02/08/2016

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No : CHEM F214
Course title : Inorganic Chemistry I
Instructor-in-charge : INAMUR RAHAMAN LASKAR

Course Description: The course is designed in consideration to growing the basic level knowledge and understanding in inorganic chemistry. It includes electronegativity, detail study of acid-base chemistry, non-aqueous solution chemistry, concept of redox chemistry, shape and structure of inorganic covalent molecules using VSEPR model and bonding of ionic compounds in solid state. It includes the chemistry of halogen and noble gases and main group elements. There will have thorough discussion of chemistry of macromolecules containing inorganic chains, rings and cages.

Scope and Objective of the Course: The course provides a comprehensive survey of the concepts involved in the study of the VSEPR Model, VB Theory, Ionic Crystal Structure, Structure of Complex Solids, Electronegativity, Acid-Base Chemistry, Chemistry in Aqueous and Non-Aqueous Solvents, Periodicity, Chemistry of transition metals, Halogens and Noble Gases, Inorganic Chains, Rings, Cages and Clusters. This course will attempt to provide the students with sufficient basic knowledge of the structure and reactivity of inorganic systems to ensure a more comprehensive understanding.

By the end of semester, you will be able to learn –

- Different scales to define electronegativity; rationalization of unusual reactivity
- Shape and structure of different covalent molecules and ionic compounds
- Measures of acid-base strength in gas and solution phase; Relation between hardness and softness, Symbiosis
- Chemistry of protonic and aprotic solvents; Redox stability; Diagrammatic presentation of potential data
- Use (or not) of d orbitals by nonmetals; Reactivity and d orbital participation
- Positively charged halogens; Pseudohalogens
- Numerous examples in nature of inorganic chains, rings and cages – their structures and chemistry

Text Book: Inorganic Chemistry by Huheey J. E., Keiter, E. A. Keiter, R. L. Keiter, O. K. Medhi, 4th ed., Pearson Education

Reference Books: I. Inorganic Chemistry by Shriver & Atkins, (4th edition)II. Advanced Inorganic Chemistry by Cotton F.A., Wilkinson G., Murillo, C.A., Bochmann, M., 6th ed., John Wiley and Sons, New York (2003).

1. Course Plan:

Lec.	Topics to be	Learning objects	Reference: (Chapter

No:	covered		and page No: of T1)
1	Introductory class	Description of the course: Objective and prospects; Course contents; Outcome; Evaluation pattern and some important points related to the course	
2-7	Concepts of inorganic chemistry	Electronegativity Acid-base chemistry A generalized acid-base concept Measures of acid-base strength	Chapter 5: p 155-169 Chapter 8: p 220-227 Self-study (p 228-236) p 237-243
8-10		Hard and soft acids and bases, Symbiosis Chemistry of aqueous and nonaqueous solvents Summary of protonic and aprotic solvents Molten salts	Chapter 9: p 246-257 Self-study (p257-260)
11-14		Electrode potentials, electromotive forces, Trends in standard potentials, Nernst Equation, Redox Stability, Latimer and Frost diagram, Ellingham diagram, Electrochemistry of the halogens and pseudohalogens	Chapter 9: p 260-265 Chapter 12: p. 367; Chapter 13: p. 379-389 and hand notes / ref. book
15-16	Structure of molecules	The Covalent Bond: VSEPR Model and VB Theory	Chapter 6: p171-182
17-21	The chemistry of halogens and the noble gases	Noble gas chemistry: Fluorides, bonding Other compounds of xenon Bond strengths in noble gas compounds Halogens in positive oxidation states Polyhalide ions, Fluorine-oxygen chemistry, Oxyacids of heavier halogens, Halogen oxides and oxyfluorides Halogen cations, Halides, Pseudohalogens	Chapter 12: p343-367
22-26	Ionic bonding and the solid state	The ionic bond, Lattice energy, Size effects, Covalent character in predominantly ionic bonds, Imperfections in crystals, Conductivity in ionic Solids, Solid held together by covalent boding	Chapter 4: p72-114
27-29	The	Periodicity: First and second row anomalies	Chapter 10: p267-290

	Chemistry of the Main Group Elements: Periodicity	The use of *p* orbitals in pi-bonding The use of *d* orbitals by nonmetals Periodic anomalies of the nonmetals and post-transition metal	
30-38	Inorganic chains, rings, cages	Catenation, Heterocatenation, Silicate minerals, Intercalation chemistry, One dimensional conductors, Isopoly anions, Heteropoly anions; Borazines, Phosphazenes, Phosphazene polymers, Other heterocyclic inorganic systems, Homocyclic inorganic systems; Boron cage compounds-Boranes, Carboranes, Metallacarboranes, Structure prediction for heteroboranes and organometallic clusters	Chapter 11: p292-338
39-40	Inorganic clusters	Metal clusters, Dinuclear compounds, Trinuclear clusters, Tetranuclear clusters, Hexanuclear clusters, Polyatomic Zintl anions and cations, Chevrel phases, Infinite metal chains	Chapter 13: p395-406

Evaluation Scheme:

Components	Duration	Weightage%	Date and Time	Remarks
Mid Term Test	90 min	30%	<TEST_1>	Closed Book
Tutorials	15 min (each test)	30%	Continuous	Closed book
Comprehensive Exam.	3 hrs.	40%	<TEST_C>	$

$ The Comprehensive Examination will have a closed book quiz portion with 15% weightage, and an open book section with 25% weightage.

Notices: Notices, if any, concerning the course will be uploaded at Nalanda.

Make up policy: Make up would be considered only for **genuine cases.**

Instructor-in-charge

CHEM F214