

Supporting Information for:

Quadruple-CO₃²⁻ Bridged Octanuclear Dysprosium(III) Compound Showing Single-Molecule Magnet Behaviour

Experimental Section

Synthetic procedures

All chemicals were of reagent grade and were used without any further purification.

Synthesis of pyrazine-2-carbohydrazide

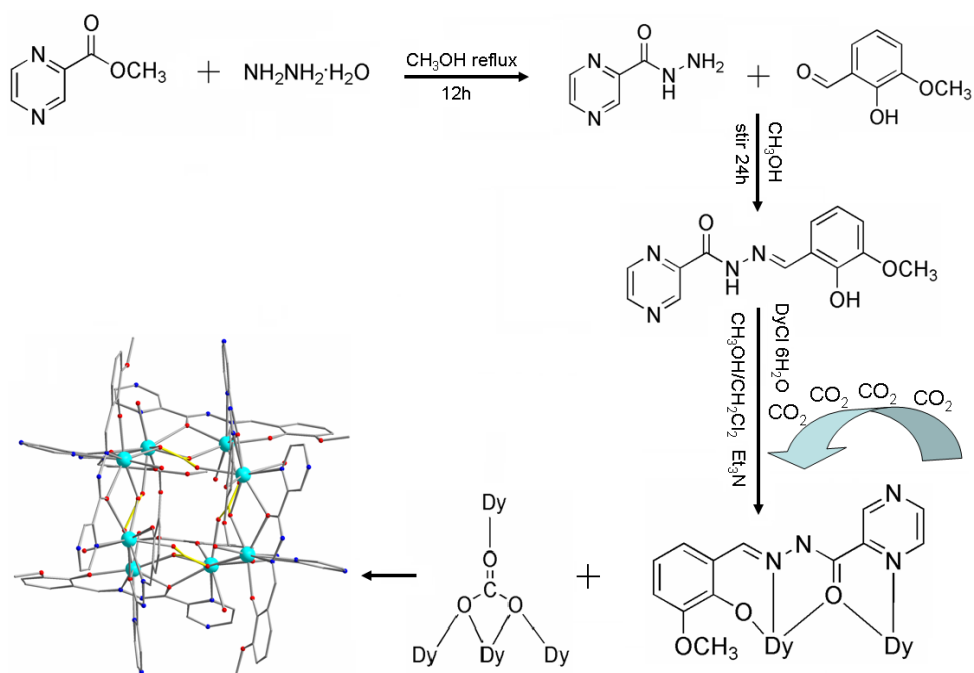
The pyrazine-2-carboxylic acid methyl ester was prepared by a literature procedure described elsewhere. A mixture of pyrazine-2-carboxylic acid methyl ester (1.38 g, 10 mmol) and hydrazine hydrate (85%, 15 ml) in methanol (20 ml) was refluxed overnight, at a temperature somewhat below 80°C. The resulting pale-yellow solution set aside 12 hrs. During this period, a colorless product, *i.e.* pyrazine-2-carbohydrazide, precipitated from the reaction mixture as a crystalline solid (yield = 0.84 g, 61%).

Synthesis of (*E*)-N'-(2-hydroxy-3-methoxybenzylidene)pyrazine-2-carbohydrazide

Pyrazine-2-carbohydrazide (2 mmol, 0.276 g) was suspended together with *o*-vanillin (2 mmol, 0.304 g) in methanol (20 ml), and the resulting mixture was stirred at the room temperature overnight. The pale yellow solid was collected by filtration (yield = 0.56 g, 83%). Elemental analysis (%) calcd for C₁₃H₁₂N₄O₃: C, 57.35, H, 4.44, N, 20.58: found C, 57.64, H, 4.59, N, 20.39. IR (KBr, cm⁻¹): 3415(w), 3258(w), 1677(vs), 1610(s), 1579(m), 1530(s), 1464(s), 1363(m), 1255(vs), 1153(s), 1051(w), 1021(s), 986(w), 906(m), 938(w), 736(s), 596(m), 498(w).

Synthesis of the complex 1

The solution of DyCl₃·6H₂O (56.5 mg, 0.15 mmol) and the H₂L (40.5 mg, 0.15 mmol) in 15 ml CH₃OH/CH₂Cl₂ (1:2 v/v) was stirred with triethylamine (0.4 mmol) for 6h. The resultant yellow solution was left unperturbed to allow the slow evaporation of the solvent. Red single crystals, suitable for X-ray diffraction analysis, were formed after one week. Yield: 28 mg, (34%, based on metal salt). Elemental analysis (%) calcd for C₁₁₈H₁₄₀Dy₈N₃₂O₅₆: C, 33.62, H, 3.35, N, 10.64: found C, 33.56, H, 3.41, N, 10.59. IR (KBr, cm⁻¹): 3385(m), 3055(w), 1609(vs), 1562(m), 1544(w), 1521(w), 1452(s), 1419(w), 1377(w), 1346(m), 1289(w), 1241(m), 1217(s), 1159(m), 1105(w), 1048(w), 1029(w), 1020(w), 971(w), 925(w), 860(w), 785(w), 770(w), 743(m), 708(w), 642(w), 532(w), 484(w), 425(m).



Scheme S1 Preparation of **1**.

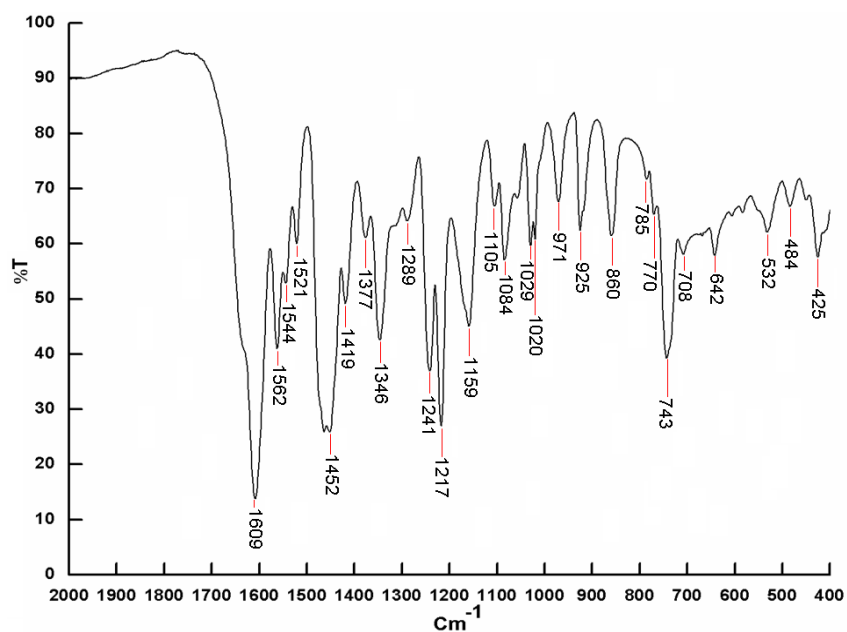


Fig. S1 Infrared spectrum of **1**.

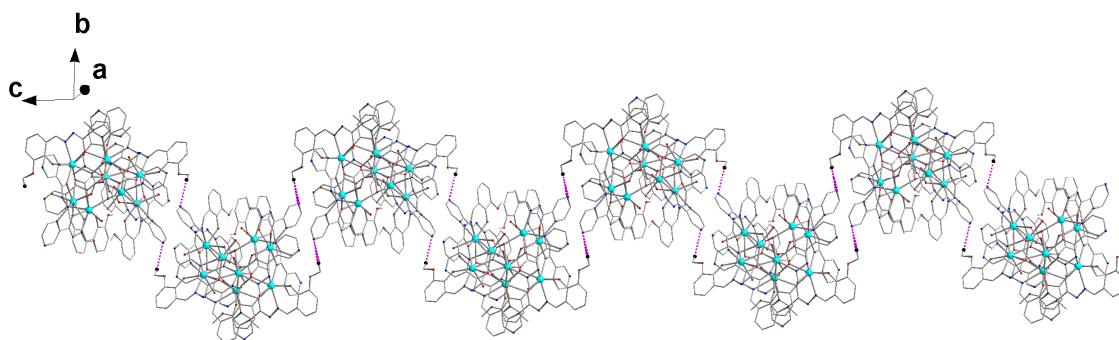


Fig. S2 Illustration showing the hydrogen-bonding interactions (pink lines) and the one-dimensional zigzag chain arrangement of the molecules in **1**.

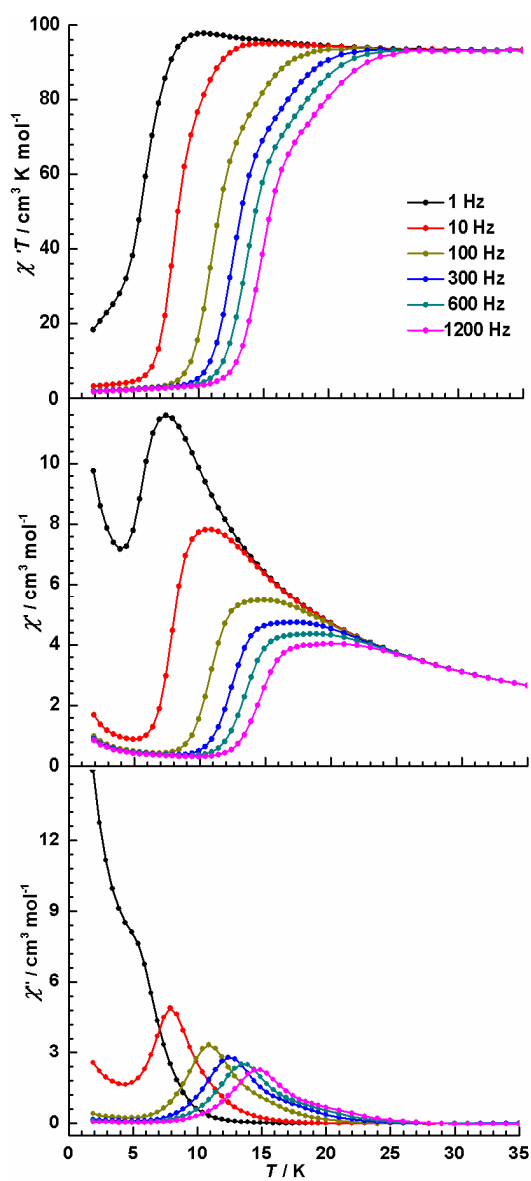


Fig. S3 Temperature dependence of the $\chi' T$ product (top), χ' (middle) and χ'' (bottom) *ac* susceptibility under zero-dc field for **1**.