

# **First Course Handout**

## **CSO-203A: Inorganic Molecules, Materials & Medicine**

**Instructor(s):** Prof. S. P. Rath (I/C)  
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**Lecture Days: MWTh 12:00-13:00, Venue: L-4**

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**Tutorial day: F 17:00-18:00, Venue: L12**

### **Course Description:**

#### **Module I: Coordination Chemistry**

Introduction to Coordination Chemistry: Structures; d-Orbital Splitting and its Manifestation; Bonding and Spectra; Reactions, Kinetics and Mechanism.

#### **Module II: Life with oxygen**

The aim of this module is to understand how our life is dependent on oxygen. We will start with the fundamentals related to dioxygen and need for its activation. We will then talk about its usefulness in various biological activities and applications.

#### **Module III: Metals and Medicine**

Dmitri Ivanovich Mendeleev in 1869 delivered a remarkable contribution to arrange chemical elements in the Periodic table. This module starts with Nature's selection of elements from Periodic Table. It will provide a brief overview of metals used in the ancient times and today as therapeutic and diagnostic agents. Will discuss on the Rosenberg's accidental landmark discovery of cisplatin as blockbuster anticancer drug. Lectures will also provide mechanistic action of the drug and the current status.

#### **Module IV: Electron transfer in metal complexes**

Nobel Prize in Chemistry in 1983 has been given to Henry Toube for his outstanding work on the mechanisms of electron transfer reactions, especially in metal complexes. We will discuss various electron transfer processes and understanding of inorganic reaction mechanism.

#### **Module V: Catalysis and Sustainability**

Fundamentals of Catalysis; Green Chemistry for Chemical Synthesis; Sustainable Processes and Products: Selected Examples.

**Module VI**

Inorganic Materials: Magnetic, Optical, Conducting Materials. Selected Applications.

**Books:**

- [1] *Inorganic Chemistry-Principles of Structure and Reactivity*, 4<sup>th</sup>Edn., J. E. Huheey, E. A. Keiter and R. L. Keiter, Harper-Collins, NY, 1993
- [2] *Advanced Inorganic Chemistry*, 6<sup>th</sup> Edn., F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann, Wiley, 1999
- [3] *Concepts and Models of Inorganic Chemistry*, 3<sup>rd</sup>Edn., B. Douglas, D. McDaniel and J. Alexander, John Wiley, New York. 1993
- [4] *Chemistry of the Elements*, 2<sup>nd</sup>Edn., N. N. Greenwood and A. Earnshaw, Pergamon, Oxford, 2005
- [5] *Supramolecular Chemistry*, J-M. Lehn, VCH, Weinheim, 1995
- [6] *Bioinorganic Chemistry*, I. Bertini, H. B. Gray, S. J. Lippard & J. S. Valentine, Viva Books Pvt. Ltd., 2004.
- [7] Shriver and Atkins *Inorganic Chemistry*, 5<sup>th</sup> Edn., Oxford University Press, 2009.
- [8] *Organotransition Metal Chemistry: From Bonding to Catalysis*, 1<sup>st</sup> Edn., J. Hartwig, 2010
- [9] *Molecular Magnetic Materials: Concepts and Applications*, Editors(s): B. Sieklucka and D. Pinkowicz, Wiley-VCH, 2016
- [10] *Chemistry of High-Energy Materials*, T. M. Klapötke, 4<sup>th</sup> Edn., 2009

**Grading Scheme:**

Home assignments/ Quizzes:	20
Mid sem exam:	40
End-sem exam:	40
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Total Grading points:	100

**Letter Grades:** Letter grades will be awarded based on the total points out of 100.