

Name of the Programme: M.Sc. Part-II (Inorganic Chemistry)

Course Code: CHI-622 **Title of the course:** Chemistry of p-block elements & their compounds

Number of Credits: 4

Effective from AY: 2023-24

Prerequisites for the course:	Students should have studied chemistry/biochemistry courses at M.Sc. Part-I.	
Course Objective:	<ol style="list-style-type: none">1. To study the different trends in physical and chemical properties of p-block elements.2. To understand the variations in physical and chemical properties of compounds of p-block elements.3. To study the preparation and structure of some important compounds of p-block elements.4. To study the applications of some of their compounds.	
Content	1. General trends of different properties in groups and periods in periodic table	No of hours 4
	2. Chemistry of Group 13 Elements and their Compounds a. Introduction, physical properties, chemical reactions with oxygen, nitrogen, sulphur, halogens, HCl, NaOH, NH ₃ , mono-di-tri-chlorides, alums, organo-compounds of B and Al, difference between boron and other Gr. 13 elements, diagonal relationship. b. Preparation, bonding and structure of diborane, higher boranes, borane anions, carboranes and metallocarboranes. c. Borazine: Synthesis, properties, structure, bonding and some of its derivatives. d. Borates: Classification, structure and examples.	13
	3. Chemistry of Group 14 Elements and their Compounds a. Introduction, physical properties, allotropy, compounds of Gr.14: different types of oxides, di, tetra & catenated halides, hydrides, sulphides, cyanides. b. Coordination compounds, organosilicon compounds, silicones, cluster compounds of Ge, Sn and Pb. c. Silicates: classification with examples and applications, zeolite. d. Carbon dating, graphene, metallocarbohedrenes, freons. e. Intercalation compounds of graphite with oxygen and fluorine, heavier Group 1 elements, different halides including FeCl ₃ . f. Carbides: classification, preparation, properties and uses.	13
	4. Chemistry of Group 15 Elements and their Compounds a. Introduction, allotropes, physical properties, Preparation,	9

	<p>properties and structure of: Hydrides, halides, oxides, oxyacids, oxohalides.</p> <p>b. Preparation, properties and structure of Phosphorous: sulphides, oxosulphides, organophosphorous compounds.</p> <p>c. Classification, preparation, properties and structures of phosphazenes.</p>	
	<p>5. Chemistry of Group 16 Elements and their Compounds</p> <p>a. Introduction, allotropes, physical properties, Preparation, properties and structure of: Hydrides, halides, oxohalides, oxides, oxyacids, classification of oxides.</p> <p>b. Compound of sulphur and nitrogen: Preparation, properties and structure of $(\text{SN})_x$, S_2N_2 and S_4N_4.</p> <p>c. Polyatomic sulphur cations, anionic polysulphides, compounds with sulphur as a ligand.</p>	9
	<p>6. Chemistry of Group 17 Elements and their Compounds</p> <p>a. Introduction, physical properties; preparation, properties and structure of: oxides, oxyacids, halides, oxohalides, hydrogenoxide fluorides and related compounds.</p> <p>b. Preparation, properties and structure of: interhalogen compounds, polyhalide anions, polyhalonium cations, halogen cations.</p>	8
	<p>7. Chemistry of Group 18 Elements and their Compounds</p> <p>a. Introduction, physical properties; preparation, properties, structure and bonding of xenon compounds (fluorides and oxides); organoxenon compounds, compound containing Xe-Xe bond.</p> <p>b. Preparation, properties and structure of compounds of other noble gases.</p>	4
Pedagogy	<p>Mainly lectures and tutorials. Seminars / term papers / assignments / presentations / self-study or a combination of some of these can also be used. ICT mode should be preferred. Sessions should be interactive in nature to enable peer group learning.</p>	
References / Readings	<ol style="list-style-type: none"> 1. P. W. Atkins, T. Overton, J. Rourke, M. Weller, F. Armstrong, Shriver & Atkins Inorganic Chemistry, 5th Ed.; Oxford Publications, 2009. 2. J. E. Huheey, E. A. Keiter, R. L. Keiter, O. K. Medhi, Inorganic Chemistry: Principles of Structure & Reactivity, 4th Ed.; Pearson, 2011. 3. N. N. Greenwood, A. Earnshaw, Chemistry of the Elements, 2nd Ed. (reprinted); Elsevier, 2014. 4. J. D. Lee, Concise Inorganic Chemistry, 5th Ed. (reprint); Blackwell Science Wiley, 2015. 5. F. A. Cotton, G. Wilkinson, P. L. Gaus, Basic Inorganic Chemistry, 3rd Ed.; Wiley, 2008. 6. F. A. Cotton, G. Wilkinson, Advanced Inorganic Chemistry, 3rd Ed.; Wiley, 1984. 	

	7. G. C. Miessler, D. A. Tarr, Inorganic Chemistry, 3 rd Ed.; Pearson, 2004.
Course Outcome:	<ol style="list-style-type: none"> 1. Students will be able to explain the trends in physical properties in groups and periods in the periodic table. 2. Students will be able to explain the chemistry of p-block elements as this course will give sufficient information about p-block elements and their compounds in particular. 3. Students will be able to prepare some important compounds of p-block elements. 4. Students will apply the knowledge of chemical properties of compounds to solve day to day problems.