Ferromagnetic manganese "cubes": from PSII to single-molecule magnets.

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Rok wydania

2010

Czasopismo

Dalton Transactions

Numer woluminu

39

Strony

4777-4785

DOI

10.1039/B925248G

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

The reaction of $Mn(O_2CMe)_2{\cdot}2H_2O$ with Me-saoH$_2$ (Me-saoH$_2$= 2-hydroxyphenylethanone oxime) in MeCN forms the complex $[Mn^{III}_4(Me\text{-}sao)_4(Me\text{-}saoH)_4]$ (**1**) in good yields. Replacing Me-saoH$_2$ with Naphth-saoH$_2$ (Naphth-saoH$_2$ = 2-hydroxy-1-napthaldoxime) in the presence of CH_3ONa forms the complex $[Mn^{III}_4(Naphth\text{-}sao)_4(Naphth\text{-}saoH)_4]$ (**2**) in low yields, while the reaction between $Mn(ClO_4)_2{\cdot}6H_2O$, Et-saoH$_2$ (Et-saoH$_2$= 2-hydroxypropiophenone oxime) and NBu_4OH in MeCN gives the complex $[Mn^{III}_4(Et\text{-}sao)_4(Et\text{-}saoH)_4]$ (**3**) in moderate yields. All three tetrametallic cages exclusively contain Mn^{III} centres arranged in a “cube”-like topology, in which the metal centres are connected by–N–$O_{oximate}$ groups. The magnetic properties o f **1–3** are near identical, revealing the presence of only ferromagnetic interactions between the metal ions leading to high-spin ground states of S = 8. The complexes display frequency dependent out-of-phase signals in ac susceptibility studies and, in the case of **1** single-molecule magnetism has been observed by means of single-crystal hysteresis loop measurements.

Adres publiczny

http://dx.doi.org/ 10.1039/B925248G

Strona internetowa wydawcy

https://www.rsc.org/