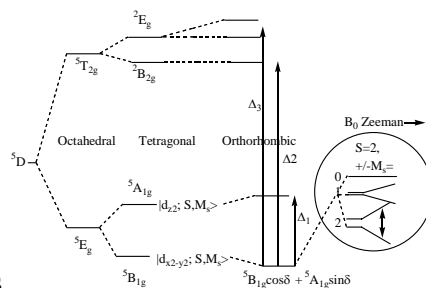


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Spring 2005: CHM 523 Coordination Chemistry

Description: Chemical bonding between atoms leading to the formation of molecules, clusters and extended solids is the most pervasive concept in chemistry, unifying all of the subdisciplines. Yet it is often the most superficially understood chemical concept of practicing scientists. Often it is reduced to a set of phenomenological rules or descriptive examples that lack predictive insight. As a result, prediction of reactivity often relies on memorization of known examples, rather than an awareness of what determines reactivity. In this course we seek to reveal the unifying concepts of chemical bonding that tie together all branches of chemistry, but which are richly illustrated by coordination complexes of transition metals.

Prerequisites: Undergrad inorganic and quantum is required, like CHM 407 and 405.

Reading List:

Electronic Structure and Properties of Transition Metal Compounds: Introduction to the Theory ,
 By Isaac B. Bersuker, J Wiley Publisher, March 1996, ISBN 0-471-13079-6

The topics to be covered will be chosen after discussion with the students and will include

- nominated topics from student recommendations
- chapters from Bersuker (see list below)
- selections from the Case Studies list (attached)
- introduction to the Cambridge Crystallographic Structure Database

Ch 3. Using Symmetry to Classify Molecular Shapes and Enumerate Isomers

Ch 4. Crystal Field Theory- How orbitals split and the resulting states and spectral transitions

Ch 5. MO Theory-using symmetry to construct MOs of inorganic systems

Ch 6. Electronic Structure and Chemical Bonding in TM Complexes

Ch 7. Electronic Control of Nuclear Configuration

Choose from

Ch 9. Stereochemistry and Crystal Chemistry.

Ch 10. Electron Transfer, Redox Properties, and Electron-Conformational Effects.

Ch 11. Catalysis: Chemical Activation of Ligands by TM Complexes