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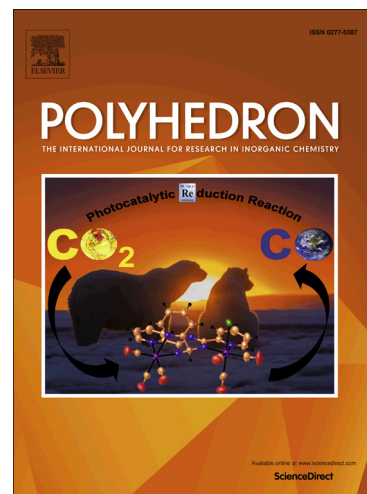
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Low spin Fe(II) complexes formed of monosubstituted 2,6-bis(2-benzimidazolyl)pyridine ligands

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Abstract

Five ligands as monosubstituted derivatives of the basic skeleton of 2,6-bis(2-benzimidazolyl)pyridine were synthesized, and characterized by NMR and IR spectra along with the X-ray structure analysis. Their complexation gave a set of hexacoordinate Fe(II) complexes showing predominantly the diamagnetism until ambient temperature. Some temperature-independent paramagnetism along with an onset of the spin transition is also detected.

Key words

Crystal structure, derivatives of 2,6-bis(2-benzimidazolyl)pyridine, Fe(II) complex, magnetic data.

1. Introduction

The condensation product of the *o*-phenylenediamine with pyridine-2,6-dicarboxylic acid results in the formation of 2,6-bis(2-benzimidazolyl)pyridine, abbr. *bzimpy*. The *bzimpy* ligand became one of the most useful starting materials for more complicated organic compounds e.g. anchoring and ancillary ligands used to coordination chemistry [1-3]. The benzimidazole group is also known as a good provider of greater coordination bonding due to strong σ donor effect [4]. This ligand has been widely combined with metal ions yielding a number of transition metal complexes that were studied from various aspects in detail [5]. The high and low spin Fe(II) complexes with six-membered ring ligands were studied largely [6-13]. One target of investigation was oriented to magnetic studies as Fe(II) complexes of the formula $[\text{Fe}(\textit{bzimpy})_2]\text{X}_2 \cdot \textit{sol}$ are susceptible for spin crossover from the low-spin state $S = 0$ to the high-spin state $S = 2$ [14-16]; X – monoanion, *sol* – crystal solvent. Also deprotonation of the basic ligand *bzimpy* to *bzimpy*_{-1H} gave neutral Fe(II) complex with interesting magnetic behaviour [17].

Herein we are reporting about synthesis and characterization of new ligands L² through L⁶ as derivatives of the basic ligand L¹ = *bzimpy* (Scheme 1). Their complexation with Fe(II) salts produced a set of hexacoordinate complexes $[\text{Fe}(\text{L}^n)_2](\text{ClO}_4)_2$ and $[\text{Fe}(\text{L}^n\text{-}_{1\text{H}})_2]$ whose magnetic properties, after structure determination, were studied in detail (Scheme 2).

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