Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2021-22
Course Handout (Part II)

Date: 13.01.2022

In addition to Part-I (General Handout for all courses appended to the Timetable) this portion gives further specific details regarding the course.

Course No. **: CHEM G552**
Course Title **: Advanced Inorganic Chemistry**
Instructor-in-charge **: Himanshu Aggarwal**
Instructors **: Himanshu Aggarwal and Sounak Roy**

Course Description : Advanced coordination chemistry, reactions, kinetics and mechanism; advanced organometallic chemistry, bonding models in inorganic chemistry, inorganic chains, rings, cages and clusters; group theory and its applications to crystal field theory, molecular orbital theory and spectroscopy (electronic and vibrational); inorganic chemistry in biological systems

1. **Scope and Objective of the Course:** Theories of coordination chemistry, electronic spectroscopy and magnetism of complexes, organometallic chemistry and chemistry of lanthanides and actinides.

2. **Text Book:** T1. " Inorganic Chemistry" Huheey J. E., Keiter, Ellen A., Keiter, Richard L., Medhi, O.K.; 4th ed., Pearson.
   Reference Books: R1. "Concise Inorganic Chemistry", Lee, J.D. 5th Edition, Wiley, India Edition.
   R2 "Inorganic Chemistry", Shriver, D.F.; Atkins, P.W.; Overton T. L., Rourke, J. P., Weller, M. T., Armstrong, F. A. 4th edition, Oxford.
   R3 "Concepts & Models of Inorganic Chemistry" B. Douglas, D. McDaniel and J. Alexander 3rd Edn, wiley India.

3. **Course Plan:**

Lecture No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1-2	Coordination chemistry	Coordination chemistry: Bonding VB theory applied to coordination compounds	T1:Chapter14: 424-428
3-5	Crystal Field Theory (CFT)	Crystal Field Theory (CFT):	T1:Chapter 14:

		Crystal field splitting; d orbitals in different crystal fields; applications of CFT	428-444
6-8	Molecular orbital theory	Molecular orbital theory	T1:Chapter 14: 444-459
9-12	Electronic spectra of complexes, Magnetic properties of complexes	Electronic spectra of complexes, Magnetic properties of complexes	T1:Chapter 15: 461-492
13-15	Structure Nomenclature	Structure – Nomenclature, Coordination numbers 1, 2, 3, 4, 5, 6, 7 Generalization about coordination numbers Isomerism: Linkage and other types of isomerism Chelate effect	T1:Chapter 16: 495-539 Lecture notes
16-20	Reactions of coordinated complexes	Reactions – Nucleophilic substitution reactions, Kinetics, Mechanisms	T1:Chapter 17 (542-569) and Lecture notes
21-30	Organometallic chemistry	The 18-electron rule Metal-carbonyl complexes Nitrosyl complexes Dinitrogens Alkyls Carbenes, Carbynes, Carbides Alkenes Alkynes Metallocenes	T1:Chapter 18 and Lecture notes
31-38	Catalysis and reaction mechanisms.	Catalysis by organometallic compounds Stereo chemically non-rigid molecules	T1:Chapter 19 (634-661) T1:Chapter 6 (196-202)
39-40	Lanthanide and actinide chemistry	Descriptive chemistry of metals - The Lanthanides and Actinides	T1:Chapter 13 (407- 419) Lecture notes

4. Evaluation Schedule:

Component	Duration	Weighting (%)	Date and Time	Nature of Component
Class tests, Assignments and presentations	-	40	Continuous	Open Book
Mid Semester Test	90 min	25	As announced by Time Table	Closed Book
Comprehensive Examination	120 min	35	As announced by Time Table	Closed Book

5. **Chamber consultation hour:** To be announced in the class.
6. **Make-up for tests:** May be granted only for genuine cases.
7. **Notices:** All notices for this course will be displayed in the Chemistry Notice Board.

8. **Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable

Instructor-in-charge

CHEM G552


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