

# Synthesis, Crystal and Magnetic Structure of the New Double Perovskite $\text{Ba}_2\text{MnMoO}_6$

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We describe the preparation and characterization of a new double perovskite of formula  $\text{Ba}_2\text{MnMoO}_6$ . It has been obtained in polycrystalline form by thermal treatment, in a  $\text{H}_2/\text{N}_2$  flow, of previously decomposed citrate precursors. This material has been studied by X-ray (XRD) and neutron powder diffraction (NPD): it crystallizes, at room temperature, in the cubic space group  $Fm\bar{3}m$ , and shows an almost perfect ordering between  $\text{Mn}^{2+}$  and  $\text{Mo}^{6+}$  cations at the B substructure. Below  $T_N = 10.8$  K, it experiences a long range antiferromagnetic ordering that was followed from sequential NPD data. The low-temperature magnetic structure is defined by the propagation vector  $\mathbf{k} = (\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ . The ordered magnetic moment of Mn is found to be  $4.04(8) \mu_B$  at 2 K, suggesting a divalent oxidation state for Mn cations, in a high spin  $t_{2g}^3 e_g^2$  ( $S = 5/2$ ) electronic configuration.

*Key words:* Perovskite Structure, Neutron Diffraction, Magnetic Structure, Antiferromagnetic Ordering, Manganese