

Preparation, structure, and magnetic properties of a dodecanuclear mixed-valence manganese carboxylate.

Autorzy

Tadeusz Lis

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Streszczenie

This new type of dodecanuclear crystalline complex was obtained by reaction of Mn^{2+} with MnO_4^- in acetic and propionic acids. The reddish-black acetate complex has the formula $[\text{Mn}_{12}(\text{CH}_3\text{COO})_{16}(\text{H}_2\text{O})_{12}] \cdot 2\text{CH}_3\text{COOH} \cdot 4\text{H}_2\text{O}$, established by chemical and single-crystal X-ray diffraction methods. This complex is tetragonal, space group $I4_1$, with $a = 17.319(9)$, $c = 12.388(7)$. The final R and R_w were 0.045 and 0.034 for 1172 non-zero reflexions. The crystals are built up $[\text{Mn}_{12}(\text{CH}_3\text{COO})_{16}(\text{H}_2\text{O})_{12}] \cdot 2\text{CH}_3\text{COOH} \cdot 4\text{H}_2\text{O}$ molecules. In the dodecanuclear molecules, which have 4 (S_4) crystallographic symmetry, the Mn atoms are linked. The occurrence of a strong Jahn-Teller effect in Mn^{2+} ions differentiates the Mn^{3+} and Mn^{4+} ions. The interesting magnetic properties ($9 \times 10^{-24} \text{ J T}^{-1}$ at 3-3 K to a maximum of $56.5 \times 10^{-24} \text{ J T}^{-1}$ at 17-31 K and then decreases to $33.4 \times 10^{-24} \text{ J T}^{-1}$ at 280 K per Mn atom) may be interpreted in terms of the Mn-Mn distances and superexchange via bridge O atoms.

Adres publiczny

<http://scripts.iucr.org/cgi-bin/paper?S0567740880007893>