P03

Magnetic field induced spin crossover in three-nuclear triangular complexes

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An actual problem of modern chemistry and physics is design of new magnetic materials and molecular magnets, in particular. These materials can be designed by using "building blocks" – complexes and clusters of transitional metals with organic ligands. Different three-nuclear triangular complexes have been synthesized for last years. These complexes containing paramagnetic ions in vertices of triangle have approximately equal distances between them. Some of complexes have copper ions (Cu^{2+}) with spin S = 1/2 or nickel ions (Ni^{2+}, S = 1). Those are very perspective as molecular magnets with triangular lattices and kagome-type lattices.

Magnetic properties of these complexes have been studied theoretically. Low spin (LS) ↔ high spin (HS) transitions stimulated by external magnetic field were proved to be possible in three-nuclear triangle clusters. Such transitions are similar to spin-crossover behavior in three-nuclear complexes induced by magnetic field. Unusual temperature dependences M(T) have been calculated: the magnetization can increase along with temperature rise. Ground states of complexes Cu_3L_3 and Ni_3L_3 (L – is the tetradentate lugand, for example, R–OOC–CH=COH–COH=CH–COO–R, (R – CH_3O, C_2H_5O, C_3H_9O)) have been investigated. The ground state of Ni_3L_3 was shown to be diamagnetic singlet one, but it can be changed by intermolecular exchange interactions.

Bibliography

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