

## **Chemistry Assignment for Sem I Students 2025-26**

***“Use fair register to write the answers”***

**Major:-** Write all questions.

**Minor:-** Write only Question number 1, 3, 4, 6, 7, 8, 11, 12, 14, 16, 18, 26-46

**Q1.** Explain the following (give examples wherever required):

- a) Pauli's exclusion principle.
- b) Diagonal relationship.
- c) Inert pair effect.
- d) Effective nuclear charge.
- e) Covalent radii and van der Waal's radii.

**Q2.** Write short notes on the following:

- a) Bonding in diborane.
- b) Silicates and its classification.
- c) Inter halogen compounds.
- d) Lattice defects and its types.
- e) Fajan's rule.
- f) Draw Molecular orbital diagram for heteronuclear CO and NO molecule.
- g) Radius ratio rule and its limitations.
- h) Reducing nature of alkali metals.
- i) Role of alkali and alkaline earth metals in biological system.
- j) Silicates and their 3 dimensional network.
- k) Freons
- l) Oxyacids of chlorine
- m) Nitrogen fixation
- n) Oxyacids of Nitrogen

**Q3.** Calculate sigma (screening effect) for 3d and 4s electrons of Copper.

**Q4.** Derive Schrodinger Wave equation.

**Q5.** Draw Born-Haber Cycle for NaCl.

**Q6.** Explain VSEPR theory. On its basis explain the shape of:-  $\text{ClF}_3$   $\text{SF}_4$   $\text{SF}_6$   $\text{I}_3^-$

**Q7.** Define the term electronegativity. What are the factors that affect the electronegativity?

**Q8.** Discuss the variation of electron affinity in periodic table. What are the different theories of electronegativity?

**Q9.** Among the boron Trihalides, explain why  $\text{BF}_3$  is least acidic while  $\text{BI}_3$  is most acidic?

**Q10.** Why  $\text{CCl}_4$  is resistant to hydrolysis but  $\text{SiCl}_4$  is readily hydrolysed?

**Q11.** Explain the significance of  $\Psi$  and  $\Psi^2$ .

**Q12.** What are the limitations of Valence Bond Theory? Explain the rules of Linear Combination of Atomic Orbitals (LCAO) in Molecular Orbital Theory.

**Q13.** Draw Molecular Orbital Diagram for  $\text{O}_2$  ,  $\text{O}_2^+$  ,  $\text{O}_2^-$  ,  $\text{O}_2^{2-}$  and calculate their bond order.

**Q14.** Explain the shapes of Xenon Fluorides, Oxides and Oxy-fluorides.

**Q15.** Berilium hydride is covalent, but calcium hydride is ionic.

**Q16.** Differentiate between Bonding molecular orbital and Anti bonding molecular orbital.

**Q17.** Why Borazine is also called inorganic benzene?

**Q18.** What is Ionization Energy? On what factors does it depend? How does the ionisation energy vary in a period and a group of periodic table?

**Q19.** Why  $(\text{CH}_3)_3\text{N}$  is more basic than  $(\text{SiH}_3)_3\text{N}$  ?

**Q20.** Predict the acidity order in the following compound with proper explanation:

- a)  $\text{BF}_3$  ,  $\text{BCl}_3$  ,  $\text{BBr}_3$  ,  $\text{BI}_3$
- b) HF, HCl, HBr, HI

**Q21.** Why carbonates of Cd, Pb decompose at much lower temperature than  $\text{CaCO}_3$ ?

**Q22.** Why  $\text{AlCl}_3$  is dimeric whereas  $\text{BCl}_3$  is monomeric?

**Q23.** Explain the ionic conductivity of alkali metals in aqueous solution.

**Q24.** What are interhalogen compounds? Explain their preparation methods and Chemical properties.

**Q25.** What are silicates? Explain the structure of different types of silicates with proper examples.

**Q26.** Give a brief account of the wave nature of electrons and quantization of angular momentum from de Broglie equation. Explain Heisenberg uncertainty principle.

**Q27.** What do you understand by quantum number? Explain the 4 quantum numbers and also explain their significance in characterising an electron in an atom.

**Q28.** What are radial wave function and angular wave function? What information do we get from these wave functions?

**Q29.** Explain the reasons of exceptional electronic configuration of chromium and copper.

**Q30.** Draw the radial probability curves for 2s, 2p, 3p and 3d orbitals.

**Q31.** van der Waals radius for chlorine is larger than it's covalent radius. Explain.

**Q32.** The first ionization potential of nitrogen is more than the first ionization potential of oxygen, but the second ionization potential of oxygen is more than second ionisation potential of nitrogen. Explain.

**Q33.** Why the electron affinities of beryllium, magnesium and noble gases is zero and those of nitrogen(0.20ev) and phosphorus(0.80ev) are very low?

**Q34.** Explain with proper reasoning why the formation of fluoride ion from F is exothermic whereas that of peroxide ion from O is endothermic (all entities are in gaseous phase)

**Q35.** On what factors does electronegativity depend and how does it change in a group and in a period? Give its applications in explaining the chemical behaviour.

**Q36.** In a period, generally the size of atom decreases with increase in atomic number, but at the end of each period the size increases abruptly in noble gases. Explain.

**Q40.** What are electron deficient compounds? Describe the structure and bonding in diborane.

**Q41.** What is meant by dipole moment? Explain how the magnitude of dipole moment can give an idea about the structure of molecules and polarity of a bond.

**Q42.** What do you mean by crystal defects? What is the effect of temperature on these defects? Discuss the defects observed in their structures.

**Q43.** What are semiconductors? How are they classified? What is the effect of temperature on conductivity of semiconductors? Give their uses.

**Q44.** What is Hydrogen bond? Explain its types. Discuss the effect of hydrogen bonding on the physical properties of compounds containing hydrogen bonds.

**Q45.** What do you mean by polarization and polarizability of ions? State Fajans rule?

**Q46.** Explain this shape, geometry, bond angle and hybridisation in ammonia, water and Methane molecules.