# Large spin, magnetically anisotropic octametallic vanadium(III) clusters with strong ferromagnetic coupling: Supplementary Information

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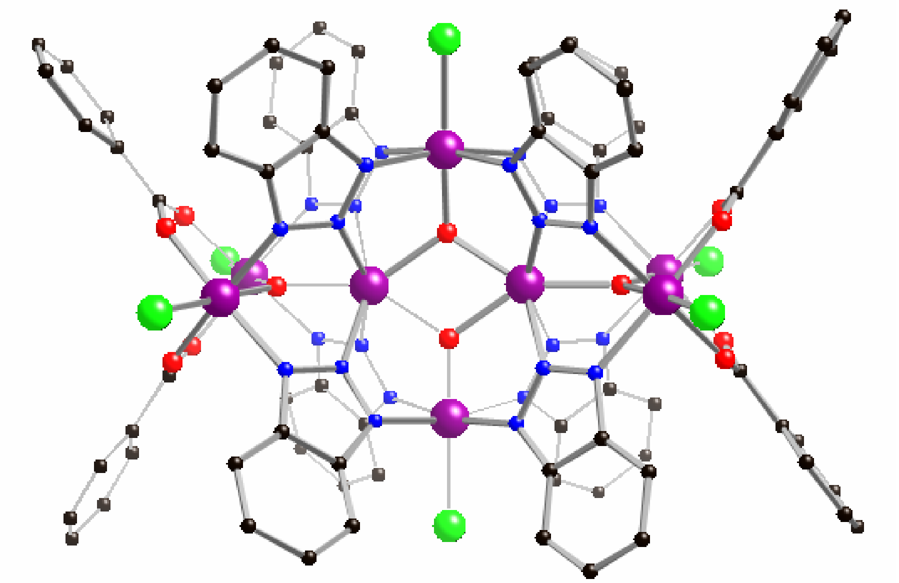

**Figure S1**. View of the structure of the dianion of **2**. Scheme: V (purple), O (red), N (blue), Cl (green), C (black), H omitted for clarity.

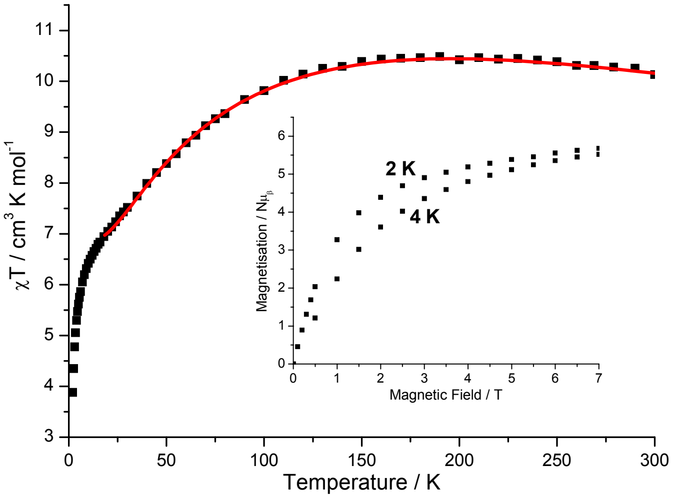

**Figure S2**. $\chi T$ vs. $T$ for **2** measured in 1 T applied magnetic field (black squares) and best fit down to 18 K (red line) using the coupling scheme in the insert of Fig. 2 and spin Hamiltonian (1) in the main text. Best fit parameters: $J_1 = +118$, $J_2 = -49$, $J_3 = -6$ and $J_4 = -11$ cm$^{-1}$ with $g = 1.9$. Inset: low temperature $M$ vs. $H$ for **2**.

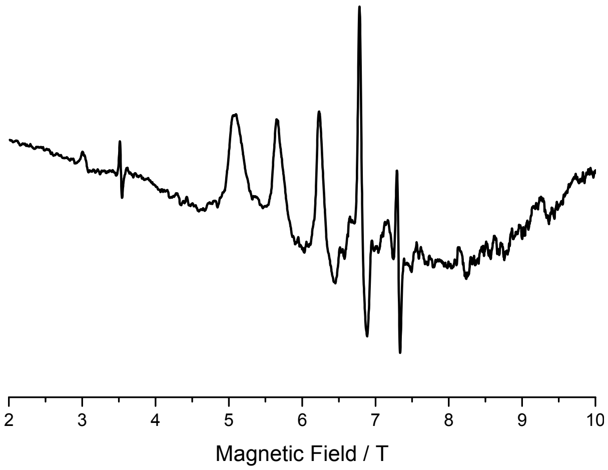

**Figure S3.** 190 GHz EPR spectrum at 5 K of a loose polycrystalline sample of **1**, confirming the W-band observations in the main text.

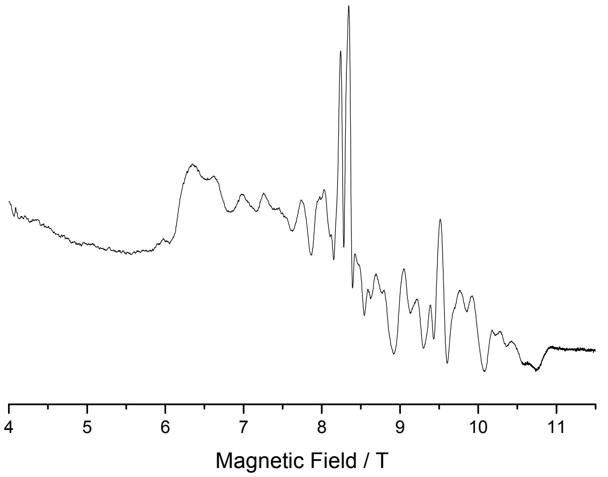

**Figure S4.** 230 GHz EPR spectrum at 5 K of a polycrystalline sample of **1** restrained in eicosane wax. Note the very different form of the spectrum to that in Fig. S3, confirming that the crystallites orient in the field when loose.

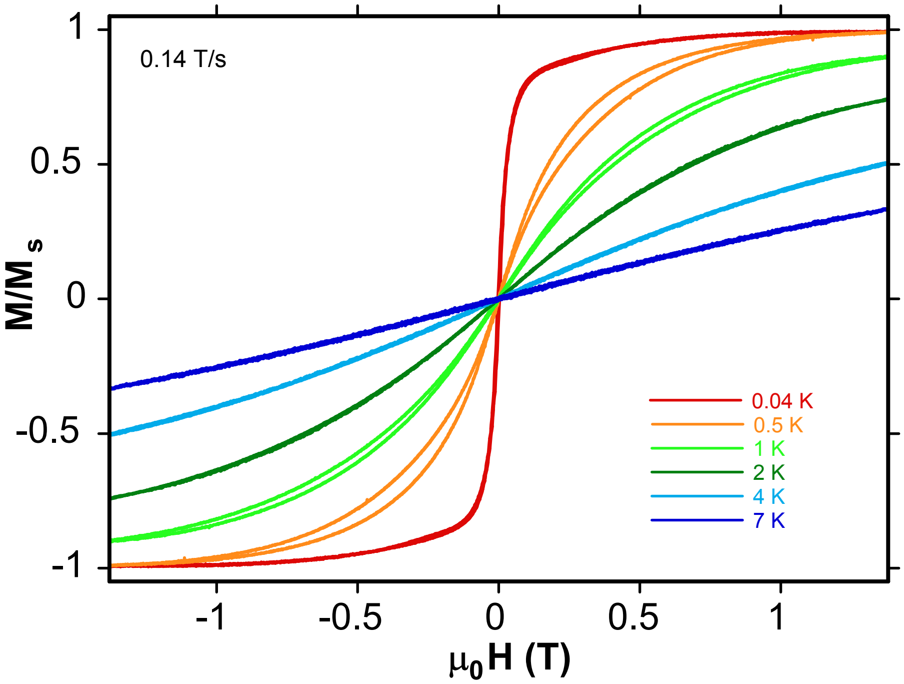

**Figure S5.** Low temperature *M* vs. *H* (*M* normalised to saturation value $M_s$) loops for a single crystal of **1** measured on a micro-SQUID array.

**Table S1.** Bond valence sum calculations for the vanadium ions in **1** and **2**, using parameters from N. E. Brese and M. O'Keefe, *Acta Cryst.* 1991, **B47**, 192-197.

| | **Complex 1** | | | | **Complex 2** | | | |
|---|---|---|---|---|---|---|---|---|
| | **V(III)** | **V(IV)** | **V(V)** | **Assignment** | **V(III)** | **V(IV)** | **V(V)** | **Assignment** |
| V1 | 3.21 | 3.35 | 3.46 | V(III) | 3.22 | 3.36 | 3.47 | V(III) |
| V2 | 3.22 | 3.33 | 3.45 | V(III) | 3.29 | 3.40 | 3.53 | V(III) |
| V3 | 3.32 | 3.44 | 3.57 | V(III) | 3.25 | 3.36 | 3.49 | V(III) |
| V4 | 3.43 | 3.47 | 3.53 | V(III) | 3.42 | 3.46 | 3.52 | V(III) |