

Characteristic Features of Copper Oxysalt Minerals Containing 1D Cu-O Structural Units

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Among the copper-oxygen compounds, the individual class of cuprates, the salts of hypothetical copper acid, was separated. The crystal-chemical classification of the class is developed by analogy with silicates and sulfates. The main building units in the Cu-O motives of cuprates are Cu-O squares, isolated or polymerized into 1D, 2D or 3D units. In the structures of copper oxysalts, the Cu-O structural units, which are the same as these for cuprates, can be decorated by additional acid radicals. The validity of the assignment of the copper oxysalt minerals to the class of cuprates was justified by the observation of the physical properties typical of cuprates.

The magnetic measurements provided in the present work have indicated for the first time the presence of dimerization of Cu-ions in copper oxysalt minerals. This effect is typical for cuprates with the ribbon of Cu-O squares sharing edges. Basing on the data for synthetic cuprate CuGeO_3 , it is reasonable to assume that the presence of the 1D Cu-O ribbon composed of the CuO_4 -squares sharing edges makes the manifestation of the spin-Peierls effect highly probable in natural cuprates. The indication of common physical properties in synthetic and natural copper-oxygen compounds revealed the generic relationship between the structure and properties in the class of cuprates. The results obtained present the base for a further development of the classification scheme in Cu-O compounds.