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Rich magnetic chemistry of cobalt(II) complexes with N-phosphorylthioureas. Crystal structure and solution1H NMR spectral properties

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Abstract

Structure and magnetic properties of CoII complexes with N-phosphorylthiourea derivatives [RC(S)NHP(O)(OiPr)2] (HL) [Co {Et2NC(S)NP(O)(OzPr)2}2] (1), [Co [(PrNHC(S)NP(O)-(OiPr)2}2] (2), [Co {[/BuNHC(S)NP(O)(OiPr) 2}2] (3), [Co{p-MeOC6H4NHC(S)NP(O) (O(Pr)2}2] (4), [Co{P-BrC6H4NHC-(S) NP(O)(O(Pr)2}2] (5) were investigated. Paramagnetic shifts in the 1H NMR spectrum were observed for high-spin CoII complexes with HL, incorporating amidophosphate moiety C(S)NP(O). The thermal dependence of the magnetic susceptibility has shown that the extended materials 2, 3 and 5 show ferromagnetic exchange between distorted tetrahedral metal atoms, while in complex 4 antiferromagnetic behavior takes place. Compound 1 behaves as a spincanted ferromagnet, an antiferromagnetic ordering taking place below a critical temperature, Tc = 175 K. Complex 2 was investigated by single crystal X-ray diffraction. The cobalt(II) atom in complex 2 is in distorted tetrahedral CoO2S2 environment formed by the C=S sulfur atoms and the P=O oxygen atoms of two deprotonated ligands. © 2007 WILEY-VCH Verlag GmbH & Co. KGaA.

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Keywords

Amidophosphate, Chelate, Magnetic susceptibility, Nmr-spectroscopy, Thioureas