Class XI Chemistry Question Bank

Vivekanand Public School
Comprehensive Syllabus Coverage (CBSE)

Chapter 1: Some Basic Concepts of Chemistry

1. What is the SI unit of luminous intensity?
2. Define the Law of Multiple Proportions with an example.
3. Calculate the molecular mass of glucose (C6H12O6).
4. Define one mole and Avogadro's constant.
5. What is the difference between molarity and molality?
6. How many significant figures are in 0.0025?
7. Calculate the mass percent of different elements in sodium sulphate (Na2SO4).
8. Define empirical formula and molecular formula.
9. What is the limiting reagent in a chemical reaction?
10. Explain the Law of Definite Proportions.
11. Calculate the molarity of a solution containing 5g of NaOH in 450mL solution.
12. Convert 35 degrees Celsius to Fahrenheit.
13. What is the mass of one atom of Carbon-12 in grams?
14. State Gay Lussac’s Law of Gaseous Volumes.
15. Calculate the number of molecules in 1.8g of water.
16. Define formula mass with an example.
17. Distinguish between precision and accuracy.
18. What is the mass percent of solute in a solution prepared by adding 2g of A to 18g of water?
19. Define stoichiometry.
20. Explain the concept of atomic mass unit (amu).

Chapter 2: Structure of Atom

1. State Heisenberg's Uncertainty Principle.
2. Define black body radiation.
3. What are the four quantum numbers? Explain their significance.
4. State Pauli's Exclusion Principle.
5. Explain Hund's Rule of Maximum Multiplicity.
6. Calculate the wavelength of a photon with frequency 5 x 10^14 Hz.
7. What is the photoelectric effect?
8. Define isotopes, isobars, and isotones.
9. Explain the dual nature of matter (de Broglie's relation).
10. What are the limitations of Bohr's model of an atom?
11. Define an atomic orbital.
12. Write the electronic configuration of Cr (Z=24) and Cu (Z=29).
13. Calculate the energy of one mole of photons of radiation whose frequency is 5 x 10^14 Hz.
14. State the Aufbau Principle.

15. What is the significance of the wave function (psi) and its square?
16. Explain the shape of s and p orbitals.
17. Define nodes and nodal planes.
18. What is the Zeeman effect and Stark effect?
19. Calculate the radius of the second orbit of the hydrogen atom.
20. Distinguish between a shell and an orbital.

Chapter 3: Classification of Elements and Periodicity in Properties

1. State the Modern Periodic Law.
2. How does atomic radius vary along a period and down a group?
3. Define Ionization Enthalpy. Why is the second ionization enthalpy always higher than the first?
4. Explain Electron Gain Enthalpy. Why do halogens have high negative values?
5. Define Electronegativity. How is it different from Electron Gain Enthalpy?
6. What are representative elements?
7. Why is the size of a cation smaller than its parent atom?
8. Why is the size of an anion larger than its parent atom?
9. Explain diagonal relationship with an example.
10. What are transuranic elements?
11. Discuss the variation of metallic character in the periodic table.
12. Define screening effect (shielding effect).
13. Why does Nitrogen have higher ionization enthalpy than Oxygen?
14. What are isoelectronic species? Give examples.
15. Define periodicity in properties.
16. How does valency vary in a group and in a period?
17. Classify elements into s, p, d, and f blocks based on electronic configuration.
18. What is the IUPAC name and symbol for the element with atomic number 120?
19. Explain the trend of oxidizing and reducing nature in the periodic table.
20. Why are noble gases placed in a separate group?

Chapter 4: Chemical Bonding and Molecular Structure

1. Define a chemical bond.
2. Explain Octet Rule and its limitations.
3. What is Lattice Enthalpy?
4. Explain the geometry of BeCl2 and BF3 using VSEPR theory.
5. Distinguish between sigma and pi bonds.
6. Define hybridization. Explain sp3 hybridization in CH4.
7. Draw the Lewis structure of CO3^2- and NO3^-.
8. What is Dipole Moment? Why is BF3 non-polar while NF3 is polar?
9. Explain Hydrogen Bonding and its types.
10. Define bond length, bond angle, and bond enthalpy.
11. What is formal charge? Calculate it for atoms in Ozone (O3).
12. Explain the geometry of PCl5 and SF6.

13. State the postulates of Valence Bond Theory.
14. What are the conditions for the combination of atomic orbitals in MOT?
15. Calculate the bond order for O2, O2+, and O2-.
16. Explain why He2 molecule does not exist.
17. Define resonance with the example of Benzene or Ozone.
18. What is the importance of the polar covalent bond?
19. Explain the paramagnetic nature of Oxygen using Molecular Orbital Theory.
20. Define coordinate covalent bond with an example.

Chapter 5: Chemical Thermodynamics

1. Define system and surroundings.
2. Distinguish between intensive and extensive properties.
3. State the First Law of Thermodynamics.
4. Define Enthalpy (H). How is it related to Internal Energy (U)?
5. What is Hess's Law of Constant Heat Summation?
6. Define Entropy. What is the entropy change for a spontaneous process?
7. State the Second Law of Thermodynamics.
8. Define Gibbs Free Energy. What is the criterion for spontaneity?
9. What is an adiabatic process?
10. Define heat capacity and molar heat capacity.
11. Calculate the work done during isothermal reversible expansion of an ideal gas.
12. Define Enthalpy of Formation and Enthalpy of Combustion.
13. Explain the term 'state function' with examples.
14. What is the Third Law of Thermodynamics?
15. Define Bond Enthalpy.
16. For a reaction, delta H and delta S are positive. Under what conditions will it be spontaneous?
17. Define isolated, closed, and open systems.
18. Calculate delta G for a reaction where K = 1 at 298 K.
19. What is the sign of delta S for the freezing of water?
20. Explain the relationship Cp - Cv = R for an ideal gas.

Chapter 6: Equilibrium

1. State the Law of Chemical Equilibrium.
2. Define Kp and Kc. How are they related?
3. State Le Chatelier’s Principle.
4. Explain the effect of change in pressure on the equilibrium: N2 + 3H2 <-> 2NH3.
5. Define pH and pOH.
6. What is the solubility product (Ksp)?
7. Explain the Common Ion Effect with an example.
8. Define Buffer Solutions. Give an example of an acidic buffer.
9. What is the ionic product of water (Kw)?
10. Differentiate between homogeneous and heterogeneous equilibrium.

11. Calculate the pH of 0.01 M HCl solution.
12. What are Lewis acids and bases? Give examples.
13. Define Bronsted-Lowry concept of acids and bases.
14. What is the significance of the reaction quotient (Qc)?
15. Define degree of dissociation.
16. How does a catalyst affect chemical equilibrium?
17. Define salt hydrolysis. Why is an aqueous solution of NH4Cl acidic?
18. Calculate the solubility of AgCl if Ksp = 1.8 x 10^-10.
19. Explain the effect of temperature on an endothermic reaction at equilibrium.
20. What is the relationship between Delta G and Equilibrium Constant K?

Chapter 7: Redox Reactions

1. Define oxidation and reduction in terms of electron transfer.
2. What is a Redox reaction? Give an example.
3. Define Oxidation Number.
4. Calculate the oxidation number of Cr in K2Cr2O7.
5. Balance the redox reaction: MnO4- + Fe2+ -> Mn2+ + Fe3+ in acidic medium.
6. Identify the oxidizing and reducing agents in: H2S + Cl2 -> 2HCl + S.
7. What is a Disproportionation reaction? Give an example.
8. Define a salt bridge and its functions.
9. What is Standard Electrode Potential?
10. Explain the working of a Galvanic cell (Daniel Cell).
11. Distinguish between electrolytic and electrochemical cells.
12. What is the Electrochemical Series?
13. Calculate the oxidation state of Phosphorus in H3PO4.
14. Balance the redox reaction: P4 + OH- -> PH3 + HPO2- in basic medium.
15. What is a reference electrode? Give an example.
16. Define EMF of a cell.
17. Explain oxidation in terms of oxidation number increase.
18. What is the oxidation number of oxygen in peroxides and superoxides?
19. Can we store CuSO4 solution in a Zinc pot? Explain.
20. What is the oxidation state of Nitrogen in NH3 and HNO3?

Chapter 8: Organic Chemistry – Some Basic Principles and Techniques

1. Define Catenation.
2. Explain the shapes of Ethane, Ethene, and Ethyne.
3. What is a Functional Group? Give three examples.
4. Explain Homologous Series.
5. Write IUPAC names for: (a) CH3CH2CHO (b) CH3COCH3 (c) CH3COOH.
6. What are isomers? Explain structural isomerism with examples.
7. Define Electrophiles and Nucleophiles.
8. Explain Inductive Effect (+I and -I) with examples.

9. What is Resonance Effect (Mesomeric Effect)?
10. Define Hyperconjugation.
11. Explain Electromeric Effect.
12. What are the types of fission of a covalent bond? (Homolytic and Heterolytic).
13. Define Carbocations and Carbanions. Discuss their stability.
14. What is the principle of Fractional Distillation?
15. Explain the technique of Chromatography.
16. Describe Lassaigne's Test for detection of Nitrogen.
17. How is estimation of Carbon and Hydrogen done in organic compounds?
18. Define Stereoisomerism.
19. Explain the principle of Steam Distillation.
20. What are free radicals? How are they formed?

Chapter 9: Hydrocarbons

1. Explain Wurtz reaction with an example.
2. Define Conformations. Draw Sawhorse and Newman projections of Ethane.
3. What is Markovnikov's Rule? Explain with the addition of HBr to Propene.
4. Explain Kharasch Effect (Peroxide Effect).
5. What is Ozonolysis? Give the ozonolysis products of Ethene.
6. State Huckel's Rule of aromaticity.
7. Explain the mechanism of Nitration of Benzene.
8. How will you convert Sodium Acetate to Methane?
9. Write a note on Friedel-Crafts Alkylation.
10. Explain Geometrical Isomerism (cis-trans) in Alkenes.
11. How is Ethyne prepared from Calcium Carbide?
12. Define Pyrolysis (Cracking).
13. What happens when Benzene reacts with Chlorine in the presence of UV light?
14. Explain the acidic character of Alkynes.
15. Discuss the stability of Alkenes based on hyperconjugation.
16. How do you prepare Benzene from Phenol?
17. What is Kolbe's Electrolytic method for preparing Alkanes?
18. Explain the directed influence of -OH group in Benzene ring.
19. Define Aromaticity.
20. How is Ethene prepared from Ethyl Alcohol?