

A bulky oxime for the synthesis of Mn(III) clusters.

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The reaction between $\text{Mn}(\text{OAc})_2 \cdot 4\text{H}_2\text{O}$ and Br-saoH_2 (=5-Br-salicylaldoxime) in EtOH in the presence of NMe₄OH led to the formation of the hexanuclear cluster $[\text{Mn}_6\text{O}_2(\text{Br-sao})_6(\text{OAc})_2(\text{H}_2\text{O})_2(\text{EtOH})_2] \cdot 2.8\text{H}_2\text{O} \cdot 2.2\text{EtOH}$ (1). Switching from $\text{Mn}(\text{OAc})_2 \cdot 4\text{H}_2\text{O}$ to $\text{Mn}(\text{ClO}_4)_2 \cdot 6\text{H}_2\text{O}$, the same reaction upon addition of pivH (= trimethyl acetic acid) yielded $[\text{Mn}_6\text{O}_2(\text{Br-sao})_6(\text{piv})_2(\text{H}_2\text{O})_2(\text{EtOH})_2] \cdot 6\text{EtOH}$ (2 6EtOH), and finally upon changing pivH to NaO₂CPh, we were able to isolate $[\text{Mn}_6\text{Na}_2\text{O}_2(\text{Br-sao})_6(\text{O}_2\text{CPh})_4(\text{H}_2\text{O})_2(\text{EtOH})_4] \cdot 6\text{EtOH}$ (3 6EtOH). Clusters 1 and 2 6EtOH describe "typical" $[\text{Mn}_6/\text{oximate}]$ complexes consisting of two $\{\text{Mn}_3\}$ oxo-centered triangular units bridged by oximate groups, while in 3 6EtOH these triangular motifs are separated by two sodium cations. An investigation into the magnetic properties of all three clusters revealed the presence of dominant antiferromagnetic interactions, leading to ground states of $S = 4$ and 2 for 1 and 3, respectively. Finally, cluster 2 6EtOH functions as a single-molecule magnet with $U_{\text{eff}} = 27.54$ K.

Słowa kluczowe

Mn(III) oximate complexes, Crystal structures, magnetic properties, single-molecule magnets

Adres publiczny

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