MAGNETIC CLUSTERS IN DOUBLE COPPER HEXAFLUOROZIRCONATES

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Magnetic clusters in the double hexafluorozirconates with general formula $A_2Cu(ZrF_6)_2 \cdot 6H_2O$ (A: NH_4; K; Rb; Cs) were studied by X-band EPR in the temperature range 4.2-300 K. All the compounds studied crystallize in the monoclinic syngony with symmetry $P2_1/n$. A sublattice of the $Cu(H_2O)_6^{2+}$ ions with the equivalent complexes in the corners of the unit cell and magnetically nonequivalent complex in its center can be distinguished. In the compounds with various monovalent cations the deformation of the copper complex differ significanltly due to the packing effect.

Three types of interactions: magnetic dipole-dipole, exchange and vibronic were studied. The magnetic clusters are picked out due to the dipole-dipole interactions between nearest and next nearest neighbors. Large clusters consist of 2 nearest, 8 next nearest and 10 neighbors in the further coordination sphere. An existence of these clusters is manifested in the EPR as an additional splitting of the resonance line. Exchange interactions in potassium ($J \sim E_{dd}$) and in ammonium ($J >> E_{dd}$) compounds and the Jahn-Teller dynamic in cesium compound modify the EPR spectra. The analysis of the strong temperature and angular dependencies of the EPR spectra allows determination of the exchange and vibronic parameters of the copper complexes in the crystals studied.