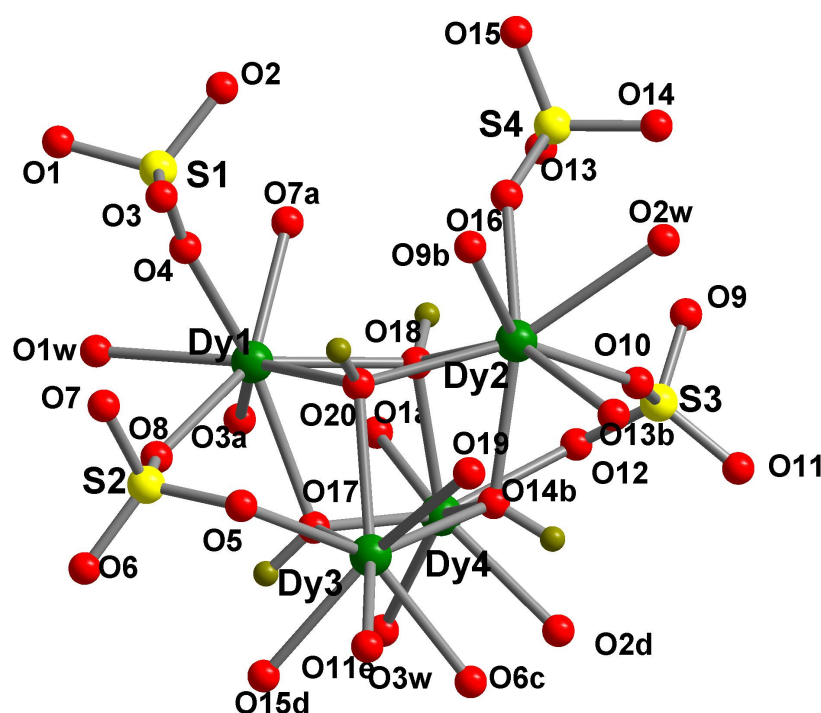


Figure S1 View of the coordination environments of Dy atoms in **1**.

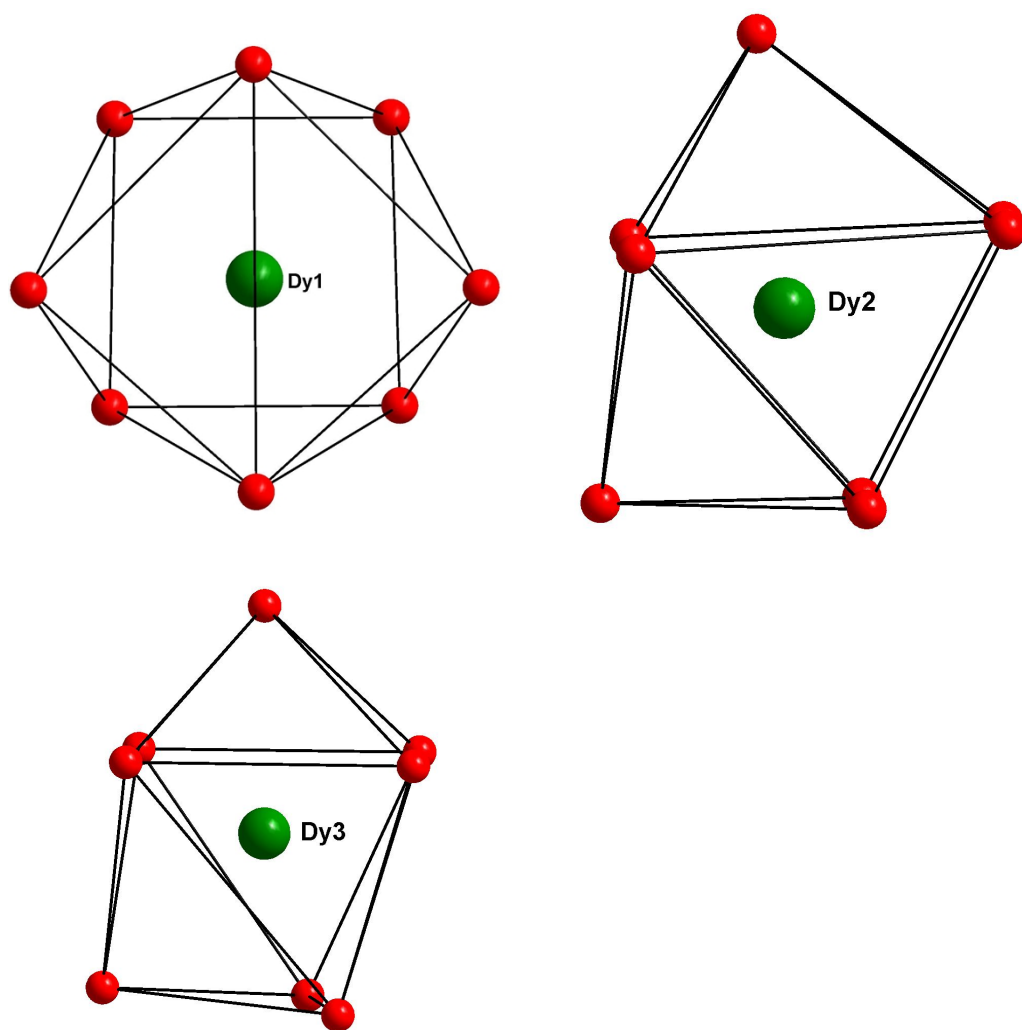
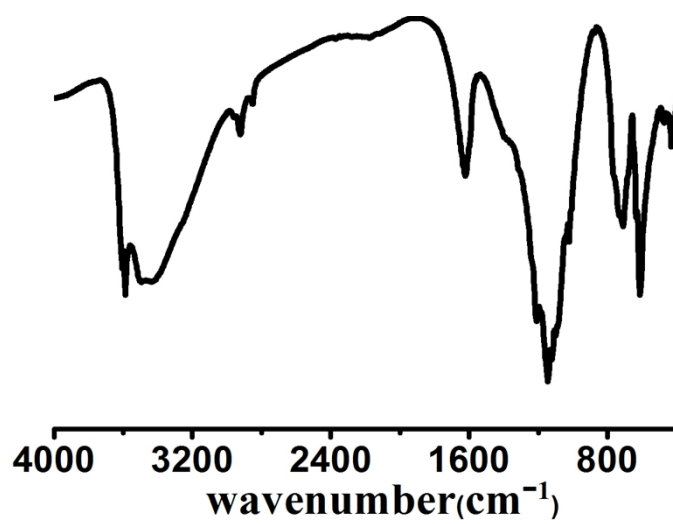
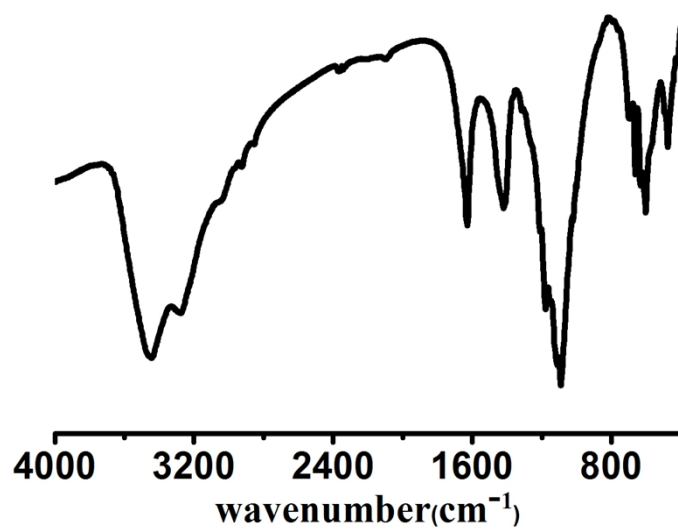


Figure S4. Polyhedral view of the coordination environments of three Dy atoms in **2**.



(a)



(b)

Figure S5. FTIR spectra curves of complex 1 (a) and 2 (b).

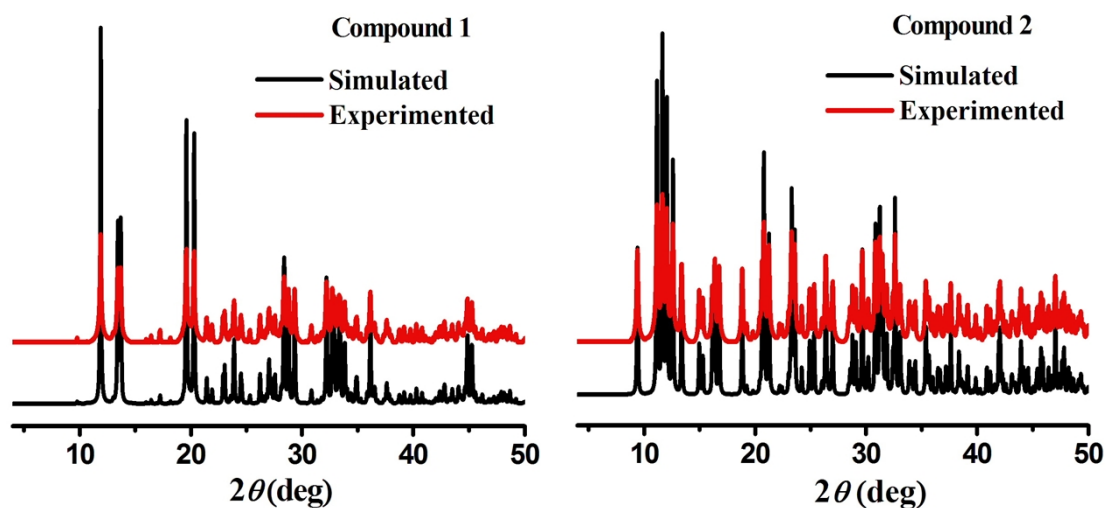


Figure S6. The experimental and simulated PXRD patterns of 1 and 2.

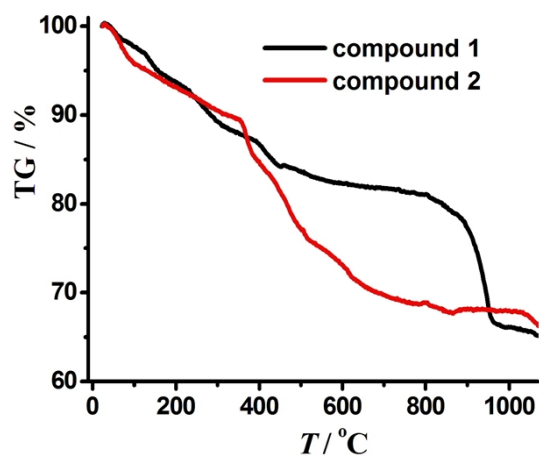


Figure S7. TGA curves of compounds 1-2.

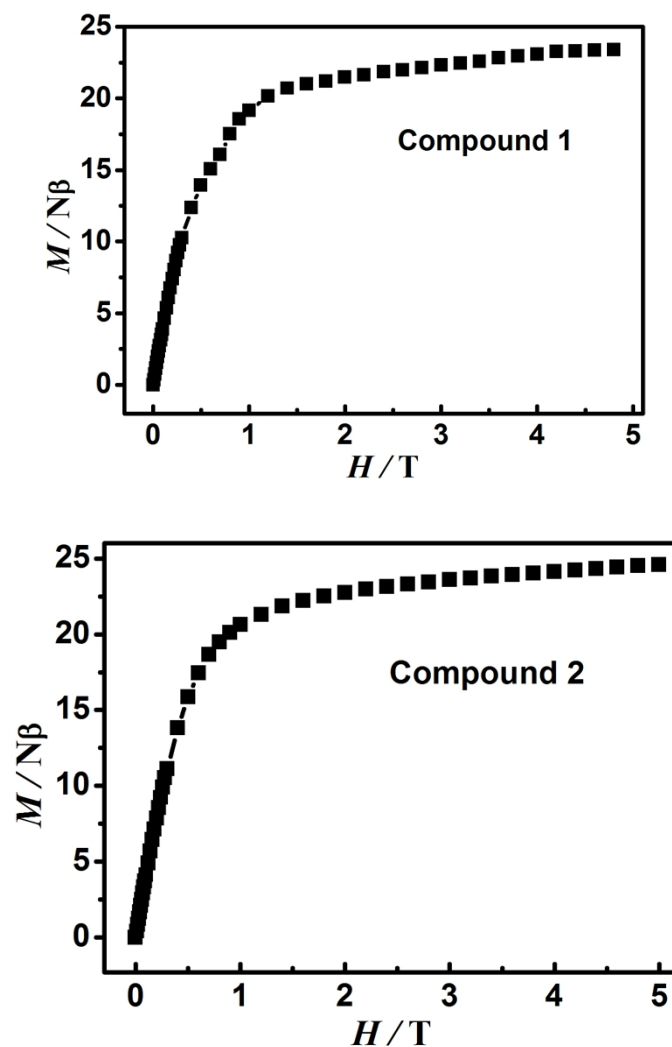


Figure S8. M versus H curves per Dy_4 unit at 2 K for **1** (a) and **2** (b).

Table S1. Bond lengths [$\text{\AA}$] and angles [deg] for compounds **1-2**.

Compound 1			
Dy(1)-O(7a)	2.297(4)	Dy(3)-O(6c)	2.293(4)
Dy(1)-O(20)	2.300(2)	Dy(3)-O(15d)	2.310(5)
Dy(1)-O(3a)	2.345(5)	Dy(3)-O(5)	2.327(4)
Dy(1)-O(1W)	2.354(2)	Dy(3)-O(14b)	2.372(4)
Dy(1)-O(8)	2.363(4)	Dy(3)-O(19)	2.369(4)
Dy(1)-O(4)	2.380(4)	Dy(3)-O(17)	2.389(4)
Dy(1)-O(18)	2.436(4)	Dy(3)-O(20)	2.446(2)
Dy(1)-O(17)	2.484(4)	Dy(3)-O(3W)	2.514(2)
Dy(2)-O(9b)	2.258(5)	Dy(4)-O(11e)	2.275(5)
Dy(2)-O(19)	2.334(4)	Dy(4)-O(18)	2.297(4)

Dy(2)-O(16)	2.336(4)	Dy(4)-O(17)	2.314(4)
Dy(2)-O(10)	2.346(4)	Dy(4)-O(12)	2.338(4)
Dy(2)-O(18)	2.361(4)	Dy(4)-O(19)	2.360(4)
Dy(2)-O(13b)	2.376(5)	Dy(4)-O(2d)	2.362(4)
Dy(2)-O(20)	2.390(2)	Dy(4)-O(1a)	2.479(5)
Dy(1)-Dy(4)	3.7560(4)	Dy(2)-Dy(3)	3.7893(4)
Dy(1)-Dy(3)	3.8220(4)	Dy(3)-Dy(4)	3.8482(4)
Dy(1)-Dy(2)	3.8756(4)		
O(7a)-Dy(1)-O(20)	109.15(13)	O(6c)-Dy(3)-O(15d)	78.51(16)
O(7a)-Dy(1)-O(3a)	82.44(17)	O(6c)-Dy(3)-O(5)	142.50(16)
O(20)-Dy(1)-O(3a)	134.69(15)	O(15d)-Dy(3)-O(5)	79.50(17)
O(7a)-Dy(1)-O(1W)	88.63(12)	O(6c)-Dy(3)-O(14b)	96.69(16)
O(20)-Dy(1)-O(1W)	151.80(11)	O(15d)-Dy(3)-O(14b)	149.69(17)
O(3a)-Dy(1)-O(1W)	67.56(14)	O(5)-Dy(3)-O(14b)	87.38(16)
O(7a)-Dy(1)-O(8)	152.65(17)	O(6c)-Dy(3)-O(19)	72.78(15)
O(20)-Dy(1)-O(8)	81.14(13)	O(15d)-Dy(3)-O(19)	125.86(15)
O(3a)-Dy(1)-O(8)	108.77(16)	O(5)-Dy(3)-O(19)	144.05(15)
O(1W)-Dy(1)-O(8)	73.80(13)	O(14b)-Dy(3)-O(19)	79.50(15)
O(7a)-Dy(1)-O(4)	78.51(16)	O(6c)-Dy(3)-O(17)	101.24(15)
O(20)-Dy(1)-O(4)	83.21(14)	O(15d)-Dy(3)-O(17)	73.90(15)
O(3a)-Dy(1)-O(4)	141.72(19)	O(5)-Dy(3)-O(17)	101.34(15)
O(1W)-Dy(1)-O(4)	79.03(14)	O(14b)-Dy(3)-O(17)	135.92(16)
O(8)-Dy(1)-O(4)	77.69(17)	O(19)-Dy(3)-O(17)	68.19(14)
O(7a)-Dy(1)-O(18)	69.34(15)	O(6c)-Dy(3)-O(20)	141.56(12)
O(20)-Dy(1)-O(18)	68.27(11)	O(15d)-Dy(3)-O(20)	130.31(13)
O(3a)-Dy(1)-O(18)	76.31(16)	O(5)-Dy(3)-O(20)	74.73(13)
O(1W)-Dy(1)-O(18)	139.85(10)	O(14b)-Dy(3)-O(20)	70.36(13)
O(8)-Dy(1)-O(18)	136.79(16)	O(19)-Dy(3)-O(20)	69.35(12)
O(4)-Dy(1)-O(18)	125.48(15)	O(17)-Dy(3)-O(20)	70.61(12)
O(7a)-Dy(1)-O(17)	134.85(15)	O(6c)-Dy(3)-O(3W)	75.16(12)
O(20)-Dy(1)-O(17)	71.36(11)	O(15d)-Dy(3)-O(3W)	77.33(13)
O(3a)-Dy(1)-O(17)	70.37(16)	O(5)-Dy(3)-O(3W)	70.60(13)
O(1W)-Dy(1)-O(17)	111.75(11)	O(14b)-Dy(3)-O(3W)	72.54(14)
O(8)-Dy(1)-O(17)	72.14(16)	O(19)-Dy(3)-O(3W)	134.10(11)

O(4)-Dy(1)-O(17)	142.87(15)	O(17)-Dy(3)-O(3W)	151.12(11)
O(18)-Dy(1)-O(17)	69.61(14)	O(20)-Dy(3)-O(3W)	129.55(10)
Dy(4)-Dy(1)-Dy(3)	61.029(7)	Dy(2)-Dy(3)-Dy(4)	58.805(7)
Dy(4)-Dy(1)-Dy(2)	58.836(7)	Dy(1)-Dy(3)-Dy(4)	58.639(7)
Dy(3)-Dy(1)-Dy(2)	58.974(7)	O(11e)-Dy(4)-O(18)	144.26(17)
O(9b)-Dy(2)-O(19)	131.61(18)	O(11e)-Dy(4)-O(17)	92.49(16)
O(9b)-Dy(2)-O(16)	80.5(2)	O(18)-Dy(4)-O(17)	75.06(14)
O(19)-Dy(2)-O(16)	139.53(16)	O(11e)-Dy(4)-O(12)	110.89(18)
O(9b)-Dy(2)-O(10)	147.24(18)	O(18)-Dy(4)-O(12)	82.21(16)
O(19)-Dy(2)-O(10)	75.11(16)	O(17)-Dy(4)-O(12)	155.88(16)
O(16)-Dy(2)-O(10)	87.33(18)	O(11e)-Dy(4)-O(19)	136.88(17)
O(9b)-Dy(2)-O(18)	120.29(19)	O(18)-Dy(4)-O(19)	70.35(14)
O(19)-Dy(2)-O(18)	69.71(14)	O(17)-Dy(4)-O(19)	69.59(14)
O(16)-Dy(2)-O(18)	72.42(15)	O(12)-Dy(4)-O(19)	95.41(15)
O(10)-Dy(2)-O(18)	83.91(15)	O(11e)-Dy(4)-O(2d)	82.64(17)
O(9b)-Dy(2)-O(13b)	84.2(2)	O(18)-Dy(4)-O(2d)	133.08(15)
O(19)-Dy(2)-O(13b)	76.81(17)	O(17)-Dy(4)-O(2d)	111.36(15)
O(16)-Dy(2)-O(13b)	138.55(17)	O(12)-Dy(4)-O(2d)	78.65(16)
O(10)-Dy(2)-O(13b)	85.14(18)	O(19)-Dy(4)-O(2d)	69.37(15)
O(18)-Dy(2)-O(13b)	146.41(17)	O(11e)-Dy(4)-O(1a)	73.88(19)
O(9b)-Dy(2)-O(20)	71.09(15)	O(18)-Dy(4)-O(1a)	77.31(15)
O(19)-Dy(2)-O(20)	70.92(11)	O(17)-Dy(4)-O(1a)	105.19(15)
O(16)-Dy(2)-O(20)	107.34(12)	O(12)-Dy(4)-O(1a)	77.01(16)
O(10)-Dy(2)-O(20)	141.64(14)	O(19)-Dy(4)-O(1a)	147.52(16)
O(18)-Dy(2)-O(20)	68.11(11)	O(2d)-Dy(4)-O(1a)	137.07(15)

Symmetry codes: a) $-x+1, y+1/2, -z+3/2$; b) $-x, y-1/2, -z+3/2$; c) $x-1/2, -y+1/2, -z+2$;
d) $-x+1/2, -y+1, z+1/2$; e) $x+1/2, -y+3/2, -z+2$

Compound 2			
Dy(1)-O(3)	2.343(7)	Dy(3)-O(2)	2.340(5)
Dy(1)-O(5)	2.372(6)	Dy(3)-O(12d)	2.351(6)
Dy(1)-O(5a)	2.372(6)	Dy(3)-O(7b)	2.354(6)
Dy(1)-O(3Wa)	2.403(6)	Dy(3)-O(9e)	2.374(6)
Dy(1)-O(3W)	2.403(6)	Dy(3)-O(1)	2.379(4)
Dy(1)-O(2a)	2.424(5)	Dy(3)-O(11)	2.424(5)
Dy(1)-O(2)	2.424(5)	Dy(3)-O(3)	2.425(4)

Dy(1)-O(8)	2.442(9)	Dy(3)-O(6f)	2.474(5)
Dy(2)-O(4b)	2.298(6)	Dy(2)-O(2W)	2.486(11)
Dy(2)-O(4c)	2.298(6)	Dy(2)-O(1W')	2.439(14)
Dy(2)-O(2)	2.330(6)	Dy(2)-O(1)	2.416(7)
Dy(2)-O(2a)	2.330(6)	Dy(2)-O(1W'a)	2.439(14)
Dy(2)-O(1Wa)	2.352(12)	Dy(2)-O(1W)	2.352(12)
Dy(1)-Dy(2)	3.8476(7)	Dy(3)-Dy(3a)	3.8911(8)
Dy(1)-Dy(3)	3.8189(6)	Dy(2)-Dy(3)	3.7800(6)
O(3)-Dy(1)-O(5)	137.87(18)	O(4b)-Dy(2)-O(4c)	99.9(4)
O(3)-Dy(1)-O(5a)	137.87(18)	O(4b)-Dy(2)-O(2)	85.8(2)
O(5)-Dy(1)-O(5a)	73.1(3)	O(4c)-Dy(2)-O(2)	144.1(2)
O(3)-Dy(1)-O(3Wa)	81.82(16)	O(4b)-Dy(2)-O(2a)	144.1(2)
O(5)-Dy(1)-O(3Wa)	140.1(2)	O(4c)-Dy(2)-O(2a)	85.8(2)
O(5a)-Dy(1)-O(3Wa)	71.1(2)	O(2)-Dy(2)-O(2a)	70.5(3)
O(3)-Dy(1)-O(3W)	81.82(16)	O(4b)-Dy(2)-O(1Wa)	139.1(4)
O(5)-Dy(1)-O(3W)	71.1(2)	O(4c)-Dy(2)-O(1Wa)	95.5(5)
O(5a)-Dy(1)-O(3W)	140.1(2)	O(2)-Dy(2)-O(1Wa)	103.1(5)
O(3Wa)-Dy(1)-O(3W)	132.7(3)	O(2a)-Dy(2)-O(1Wa)	74.3(4)
O(3)-Dy(1)-O(2a)	69.8(2)	O(4b)-Dy(2)-O(1W)	95.5(5)
O(5)-Dy(1)-O(2a)	72.1(2)	O(4c)-Dy(2)-O(1W)	139.1(4)
O(5a)-Dy(1)-O(2a)	110.6(2)	O(2)-Dy(2)-O(1W)	74.3(4)
O(3Wa)-Dy(1)-O(2a)	138.0(2)	O(2a)-Dy(2)-O(1W)	103.1(5)
O(3W)-Dy(1)-O(2a)	74.1(2)	O(1Wa)-Dy(2)-O(1W)	51.0(8)
O(3)-Dy(1)-O(2)	69.8(2)	O(4b)-Dy(2)-O(1)	76.6(2)
O(5)-Dy(1)-O(2)	110.6(2)	O(4c)-Dy(2)-O(1)	76.6(2)
O(5a)-Dy(1)-O(2)	72.1(2)	O(2)-Dy(2)-O(1)	70.3(2)
O(3Wa)-Dy(1)-O(2)	74.1(2)	O(2a)-Dy(2)-O(1)	70.3(2)
O(3W)-Dy(1)-O(2)	138.0(2)	O(1Wa)-Dy(2)-O(1)	144.1(3)
O(2a)-Dy(1)-O(2)	67.4(3)	O(1W)-Dy(2)-O(1)	144.1(3)
O(3)-Dy(1)-O(8)	121.8(3)	O(4b)-Dy(2)-O(1W'a)	139.8(4)
O(5)-Dy(1)-O(8)	82.6(2)	O(4c)-Dy(2)-O(1W'a)	69.1(4)
O(5a)-Dy(1)-O(8)	82.6(2)	O(2)-Dy(2)-O(1W'a)	126.3(4)
O(3Wa)-Dy(1)-O(8)	75.90(17)	O(2a)-Dy(2)-O(1W'a)	75.4(4)
O(3W)-Dy(1)-O(8)	75.90(17)	O(1Wa)-Dy(2)-O(1W'a)	26.5(5)

O(2a)-Dy(1)-O(8)	145.62(14)	O(1W)-Dy(2)-O(1W'a)	74.6(6)
O(2)-Dy(1)-O(8)	145.62(14)	O(1)-Dy(2)-O(1W'a)	132.7(4)
O(4c)-Dy(2)-O(1W')	139.8(4)	O(4b)-Dy(2)-O(1W')	69.1(4)
O(2)-Dy(2)-O(1W')	75.4(4)	O(1)-Dy(2)-O(1W')	132.7(4)
O(2a)-Dy(2)-O(1W')	126.3(4)	O(1W'a)-Dy(2)-O(1W')	94.0(7)
O(1Wa)-Dy(2)-O(1W')	74.6(6)	O(4b)-Dy(2)-O(2W)	72.4(2)
O(1W)-Dy(2)-O(1W')	26.5(5)	O(4c)-Dy(2)-O(2W)	72.4(2)
O(2)-Dy(2)-O(2W)	141.54(16)	O(1)-Dy(2)-O(2W)	130.9(3)
O(2a)-Dy(2)-O(2W)	141.54(16)	O(1W'a)-Dy(2)-O(2W)	67.4(4)
O(1Wa)-Dy(2)-O(2W)	76.7(4)	O(1W')-Dy(2)-O(2W)	67.4(4)
O(1W)-Dy(2)-O(2W)	76.7(4)	Dy(3)-Dy(2)-Dy(3a)	61.954(16)
O(2)-Dy(3)-O(12d)	110.09(19)	O(2)-Dy(3)-O(1)	70.8(2)
O(2)-Dy(3)-O(7b)	98.9(2)	O(12d)-Dy(3)-O(1)	140.1(2)
O(12d)-Dy(3)-O(7b)	138.9(2)	O(7b)-Dy(3)-O(1)	76.4(2)
O(2)-Dy(3)-O(9e)	146.6(2)	O(9e)-Dy(3)-O(1)	81.9(2)
O(12d)-Dy(3)-O(9e)	79.1(2)	O(2)-Dy(3)-O(11)	145.3(2)
O(12d)-Dy(3)-O(11)	68.59(19)	O(12d)-Dy(3)-O(3)	73.6(2)
O(7b)-Dy(3)-O(11)	70.9(2)	O(7b)-Dy(3)-O(3)	146.0(2)
O(9e)-Dy(3)-O(11)	68.1(2)	O(12d)-Dy(3)-O(3)	73.6(2)
O(1)-Dy(3)-O(11)	133.7(2)	O(9e)-Dy(3)-O(3)	83.2(2)
O(2)-Dy(3)-O(3)	69.8(2)	O(1)-Dy(3)-O(3)	69.6(2)
O(12d)-Dy(3)-O(11)	68.59(19)	O(11)-Dy(3)-O(3)	135.7(2)
O(12d)-Dy(3)-O(6f)	82.7(2)	O(3)-Dy(3)-O(6f)	124.36(19)
O(7b)-Dy(3)-O(6f)	78.8(2)	O(6f)-Dy(3)-Dy(3a)	147.65(13)
O(9e)-Dy(3)-O(6f)	140.5(2)	O(3)-Dy(3)-O(6f)	124.36(19)
O(1)-Dy(3)-O(6f)	131.4(2)	Dy(2)-Dy(3)-Dy(3a)	59.023(8)
O(11)-Dy(3)-O(6f)	72.8(2)	Dy(1)-Dy(3)-Dy(3a)	59.373(7)

Symmetry codes: a) x, y, -z+1/2; b) -x+1, y+1/2, -z+1/2; c) -x+1, y+1/2, z;
d) -x+2, -y+2, -z+1; e) -x+2, y+1/2, -z+1/2; f) x, -y+3/2, z+1/2