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Magnetic Properties of Novel Dendrimeric Iron(III) Complexes of the First Generation: EPR and Mössbauer Study

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Abstract

© 2016, Springer-Verlag Wien.The magnetic properties of novel liquid-crystalline dendrimeric iron(III) complexes of the first generation, [Fe(L2)]+X−, where L = 3,4,5-tri(tetradecyloxy) benzoyloxy-4-salicyliden-N′-ethyl-N-ethylenediamine and X = Cl, NO3 have been investigated for the first time by electron paramagnetic resonance (EPR) and Mössbauer spectroscopy in the wide (4–300 K) temperature range. It has been shown that each compound consists of two types of iron centers: low-spin (LS, S = 1/2) and high-spin (HS, S = 5/2). A partial thermally driven spin transition (S = 5/2 ↔ 1/2) was observed in these complexes. EPR showed that the LS and HS iron centers are coupled by weak antiferromagnetic interactions and most probably form a chain in the column. Mössbauer spectroscopy confirmed the existence of the LS and HS Fe(III) centers in the compounds, a partial spin crossover of approximately 2–8 % of the Fe(III) molecules and showed that the HS Fe(III) centers demonstrate the antiferromagnetc type of ordering at 5 K.

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