DSC: CORE COURSE 9

<table>
<tr><td>Semester</td><td>4</td></tr>
<tr><td>Paper Number</td><td>HCHCR4092T (60 MARKS) & HCHCR4092P (40 MARKS)</td></tr>
<tr><td>Paper Title</td><td>CORE COURSE 9: INORGANIC CHEMISTRY</td></tr>
<tr><td>No. of Credits</td><td>Theory-04, Practicals-02</td></tr>
<tr><td>Theory/Composite</td><td>Composite</td></tr>
<tr><td>No. of periods assigned</td><td>Th: 4
Pr: 3</td></tr>
<tr><td>Name of Faculty member(s)</td><td>Dr. Sanjib Ganguly
Dr. Rahul Sharma</td></tr>
<tr><td>Course description/objective</td><td>Theory:
1. To understand the basic trends in the stability and reactivity of certain type of compounds of the representative elements as we move down the group of congeners.
2. To be aware of the structure and bonding in certain specific compounds of the s and p-block elements.
3. To realize the nature of ligands and the coordination complexes, their IUPAC names and isomeric forms.
Practical:
To develop the skill for synthesizing coordination complexes using different first transition metal ions and simple monodentate and bidentate ligands.</td></tr>
<tr><td>Syllabus</td><td>Annexure Core Course: 9</td></tr>
<tr><td>Texts</td><td></td></tr>
<tr><td>Reading/Reference Lists</td><td>Theory:
1.Huheey, J. E.; Keiter, E.A. & Keiter, R.L. Inorganic Chemistry, Principles of Structure and Reactivity 4th Ed., Harper Collins 1993, Pearson,2006.
2. Greenwood, N.N. & Earnshaw A. Chemistry of the Elements, Butterworth-Heinemann, 1997.
3. Cotton, F. A., Wilkinson, Advanced Inorganic Chemistry, 6th edition, Wiley
4. Hollman , Wiberg, Inorganic Chemistry
Practical:
Inorganic Synthesis, Vol. 1-10.</td></tr>
<tr><td>Evaluation</td><td><table><tr><td>Theory: 60 marks</td><td>Practical: 40 marks
(Continuous Assessment)</td></tr><tr><td>CIA: 10
End-Sem: 50</td><td>Internal Assessment Exams: 30
Viva (End Sem): 8
Attendance: 2</td></tr></table></td></tr>
<tr><td>Paper Structure for the End Sem Theory Exam (50 marks)</td><td>6 (SIX) Questions (each of 10 marks) will be set and the students will have to answer any 5 (FIVE).
Each of the Questions (10 marks) will consist of 2 or 3 parts (of 2/ 3/ 4/ 5)</td></tr>
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Annexure Core Course (CC): 9

(Credits: Theory-04, Practicals-02)

CC: 9 (Theory) 52 Lectures

Module 1: Chemistry of *s* and *p* Block Elements (30 Lectures)

Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses. Beryllium hydrides and halides. Boric acid and borates, boron nitrides, borohydrides (diborane) and graphitic compounds, silanes, Oxides and oxoacids of nitrogen, phosphorus, sulphur and chlorine. Peroxo acids of sulphur, sulphur-nitrogen compounds, interhalogen compounds, polyhalide ions, pseudohalogens, fluorocarbons and basic properties of halogens.

Rationalization of inertness of noble gases, peculiar behaviour of liquid helium, Clathrates; preparation and properties of XeF_2, XeF_4 and XeF_6; Nature of bonding in noble gas compounds (Valence bond treatment and MO treatment for XeF_2 and XeF_4). Xenon-oxygen compounds. Molecular shapes of noble gas compounds (VSEPR theory).

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes.

Module 2: Coordination Chemistry-I (22 Lectures)

Coordinate bonding: double and complex salts. Werner's theory of coordination complexes, Classification of ligands, Ambidentate ligands, chelates, Coordination numbers, IUPAC nomenclature of coordination complexes (up to two metal centers), Isomerism in coordination compounds, constitutional and stereo isomerism, Geometrical and optical isomerism in square planar and octahedral complexes.

CC: 9 (Practical) 42 Lectures

Inorganic Synthesis

1. Synthesis of a dibromo(dimethyglyoxime)(dimethylglyoximato)cobalt(III)
2. Synthesis of *cis* and *trans* isomers of bis(glycinato)copper(II) monohydrate
3. Synthesis of tris(arylazooximato)cobalt(III)
4. Synthesis of (arylazooxime)(arylazooximato)copper(I)
5. Synthesis of Tris-(ethylenediamine) nickel(II) chloride.
6. Synthesis of $[Mn(acac)_3]$ and $Fe(acac)_3]$ (acac= acetylacetonate)