

## CY-113 INORGANIC CHEMISTRY I

**Source:** Batch 2022, Batch 2023, and Batch 2024

**Atomic Structure:** Development of theories for atomic structure, Discovery of fundamental subatomic particles, Bohr's model for Hydrogen, Line spectrum, Introduction to quantum mechanics, Quantum numbers and their significance, Wave Mechanics, Wave properties of the matter, the Schrödinger equation.

**Periodic Table:** Electronic configuration and periodic table, Periodicity, Group trends in atomic and ionic radii, Ionization energies, Electro negativity, Ionization potential, Electron affinity, Oxidation potentials, Electrode potential, Magnetic properties, Para and diamagnetisms.

**Chemical Bonding in s and p Block Elements:** Effective atomic number and shielding constant, Types of chemical bonds, Ionic bond, covalent bond, The concept of hybridization and its applications, Writing wave equations of hybrid orbitals, Lattice energy and Born Haber cycle of Ionic compounds, Related numerical.

**s- and p- Block Elements** Periodicity in s- and p- block elements, Allotropy in C, S, and P. Oxidation states with reference to elements in unusual and rare oxidation states like carbides and nitrides), inert pair effect, diagonal relationship and anomalous behaviour of first member of each group.

**Compounds of s- and p- Block Elements** Hydrides and their classification (ionic, covalent and interstitial), structure and properties with respect to stability of hydrides of p- block elements. Concept of multicentre bonding (diborane). Structure, bonding and their important properties like oxidation/reduction, acidic/basic nature of the following compounds and their applications in industrial, organic and environmental chemistry. Hydrides of nitrogen ( $\text{NH}^3\text{\textasciitilde}$ ,  $\text{N}^{\text{\textasciitilde}}\text{H}^4\text{\textasciitilde}$ ,  $\text{N}^3\text{\textasciitilde}\text{H}$ ,  $\text{NH}^2\text{\textasciitilde}\text{OH}$ ) Oxoacids of P, S and Cl. Halides and oxohalides:  $\text{PCl}^3\text{\textasciitilde}$ ,  $\text{PCl}^5\text{\textasciitilde}$ ,  $\text{SOCl}^2\text{\textasciitilde}$  and  $\text{SO}^2\text{\textasciitilde}\text{Cl}^2\text{\textasciitilde}$

### Industrial Gases and Inorganic Chemicals

(a) **Industrial Gases:** Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, fluorine, sulphur dioxide and phosgene.

(b) **Inorganic Chemicals:** Manufacture, application, analysis and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, borax, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, chrome alum, potassium dichromate and potassium permanganate.