Physical Methods in Inorganic Chemistry

Introduction to Molecular Magnetism – Dr. Ștefania Grecea (UvA)

Course description:

This course introduces the field of molecular magnetism, covering the fundamental concepts of magnetism, the magnetic parameters and methods of their calculation as well as experimental techniques to measure magnetic properties. Emphasis will be on temperature dependence of magnetic susceptibility for mononuclear and dinuclear complexes. Key applications, such as magnetic cooling and induction heating will be briefly covered.

Learning outcomes:

1. To know the classical concept of magnetism and basic terminology and the methods to measure magnetic susceptibility
2. To explain the origin of magnetism arising from electrons in atoms and molecules using basic quantum-mechanical knowledge
3. To explain and compare the electronic structure of metal ions in molecular compounds and their magnetic properties, including the temperature dependence of magnetic susceptibility for paramagnetic, ferromagnetic, antiferromagnetic and ferrimagnetic materials.
4. To understand and explain the magnetic exchange coupling and spin state crossover phenomena
5. To predict antiferro- and ferromagnetic behaviour in heterobimetallic systems.

Required pre-knowledge: chemical bonding, ligand field theory, basic transition metal ions chemistry and coordination chemistry