Magnetism of Cu-Oxalate Compounds with Jahn-Teller Effect

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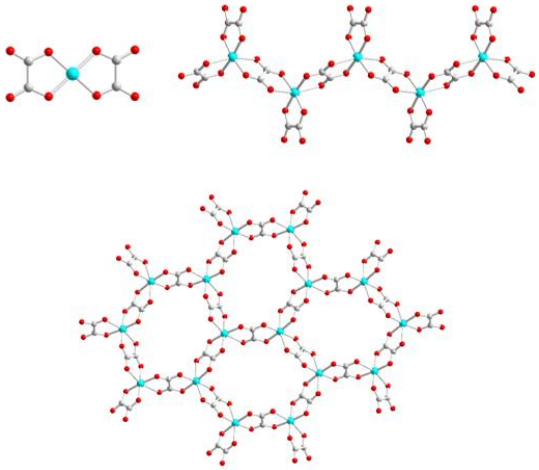
The Jahn-Teller distortion of CuO_6 octahedron plays a key role in inorganic superconductor, such as the Jahn-Teller distortion of MnO_6 octahedron in magneto-resistance materials. Oxalate ($C_2O_4^{2-}$) anion, one of the most commonly used short connectors as O^{2-}, plays an important role in molecular-based magnet and conductor. Zero-dimensional, one-dimensional, two-dimensional and three-dimensional Cu-oxalate compounds were obtained. Paramagnet, antiferromagnetic and ferromagnetic with no long range ordering above 2 K were observed. The magnetic interaction between Cu was controlled by oxalate-bridge, and the hydrogen bonds between Cu^{2+}. In zero-dimensional $Cu(C_2O_4)_2^{2-}$ compounds, Cu^{2+} was square coordinated by oxalate, the magnetic property is influenced by hydrogen bond between anion through $C_2O_4\cdots H_2O\cdots C_2O_4$ as Jahn-Teller effect. In one-dimensional $[Cu(\mu\text{-}C_2O_4)(C_2O_4)^{2-}]_n$ compounds, the magnetic property was modulated by cation and solvent molecule. When Cu^{2+} was square-pyramidally coordinated oxalate, and CH_3OH or H_2O, two-dimensional square lattice was formed by hydrogen bonds between oxalate-bridged dimer $[Cu(\mu\text{-}C_2O_4)(C_2O_4)_2(CH_3OH)_{0.5}(H_2O)_{0.5}^{2-}]$ anion and spin frustration was observed. When Cu^{2+} was octahedrally coordinated, copper-oxalate compounds honeycomb lattice $[Cu(\mu\text{-}C_2O_4)_3^{2-}]_n$ was obtained, their magnetism are different. It is different from $[CrMn(\mu\text{-}C_2O_4)^{-}]_n$ compounds, magnetism are same. It shows the Jahn-Teller effect plays a key on magnetic property of Cu-oxalate compounds.



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