Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2020-2021

Course Handout Part II

17/08/2020

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 **:** Prof.**N.Rajesh**

1. **Course Description:** This course primarily is intended to give a basic foundation to the various aspects of inorganic chemistry such as periodicity, bonding, structures of simple compounds and chemistry of some main group elements.

2. **Learning outcomes**: The objective of this course is to provide a comprehensive survey in the topics detailed in the course plan with the following broad outcomes: -

- Interpret the relevance of electronegativity and other periodic properties
- Illustrate the importance of acid base chemistry and applications of Hard-soft acid base concept
- Discuss the chemistry of halogens, noble gases and their significance
- Outline the basic aspects of Solid state chemistry with real-world applications.
- Explore the basic features of silicon and phosphorous chemistry
- Recognize the importance of intercalation compounds (graphite, clays) inorganic chains, rings, cages and cluster compounds

3. **Text Book:** Huheey J. E., Keiter, Ellen A., Keiter, Richard L. Okhil K.Medhi, "**Inorganic Chemistry**", 4th ed., Pearson Education 2006.

Reference Books: I. Inorganic Chemistry by Shriver & Atkins, (4th edition), Oxford

II. Cotton F.A., Wilkinson G., Murillo, C.A., Bochmann, M. "**Advanced Inorganic Chemistry**", 6th ed., John Wiley and Sons, New York (2003).

4. **Course Plan:**

No. of lectures	*Topics*	*Learning Objectives*	*Ref. to text*
	Concepts in inorganic chemistry		
3	Electronegativity	Definition, scales of electronegativity, applications	Chapter 5
6	Acid base chemistry	Measures of acid base strength, Systematics of acid base interactions, Hard soft acid base(HSAB) concept- relevance to diverse metal-ligand interactions, symbiosis and other applications	Chapter 8
3	Solvents and molten salts	Chemistry of aqueous and non-aqueous solvents, molten salts (ionic liquids)	Chapter 9
1	Electrode potentials	Latimer diagram to calculate emf and Frost diagram to predict the stability of oxidation states	Chapter 9
	Halogens and Noble gases		
3	Noble gas chemistry	Early discovery of noble gases, isolation, xenon compounds, bond strength in noble gases	Chapter 12
4	Chemistry of	Anomalous behavior of fluorine, Halogens oxides, oxy	Chapter 12

	halogens	fluorides, interhalogens, polyhalides, oxy acids of halogens, halogen cations and pseudohalides	
	Structure of molecules and bonding in crystalline solids		
2	VSEPR theory	VSEPR rules, applications to simple compounds, atomic inversion and pseudorotation	Chapter 6
2	Structures of crystal lattices	Lattice energy, structures of NaCl, CsCl, TiO_2, CaF_2, ZnS, Radius ratio rules, Fajans rules- covalent character	Chapter 4
3	Complex solids	Layered structures, spinels and superconductors. Basic aspects of band theory and crystal defects	Chapter 4
	Chemistry of main group elements-I		
3	Main group elements: Periodicity	First and second row anomalies, diagonal relationships, bonding in silicon and phosphorous compounds, GroupIIIA, IVA anomalies, inert pair , relativistic effects and aurophilicity	Chapter 10
	Chemistry of Main group elements-II		
3	Inorganic chains	Catenation, heterocatenation, silicate minerals, intercalation chemistry, one dimensional conductors, isopoly and heteropolyanions	Chapter 11 and chapter **13** (**for iso and hetro polyanions**)
3	Inorganic rings	Borazines, phosphazenes, phosphazene polymers, few heterocyclic and homocyclic ring systems	Chapter 11
3	Inorganic cages	Boranes, carboranes, structure prediction for heteroboranes, and organometallic clusters	Chapter 11
3	Inorganic clusters	Metal clusters, (di, tri and tetra and hexa nuclear clusters- bonding in Rhenium and Molybdenum compounds, Zintl ions, Chevrel phases and infinite metal chains	Chapter 13

5 **Evaluation Scheme:**

EC NO.	Component	Duration	Weightage (%)	Date and Time	Nature of component
1	Test I	30min.	15	September 10 –September 20 (During scheduled class hour)	Open book
	Test II	30 min	15	October 09 –October 20 (During scheduled class hour)	Open book
	Test III	30min	15	November 10 – November 20 (During scheduled class hour)	Open book
* 2.	Quiz I	10 min	5		Open
	Quiz II	10 min	5		Open
*3	Assignment		5		Open
*4	Group Discussion (GD)	5-7 min/grp	5		Open
5.	Comprehensive. Exam.	120 min	35	TBA	Open book

*__Quiz (I and II) dates__ will be announced prior and it would be conducted tentatively in the **last week of Aug and Sept.** One take home assignment would be given (CMS) and each student is expected to submit **(last week of Oct) a handwritten scanned report** (approx 4-5 pages) on the assigned topics. **GD (research article based)** is like an open book component since each group is permitted to refer the journal articles with them during discussion. **GD would be held tentatively between 23-25 Nov**. Students would be divided into 5-6 members per group with duration of about 5-7 min per group. Topics and formation of group is left to the students' choice (representative topics could be suggested by instructor). **Evaluation for each member would be done based on the level of participation, ability to moderate in the right direction and knowledge of the particular topic assigned to each group.**

6 **Make-up Policy:** Make-up will be considered for only legitimate reasons with prior permission.

7 **Academic Integrity Policy:** It is expected that in compliance with institute rules, academic integrity should be adhered to in all evaluation components and malpractice in any form will have serious implications.

8 **Chamber Consultation Hour:** To be announced in the class.

9. **Notices:** Relevant notices regarding the course will be displayed on CMS.

10. 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