10.1071/CH15520_AC

Australian Journal of Chemistry 2015, 68 (12), 1926-1928

# Supplementary Material

# $Mn(II)_2Gd(III)_3$ phosphonate as molecular refrigerant

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## X-ray Crystallography

Single crystals of dimensions 0.45 × 0.44 × 0.43 $mm^3$ for **1** were used for structural determinations on a Bruker APEX-II diffratometer using graphite monochromatized Mo *Kα* radiation ($\lambda$ = 0.71073 Å) at room temperature. Cell parameters were refined by using the program Bruker SAINT on all observed reflections. The collected data were reduced by using the program Bruker SAINT, and an absorption correction (multi-scan) was applied. The reflection data were also corrected for Lorentz and polarization effects. The structures were solved by direct methods and refined on $F^2$ by full matrix least squares using SHELXTL. There is an electron density peak near to Mn1 atom which is a 'ripple'. All of the non-hydrogen atoms were located from the Fourier maps, and were refined anisotropically. All H atoms were refined isotropically, with the isotropic vibration parameters related to the non-H atom to which they are bonded.

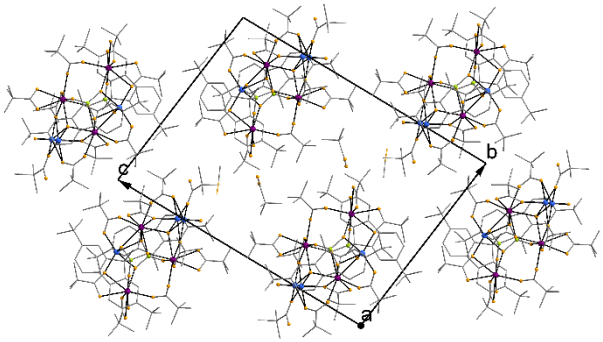


Fig. S1 Packing diagram of compound **1** viewed along the *a*-axis.

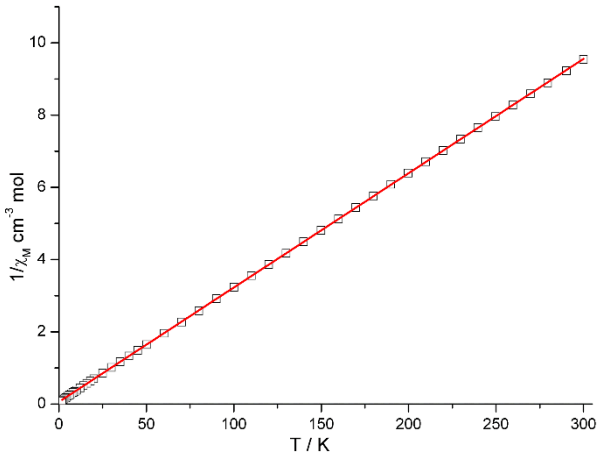


Fig. 2 $1/\chi_M$ vs T plot of compound **1**. Red line shows the best Curie-Weiss fitting of the data.

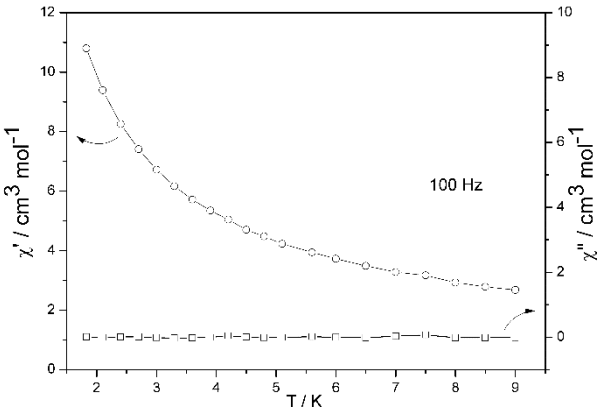


Fig. S3 Ac susceptibility of compound **1** at 100 Hz.

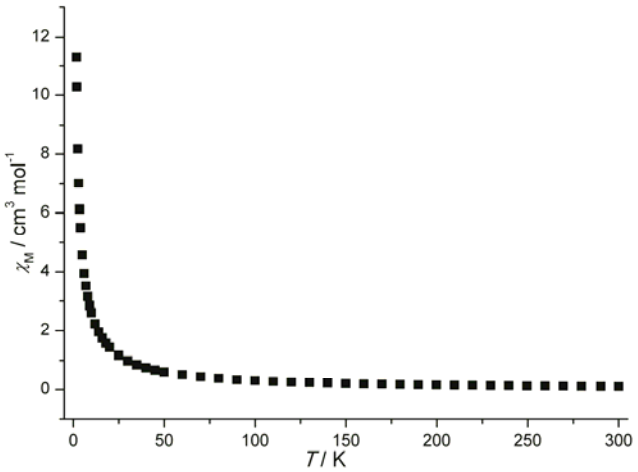


Fig. S4 $\chi_M$ vs $T$ plot for compound **1**.