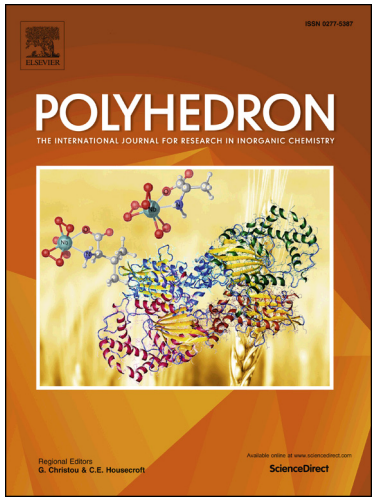

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Dinuclear cage-core [Co_2]/[Ni_2] oxo-clusters supported by Sb(III) tartrate scaffolds: Synthesis, structure and magnetic properties

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Abstract

Two dimeric metal-oxo clusters, {$Na_4[Co_2Sb_{12}(\mu_3\text{-}O)_6(\mu_3\text{-}OH)_2(\mu_4\text{-}O)_3(tartrate)_6]\cdot 19.5H_2O\}_2$ (**1**) and {$KNa_3[Ni_2Sb_{12}(\mu_3\text{-}O)_5(\mu_3\text{-}OH)_3(\mu_4\text{-}O)_3(tartrate)_6]\cdot 20H_2O\}_2$ (**2**) were obtained from a simple reaction in aqueous solution without heating. Structural analyses revealed that complexes **1** and **2** feature a cage compound {Sb_{12}} with an encapsulated {Co_2}/{Ni_2} core, implying the structural diversity in the {Sb_{12}} cage assemblies constructed from potassium antimonyl tartrate as the ligand in aqueous solution. The temperature-dependent magnetic susceptibilities indicated that there are weak ferromagnetic intermolecular or/and intramolecular interactions in **1** and strong ferromagnetic behavior in **2**, owing to the strong spin-orbital coupling (**1**) and Jahn-Teller effect (**2**).

Keywords: Dipotassium bis(μ-tartrato)-diantimony(III) ligand, Dinuclear cobalt(II)/nickel(II) cage-core structure, Metal-oxo clusters, Magnetic study

1.Introduction

Metal-oxo clusters have attracted considerable attention in recent years as a result of their intriguing architectures [1-5] as well as their fascinating properties resulting in potential applications in many fields, such as magnetism, gas adsorption and separation, catalysis and electrochemistry [6-12]. Although a diversity of self-assembly procedures have been synthesized for the construction of metal clusters by homo- and heterometallic complexes, the design and synthesis metal-oxo clusters continue to be interesting and challenging [13-16]. One feasible