Spectroscopy and magnetism of polymeric $Ln(CCL_3COO)_3 \cdot 2\ H_2O$ and their heteronuclear $Ln_2Cu(CCl_3COO)_8 \cdot 6H_2O$ analogues (Ln=Sm,Gd).

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Streszczenie

In order to study the exchange interactions between f- and d-electron ions two series of compounds, heteronuclear $Ln_2Cu(CCl_3COO)_8 \cdot 6\ H_2O$ (**1**, Sm; **2**, Gd) and polymeric $Ln(CCl_3COO)_3 \cdot 2\ H_2O$ (**3**, Sm; **4**, Gd) trichloroacetates, were synthesised. Polymeric trichloroacetates **3** and **4** are isomorphous with erbium chloroacetate, whose structure contains dimeric units linked by carboxyl bridges and water molecules into endless chains. Heteronuclear **1** and **2** are isomorphous with $Nd_2Cu(CCl_3COO)_8 \cdot 6\ H_2O$ reported by us previously. Absorption spectra of single crystals of **1**–**4** for two orientations of the crystals down to 4 K were investigated. Magnetic susceptibility measurements in the range 300–1.8 K were carried out. Optical and magnetic properties are related to the X-ray data. Electron transition probabilities were calculated and the effect of coupled ion pairs in the polymeric structure on the optical and magnetic properties was analysed. Changes in magnetic properties in relation to the mononuclear systems are discussed.In the last few years many studies have been devoted to polynuclear and heteronuclear dimeric and polymeric systems. Binucleating ligands may provide unusual structural features and/or magnetic, optical and catalytic properties and allow the preparation of sophisticated molecular optical and magnetic devices, *etc*.[1–9] For the same reasons, heteronuclear copper lanthanide compounds have been widely studied and also because of their potential applications in superconducting ceramics. In addition, it is well known that lanthanide(III) ions show peculiar physical and chemical properties that make them essential components in the preparation of many new materials. The main features of these materials can be influenced by structural parameters, the anisotropy of the ground state of 4f ions and by the nature and intensity of the exchange and other interactions involving rare earths and d-electron ions. In these systems two paramagnetic metal centres can interact either ferromagnetically or antiferromagnetically through the bridging group.With the aim of shedding light on this field we synthesised two series of polynuclear (**3**,**4**) and heteronuclear (**1**,**2**) trichloroacetates. The correlation of their optical and magnetic properties to the X-ray data is the subject of this report.

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