**Forman Christian College**

**A Chartered University**

**Chem. 454 Inorganic Electronic Spectroscopy**

**Spring 2023**

**Course contents**

**a. Magneto-chemistry**: Introduction to magnetism, magnetic properties, magnetic susceptibility, magnetic moment, Faraday’s and Guy’s methods, orbital contribution to magnetic moment, effect of temperature on magnetic properties of complexes.

**b. Inorganic Electronic Spectroscopy:** Introduction of “Electronic Spectroscopy of coordination compounds”, structure of atom, quantum numbers, term symbols, derivation of term symbols for p1 **--** p6 and d1 **--** d6, pigeon hole diagrams, Russel-Saunders coupling scheme, Term symbols and term diagrams, electronic spectrum of d1 and d2 compounds. Color in transition metal compounds.

**Course requirements:**

1. Student must attend all classes; take all tests, assignments and quizzes. All assignments must be submitted on time.
2. A student, who fails to attend 75% of classes, will not be allowed to sit in the final exam.

**Course Evaluation:**

1. 4 Class tests 40% Average of three best tests will be taken as (Midterm)

2. 2 Assignments 10%

3. Terminal exam. 50%

**Grading Policy**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 93-100 | 90- 92 | 87-89 | 83-86 | 80-82 | 77-79 | 73-76 | 70-72 | 67-69 | 60-66 | Below 60 |
| A | A- | B+ | B | B- | C+ | C | C- | D+ | D | F |
| 4.00 | 3.70 | 3.30 | 3.00 | 2.70 | 2.30 | 2.00 | 1.70 | 1.30 | 1.00 | 0.00 |

**Intended Goals:** This course is designed to enable students:

1. To acquire understanding of some basic concepts of magneto chemistry and its use in predicting structure and magnetic behavior of inorganic and organic compounds.
2. To acquire understanding of theoretical background of electronic spectroscopy i-e why a given inorganic complex compound shows one or more bands in its spectrum.
3. To acquire understanding of derivation of term states and their splitting in the octahedral ligand fields, prediction of UV-Visible spectra of coordination compounds using the acquired theoretical knowledge of electronic spectroscopy and magneto chemistry.
4. **To get feeling of FCC core values (Discipline and accountability for my actions, Fairness and justice, Community, Service ‘by love serve one another’, Integrity, Excellence, Respect for dignity of others).**

**Learning Out comes:** At the end of course students will gain enough confidence to:

1. do simple problems relating to magneto chemistry and also predict structure of coordination compounds.

using magneto chemistry concepts.

1. derive term states associated with a given configuration and also predict its electronic (UV-Vis.) spectrum. He/she will be able to read and understand published material to some extent on the subject.

**Recommended Books Magneto-chemistry:**

Magneto-chemistry is most often the realm of inorganic chemists so there is always a short discussion in any basic inorganic text.

1. An old but good book on many aspects of magneto chemistry is  
 P.W.Selwood, "Magneto-chemistry" Interscience (1956)  
  
2. An other good text is  
 A. H. Morrish "The Physical Principles of Magnetism" John Wiley & Sons (1965)  
  
3. There are chapters on magneto chemistry in R. S. Drago "Physical Methods For

Chemists" Saunders College and Harcourt Brace Jovanovich (1992).

4. Search net facilities

**Recommended Books Inorganic Electronic Spectroscopy.**

1. D. Sutton, Electronic Spectra of Transition Metal complexes**.** McGraw Hill; London, New York, Toronto. Mexico. Johannesburg.
2. A.B.P. Lever, “Inorganic Electronic Spectroscopy”, Elsevier Science Pub. Co.

US, 2nd reprint, 1997.

1. B. N. Figgis, “Introduction to Ligand Fields”, John Wiley & Sons, 1966.
2. R. Chang, “Basic Principles of Spectroscopy”, McGraw Hill; Tokyo , Int. Student ed., 1971
3. W. L. Jolly, “Modern Inorganic Chemistry”, McGraw Hill, Inc. Singapore, 2nd ed., 1991
4. William. L. Jolly The Synthsis and Characterization of Inorganic Compounds, Prentice Hall, Inc., Englewood Cliffs, N.J.
5. James. E. Huheey, “Inorganic Chemistry, Principles of Structure and Reactivity”, Harper International SI Edition. Cambridge, Philadelphia, San Francisco, London. 1983
6. Garry L. MMiessler., Donald A Tarr, “Inorganic Chemistry” Pearson Education;

India,3rd ed., 2004.

1. Search net facilities.