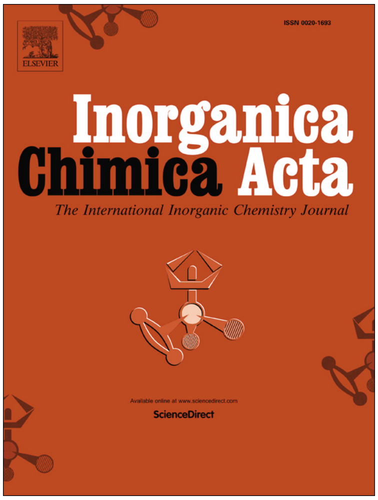

Research paper

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Rare trinuclear $Ni^{II}_2M^{II}$ complexes (M^{II} = Mn, Fe and Co) with a reduced Schiff base ligand: Synthesis, structures and magnetic properties

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ABSTRACT

Three new trinuclear hetero-metallic $Ni^{II}_2M^{II}$ complexes with M^{II} = Mn, Fe and Co have been synthesized using a [NiL^R] “metalloligand”, where H_2L^R = N,N'-bis(2-hydroxybenzyl)-1,3-propanediamine. All complexes have been characterized by elemental analysis, spectroscopic methods, single crystal XRD and magnetic and electrochemical studies. In the three complexes, in addition to the double phenoxido bridges, the two terminal Ni^{II} atoms are linked to the central M^{II} [M = Mn(**1**), Fe(**2**) and Co(**3**)] ion by means of a bridging carboxylato co-anion, giving rise to a linear Ni^{II}-M^{II}-Ni^{II} structure. Variable temperature magnetic susceptibility measurements show the presence of weak ferromagnetic and antiferromagnetic exchange interactions mediated through the phenoxido bridges with J values of +8.5 and -3.0 cm^{-1} for complexes **1** and **2**, respectively. Compound **3** shows the presence of antiferromagnetic interactions. Cyclic voltammetry shows a common quasi-reversible one electron oxidation corresponding to the Ni(II)/Ni(III) process in **1**-**3** and an irreversible M(II)/M(III) oxidation for Mn(**1**) and Fe(**2**).

Keywords: Nickel(II), Manganese(II), Iron(II), Cobalt(II), Magnetic properties

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1. Introduction

The chemistry of hetero-metallic polynuclear clusters of transition metals have attracted considerable interest to the inorganic chemists not only for their attractive structural features but also for their applications in various fields such as magnetism, photoluminescence and multifunctional molecular materials [1-4]. There are various synthetic strategies to build hetero-