



Unique Past Papers Chapter Wise

CHEMISTRY 11

(2018, 2019, 2021, 2022 & 2023)

Lahore Board, Faisalabad Board, Multan Board, Gujranwala Board, Sahiwal Board, D.G. Khan Board, Sargodha Board, Rawalpindi Board & Bahawalpur Board.

Unit 1: Basic Concepts

ATOM

- | | | |
|------|--|---------|
| Q.1: | Define the term atomicity? Give one example. | 3 Times |
| Q.2: | What is significance of John Dalton's work about atom? | 1 Time |
| Q.3: | Differentiate between atom and molecule. | 3 Times |
| Q.4: | Define atomicity. Give two examples. | 1 Time |
| Q.5: | Define macromolecules. Give example. | 1 Time |

Ion

- | | | |
|-------------|--|-----------------|
| Q.6: | What are ions? Under what conditions, they are produced? | 2 Times |
| Q.7: | Differentiate between ion and molecular ion. | 5 Times |
| Q.8: | Define cation and anion. | 3 Times |
| Q.9: | Differentiate between molecule and molecular ion. | 16 Times |
| Q.10: | Define ionic bond by giving one example. | 1 Time |

Relative Atomic Mass

- | | | |
|-------|--|---------|
| Q.11: | Why atomic masses are mentioned in fractions? | 4 Times |
| Q.12: | Define relative atomic mass unit and atomic mass unit. | 4 Times |

Isotopes

- | | | |
|-------|--|----------------|
| Q.13: | Define Isotope. Give an example. | 5 Times |
| Q.14: | Why isotopes have same chemical but different physical properties? | 5 Times |



- Q.15: What are monoisotopic elements? Give name and symbol of such an element. 2 Times
- Q.16: What is mass spectrum? 1 Time
- Q.17: What is function of ionization chamber in mass spectrometer? 2 Times
- Q.18: What is function of magnetic field in mass spectrometer? 5 Times
- Q.19: Write down any four methods used for the separation of isotopes. 7 Times
- Q.20: What is the justification of two strong peaks in the mass spectrum for bromine, while for iodine only one peak at 127 a.m.u. , is indicated? 5 Times
- Q.21: **No individual neon (Ne) atom in the sample of the element has a mass of 20.18 amu why?** 13 Times

Analysis of a Compound- Empirical and Molecular Formulas

- Q.22: Define empirical formula and give two examples. 4 Times
- Q.23: Calculate %age of Nitrogen in NH_2CONH_2 (at mass of N = 14, C = 12, H = 1, O = 16). 3 Times
- Q.24: Write function of $\text{Mg}(\text{CO}_3)_2$ and KOH in combustion analysis. 2 Times
- Q.25: A compound may have same empirical as well as molecular formula. Justify. 2 Times
- Q.26: **Define the molecular formula. How it is related to the empirical formula.** 26 Times
- Q.27: Give two examples of compounds having same empirical and molecular formulae. 2 Times
- Q.28: Differentiate between empirical and molecular formula. 4 Times
- Q.29: **Define gram atoms and gram formula.** 14 Times
- Q.30: Define mole with example. 3 Times
- Q.31: Calculate gram atoms in 0.1 gm of sodium (at mass of sodium = 23)? 6 Times
- Q.32: Calculate the mass of 10^{-3} moles of MgSO_4 . 1 Time
- Q.33: How many moles are present in 18 g of H_2O ? 1 Time
- Q.34: **What is Avogadro's number? Give equation to relate the Avogadro's number and mass of an element.** 10 Times
- Q.35: **23 g of sodium and 238 g of uranium have equal number of atoms in them.** 9 Times
- Q.36: **Mg atom is twice heavier than that of carbon atom. Explain.** 15 Times
- Q.37: 180 g of glucose and 342 g of sucrose have the same number of molecules but different number of atoms present in them. 5 Times
- Q.38: 4.9 g of H_2SO_4 when completely ionized in water, have equal number of positive and negative charges, but the number of positively charged ions are twice the number of negatively charged ion. 1 Time
- Q.39: Calculate mass in grams of 2.74 moles of KMnO_4 formula mas of KMnO_4 is 158 mol^{-1} . 4 Times



- Q.40: Moles of O atoms in 9.00 g Mg (NO₃)₂. 1 Time
- Q.41: Number of O atoms in 10.037 g of CuSO₄, 5H₂O. 1 Time
- Q.42: One mg of K₂CrO₄ has thrice the number of ions than the number of formula units when ionized in water justify. 1 Time
- Q.43: Two grams of H₂, 16 g of CH₄ and 44g of CO₂ occupy separately the volumes of 22.414 dm³, although the sizes and masses of molecules of three gases are very different from each other. 3 Times
- Q.44: One mole of H₂SO₄ should completely react with two moles of NaOH. How does Avogadro's number help to explain it? 1 Time
- Q.45: One mole of H₂O has two moles of bonds, three eight of atoms, ten moles of electrons and twenty eight moles of the total fundamental particles present in it. 3 Times
- Q.46. N₂ and CO have the same number of electrons, protons and neutrons. Explain. 1 Time
- Q.47: Calculate mass in kilogram of 2.6×10^{23} molecules of SO₂. 3 Times
- Q.48: Calculate the number of molecules in 10g of ice. 1 Time
- Q.49: **Give difference between Avogadro's number and molar volume.** 10 Times

Stoichiometry

- Q.50: **What is stoichiometry? Which assumptions are made for stoichiometry calculations?** 17 Times
- Q.51: **Law of Conservation of mass has to be obeyed during stoichiometric calculations. Give reason.** 8 Times

Limiting Reactant

- Q.52: Define limiting reactant, give an example. 4 Times
- Q.53: **How limiting reactant is identified?** 8 Times
- Q.54: What is limiting reactant? How does it control the quantity of the product formed? 4 Times
- Q.55: Many chemical reactions taking place in our surrounding involve the limiting reactants. Explain with examples. 7 Times

Yield

- Q.56: How is the efficiency of a reaction expressed? 6 Times
- Q.57: **Differentiate between actual yield and theoretical yield.** 8 Times
- Q.58: **Why theoretical yield of a chemical reaction is greater than the actual yield?** 18 Times

Unit 2: Experimental Techniques in Chemistry

Introduction

- Q.1: What is difference between qualitative analysis and quantitative analysis. **5 Times**
- Q.2: How does rate of filtration increased by fluted filter paper? **4 Times**
- Q.3: Write disadvantages of drying crystals in the folds of filter paper. **2 Times**
- Q.4: What is difference between Gooch's crucible and Sintered glass crucible. **5 Times**
- Q.5: Why sintered glass crucible is preferred over Gooch crucible? **3 Times**
- Q.6: Explain filtration through Gooch Crucible? **3 Times**
- Q.7: How does Gooch Crucible increases the rate of Filtration? **2 Times**
- Q.8: Define filtration and crystallization. **1 Time**
- Q.9: Why is there a need to crystallize the crude product? **7 Times**
- Q.10: Concentrated HCl and KMnO_4 Solutions can be filtered by Gooch's crucible. **3 Times**

Crystallization

- Q.11: What is crystallization? Write the name of its various steps. **9 Times**
- Q.12: Define Crystallization. What is basic principle of crystallization? **3 Times**
- Q.13: Write four Properties of metallic crystal. **1 Time**
- Q.14: What are liquid crystals? Why are they so called? **2 Times**
- Q.15: What is fractional crystallization? **2 Times**
- Q.16: Give the salient features of an ideal solvent used in the process of crystallization of compound. **17 Times****
- Q.17: Write down the name of eight solvents used in crystallization. **2 Times**
- Q.18: How a saturated solution is prepared? **2 Times**
- Q.19: How the crystals are dried in vacuum desiccator? **7 Times****
- Q.20: The desiccator is a safe and reliable method for drying the crystals. Explain. **2 Times**
- Q.21: Write down any two methods of drying of the crystals. **2 Times**
- Q.22: How undesirable colours are separated from a crude substance? **11 Time****

Sublimation

- Q.23: What is sublimation? Give examples of substance. **22 Times****
- Q.24: Define sublimate. Give two examples. **1 Time**
- Q.25: Define sublimation and chromatography. **2 Times**



Solvent Extraction

- Q.26: Define distribution law. How it is helpful in solvent extraction? 26 Times
 Q.27: What is solvent extraction? Give its importance. 9 Times

Chromatography

- Q.28: Define chromatography. Give its two uses. 2 Times
 Q.29: What is difference between adsorption and partition chromatography? 15 Times
 Q.30: Write down the uses of chromatography. 11 Time
 Q.31: What is mobile phase and stationary phase? 2 Times
 Q.32: What is R_f value? Why it has no units? 2 Times

Unit 3: Gases

State of Matter

- Q.1: State of Matter. 1 Time

Gas Laws

- Q.2: Give two statements of Boyle's Law. 1 Time
 Q.3: Derive Boyle's Law from Kinetic molecular theory or gases. 6 Times
 Q.4: Explain the plot of PV versus P is a straight line at constant temperature and with a fixed number of moles of an ideal gas. 2 Times
 Q.5: Draw isotherms of a gas at two different temperature. 1 Time
 Q.6: Define Quantitative definition of Charles's Law. 2 Times
 Q.7: Throw some light on the factor in $\frac{1}{273}$ Charles's Law. 2 Times
 Q.8: Define absolute zero. What is its value. 9 Times
 Q.9: How absolute zero is explained by drawing graph? 1 Time
 Q.10: What is the difference between centigrade scale and Fahrenheit scale and which relationship is used for their interconversion? 3 Times
 Q.11: Convert 40°C into °F. 4 Times
 Q.12: Convert 37°C into °F scale. 5 Times

General Gas Equation

- Q.13: Define atmospheric pressure. Give its two units. 2 Times
 Q.14: Calculate the value of gas constant "R" in S.I. units. 14 Times
 Q.15: Write expression for kinetic equation an root means square velocity of gases. 2 Times



Q.16: Derive the units of “R” in general gas equation when the pressure is in atmosphere and volume in dm³. 2 Times

Q.17: Prove that $d = \frac{PM}{RT}$ 9 Times

Avogadro's Law

Q.18: Define Avogadro's law with two suitable examples. 4 Times

Q.19: Derive Avogadro's Law from KMT of gases. 2 Times

Dalton's Law of Partial Pressure

Q.20: Derive an expression to find out the partial pressure of gas. 3 Times

Q.21: Why deep sea divers take oxygen mixed with an inert gas, like (He)? 4 Times

Q.22: Regular air cannot be used in diver's tank. Give reasons. 25 Times

Q.23: Why pilots feel uncomfortable breathing in unpressurised cabin? 6 Times

Q.24: Apply Dalton's law of partial pressure to determine the partial pressure of a dry gas. 4 Times

Q.25: Write two applications of Dalton's law of partial pressure. 6 Times

Diffusion and Effusion

Q.26: Differentiate between diffusion and Effusion of gases. 9 Times

Q.27: State Graham's Law of diffusion and write its mathematical form. 3 Times

Q.28: Lighter gases diffuse more rapidly than heavier gases. Give Reasons. 3 Times

Q.29: Why do we feel comfortable in expressing the densities of gases in the units of g/dm³ rather than g/cm³, a unit which is used to express the densities of liquids and solids? 3 Times

Q.30: Write two faulty assumptions of kinetic molecular theory of gases. 8 Times

Q.31: Write down four postulates of kinetic molecular theory of gases responsible for the deviation of gases from ideal behavior. 1 Time

Q.32: Derive molecular mass of a gas by general gas equation. 3 Times

Q.33: Derive Boyle's law from KMT. 2 Times

Liquefaction of Gases

Q.34: Give general principle of Liquefaction of gases. 1 Time

Q.35: What is meant by the term critical temperature and critical pressure. Giving one example in each case. 9 Times

Q.36: Define the critical volume of gas. 2 Times

Q.37: What is Joule Thomson Effect? 3 Times

Q.38: H₂ and He cannot be liquefied by Linds method. Why? 1 Time



- Q.39:** High pressure and low temperatures make the gases non-ideal. Explain why? **8 Times**
- Q.40:** Give two causes for deviation of gases from ideality. **7 Times**
- Q.41:** Give the units of Van der Waals' constant 'a' and 'b'. **1 Time**
- Q.42:** Hydrogen and Helium are ideal at room temperature but SO₂ and Cl₂ are non-ideal. **2 Times**

Plasma State

- Q.43:** What is plasma? How it is formed **16 Times**
- Q.44:** Write down two characteristics of plasma. **11 Time**
- Q.45:** Write two uses of plasma. **12 Times**
- Q.46:** Why water vapors do not behave ideally at 273K? **11 Time**
- Q.47:** Justify that SO₂ is comparatively non-ideal at 273K but behaves ideally at 327°C. **6 Times**
- Q.48:** Justify that 1 mole of H₂ and 1 mole of NH₃ at 0°C and one atmospheric pressure will have Avogadro's number of particles. **2 Times**
- Q.49:** What is natural and artificial plasma? **3 Times**
- Q.50:** Where plasma is found? **1 Time**

Unit 4: Liquids And Solids

Introduction

- Q.1:** The vapor pressures of solids are far less than those of liquids. Explain. **1 Time**
- Q.2:** What are intermolecular forces of attractions. Give one example. **6 Times**
- Q.3:** What are dipole-dipole forces? How they affect thermodynamic properties of substances. **5 Times**
- Q.4:** What are dipole-dipole forces of attraction? Explain with an example. **7 Times**
- Q.5:** What are Debye forces? Explain. **5 Times**
- Q.6:** What are dipole-induced dipole forces? **5 Times**
- Q.7:** Define polarizability How it affects London dispersion forces. **2 Times**
- Q.8:** Why HF shows exceptionally low acidic strength as compared to HCl, HBr and HI? **7 Times**
- Q.9:** Define hydrogen bonding. Show hydrogen bonding in ammonia molecule. **5 Times**
- Q.10:** Describe cleaning action of soaps and detergents on the basis of H-bonding **5 Times**
- Q.11:** What is the role of Hydrogen bonding in biological compounds? **1 Time**



- Q.12: In a very cold winter the fish in garden ponds owe their lives to hydrogen bonding? 1 Time
- Q.13: Hydrogen bonding is present in chloroform and acetone. Justify it. 1 Time
- Q.14: Why the boiling point of water seems to be affected by hydrogen bonding then that of Hf. 2 Times
- Q.15: Why Ice floats over the surface of water? 13 Times**
- Q.16: Water and ethanol (C₂H₅OH) can mix in all proportions. Give reason. 2 Times
- Q.17: Ethyl alcohol can dissolve in water but hydrocarbons are not soluble in water justify it. 4 Times
- Q.18: Why water is liquid at room temperature but H₂S and H₂Se are gases, comment? 7 Times
- Q.19: Give reason for the lowest boiling point of hydride of group IV-A elements.
- Q.20: What is role of hydrogen bonding in paints, dyes and textile materials? 1 Time
- Q.21: How will you justify that the structure of ice is just like that of diamond? 1 Time

Evaporation

- Q.22: How earthen ware vessels keep water cool? Explain. 9 Times**
- Q.23: One feels sense of cooling under the fan after bath. Why? 6 Times
- Q.24: Justify that evaporation takes place at all temperatures. 5 Times
- Q.25: Evaporation causes cooling Explain. 19 Times**
- Q.26: Dynamic equilibrium is established during evaporation of a liquid in a closed vessel at constant temperature. 2 Times
- Q.27: Define Evaporation and name the factors which affect evaporation. 2 Times
- Q.28: Define State of Dynamic Equilibrium. 1 Time
- Q.29: Define vapour pressure. Name the factors which affect on vapour pressure of a liquid. 2 Times
- Q.30: What is effect of intermolecular forces on vapour pressure? 2 Times
- Q.31: Write a note on the factors effecting on the London forces. 2 Times
- Q.32: Relative lowering in vapour pressure is independent of temperature. Explain. 3 Times
- Q.33: What is boiling point? Why the temperature remains constant at boiling point? 3 Times
- Q.34: Why the boiling points of noble gases increase down the group? 14 Times**
- Q.35: What is vacuum distillation? Give its advantages. 3 Times
- Q.36: Why vacuum distillation can be used to avoid decomposition of a sensitive liquid. Explain with reason. 6 Times
- Q.37: Define molar heat of vapourization and molar heat of fusion. 7 Times
- Q.38: Heat of sublimation of iodine is very high, justify. 7 Times



- Q.39: Heat of Sublimation of substance is greater than that of heat of vaporization. 3 Times

Liquid Crystals

- Q.40: Define liquid crystal with one example. 5 Times
 Q.41: What are liquid Crystals? Why are they so called? 3 Times
 Q.42: How the liquid crystals, help in the detection of the blockage in Veins and arteries? 5 Times
 Q.43: Give two uses of liquid crystal. 5 Times

Introduction

- Q.44: Write four properties of solids. 2 Times
 Q.45: Define Anisotropy and Allotropy. 7 Times
 Q.46: Define crystalline solids and crystallites. 7 Times
Q.47: What are pseudo-solids (Amorphous-Solid)? 8 Times
 Q.48: Amorphous solid like glass is also called super cooled liquid. Explain. 3 Times
 Q.49: Write down types of crystalline solids. 1 Time
Q.50: What is isomorphism? Give an example. 8 Times
 Q.51: What is the relationship between polymorphism and allotropy? 4 Times
 Q.52: Define allotropy with an example. 6 Times
Q.53: What do you mean by cleavage and cleavage planes? 9 Times
Q.54: Cleavage of crystals is itself anisotropic behavior, explain. 9 Times
Q.55: What is polymorphism? Give one example. 10 Times
Q.56: Differentiate between isomorphism and polymorphism. 9 Times
Q.57: Define transition temperature and give two examples. 19 Times
 Q.58: Define symmetry and habit of a crystal. 3 Times

Crystal Lattice

- Q.59: What are crystallographic elements? Explain with diagram. 9 Times
 Q.60: Define Unit cell. Give one example. 8 Times

Crystal and their Classification

- Q.61: One of the unit cell angles of Hexagonal crystal is 120° . Justify it. 2 Times

Classification of Solids

- Q.62: Sodium is a good conductor of electricity but NaCl is not. Give reason. 1 Time
 Q.63: Explain why sodium chloride and caesium chloride have different structure. 3 Times
Q.64: Define lattice energy. Give example. 8 Times



- Q.65: Explain why Ionic crystals and brittle?** 12 Times
- Q.66: Ionic crystals do not conduct electricity in the solid state. Why?** 12 Times
- Q.67:** What is the coordination number of an ion? What is the coordination number of the cation in (a) NaCl structure and (b) CsCl structure? Explain the reason for this difference? 1 Time
- Q.68:** Why graphite is a good conductor of electricity? 2 Times
- Q.69: Diamond is hard and an electrical insulator, Why?** 12 Times
- Q.70:** Write four properties of molecular solids. 1 Time
- Q.71:** Write four properties of Metallic crystals. 3 Times
- Q.72: The electrical conductivity of metals decreases with the increase in temperature why?** 10 Times
- Q.73:** Metallic crystals are lustrous in nature, why? 1 Time
- Q.74:** Explain with reason sodium is softer than copper, but both are very good electrical conductors. 3 Times
- Q.75:** A fresh cut metal has a shiny look. Justify? 1 Time
- Q.76:** What is cubic close packing and hexagonal close packing? 1 Time

Unit 5: Atomic Structure

State of Matter

- Q.1:** Which ever gas is used in the discharge tube, the nature of the cathode rays remains same? Why? 7 Times
- Q.2:** Why is it necessary to decrease the pressure in discharge tube to get cathode rays? 4 Times
- Q.3:** What is Cathode Ray tube? 2 Times
- Q.4:** How will you prove that Cathode Rays travel in straight line? 3 Times
- Q.5:** Narrate Properties of Cathode rays. 6 Times
- Q.6:** Cathode rays are electrons. Justify. 3 Times
- Q.7:** Describe behavior of cathode rays in magnetic field. 2 Times
- Q.8:** How bending of cathode rays in electric field show their negative nature? 2 Times
- Q.9:** How it was inferred that cathode rays are material particle? 6 Times
- Q.10:** Why e/m of cathode rays is equal to that of electrons? 4 Times
- Q.11:** Whichever gas is used in the discharge tube, the nature of the Cathode rays remains the same why? 5 Times
- Q.12:** How positive rays are produced? 6 Times
- Q.13: Why positive rays are also called canal rays?** 15 Times
- Q.14:** The e/m value for positive rays obtained from hydrogen gas is 1836 times less than that of cathode rays. Explain it. 4 Times
- Q.15:** The e/m value of positive rays is less than cathode rays. Justify. 3 Times



- Q.16: The e/m values for positive rays are different for different gases, but that of cathode rays obtained from different gases is the same. Give reasons. 4 Times
- Q.17: Write four Properties of Positive rays. 4 Times
- Q.18: How neutrons were discovered by Chadwick? Give the equation of nuclear reaction involved. 5 Times
- Q.19: What is nuclear reaction? Write equation for the production of neutron. 5 Times
- Q.20: Write down the nuclear reaction involving in the conversion of Cu into Zn. 7 Time
- Q.21: Which type of particles are formed by the decay of free neutron?** 8 Times
- Q.22: Define Slow Neutron and Fast neutron. 2 Times
- Q.23: How neutrons are used for the treatment of cancer? 1 Time
- Q.24: Calculate mass of an electron when $e/m = 1.758 \times 10^{11} \text{ CKg}^{-1}$.** 8 Times
- Q.25: How charge to mass (e/m) ratio of electron is measured? 3 Times

Rutherford's Model of Atom (Discovery of Nucleus)

- Q.26: What is defect of Rutherford's atomic model?** 13 Times
- Q.27: What is Planck's quantum theory? 7 Times
- Q.28: Justify the statement that angular momentum of electron revolving in orbit is quantized? 1 Time
- Q.29: Prove that $E = hc\bar{\nu}$. 2 Times
- Q.30: Differentiate between frequency and wave number. 7 Times

Bohr's Model of Atom

- Q.31: Write two postulates of Bohr's atomic model.** 9 Times
- Q.32: Why the radius of an atom cannot be determined precisely? 4 Times
- Q.33: Derive an expression up to radius of n th orbit for hydrogen atom. 7 Times
- Q.34: Why the potential energy of an electron is negative in an orbit of atom? 2 Times

Spectrum

- Q.35: Define spectrum and mention its types. 2 Times
- Q.36: Differentiate between continuous and line spectrum.** 12 Time
- Q.37: What is the origin of Line Spectrum? 7 Times
- Q.38: Explain atomic or line spectrum with example. 2 Times
- Q.39: Differentiate between atomic emission spectrum and atomic absorption spectrum. 6 Times
- Q.40: What is atomic emission spectrum? 7 Time
- Q.41: What is meant by fine structure of Hydrogen Spectrum? 4 Times



- Q.42: Write names of spectral series of hydrogen spectrum. 4 Time
 Q.43: What is origin of Hydrogen Spectrum? 3 Times
 Q.44: What is Lyman Series? 2 Times
 Q.45: Mention two defects of Bohr's model. 2 Times
 Q.46: Differentiate between Zeeman effect and stark effect. 15 Times

X-Rays and Atomic Number

- Q.47: What is the origin of emission of X-rays? 4 Times
 Q.48: State Moseley's law. Give its mathematical expression. 15 Times
 Q.49: Write importance of Moseley's law. 5 Times

Wave-Particle Nature of Matter (Dual Nature of Matter)

- Q.50: Derive the de Broglie Wave Equation. 1 Time
 Q.51: How the dual nature of an electron was verified. 3 Times

Heisenberg's Uncertainty Principle

- Q.52: Define Heisenberg's principle of uncertainty. 15 Times
 Q.53: What is azimuthal quantum number? Give its significance. 15 Times
 Q.54: What is principal quantum number? What is its significance? 3 Times
 Q.55: Write names of different Quantum Numbers. 1 Time
 Q.56: Differentiate between orbit and orbital. 2 Times
 Q.57: What is orbital? Draw the shape of "p" orbital. 5 Times

Electronic Distribution

- Q.58: Define Aufbau Principle. 5 Time
 Q.59: Define Pauli's exclusion principle. Give one example. 17 Times
 Q.60: State Hund's rule. Give an example. 16 Times
 Q.61: Write electronic configuration of following elements (a) ${}_{12}\text{Mg}$ (b) ${}_{29}\text{Cu}$. 9 Times
 Q.62: Write distribution of electrons in subshells of ${}_{6}\text{C}$ and ${}_{24}\text{Cr}$. 9 Times
 Q.63: Write electronic configuration of the ${}_{35}\text{Br}$. 3 Times
 Q.64: Distribute electrons in orbitals of ${}_{24}\text{Cr}$, ${}_{13}\text{Al}$. 1 Time

Unit 6: Chemical Bonding

Introduction

- Q.1: Define octet rule. Give two examples of compounds that do not obey this rule. 12 Times

Atomic Sizes

- Q.2: Why the radius of an atom cannot be determined precisely? **5 Times**
- Q.3: Atomic radius decreases from left to right in a period, justify. **2 Times**
- Q.4: What is the difference between ionic radii and covalent radii? **5 Times**
- Q.5: Briefly explain the atomic radii with example. **1 Time**
- Q.6: Why cationic radius is smaller than parent atom? **5 Times**
- Q.7: Why cationic radii are smaller than anionic radii? **3 Times**
- Q.8: Why anionic radius is greater than parent atom? 9 Times**
- Q.9: Why the radius of Na^+ is smaller than Na-atom? **3 Times**
- Q.10: The size of chlorine atom is smaller than Cl^{-1} ion. Justify it. **2 Times**

Ionization , Electron Affinity and Electronegativity

- Q.11: Define ionization energy. Also discuss it along the period with in periodic table. **5 Times**
- Q.12: What factors influence the ionization energy? **3 Times**
- Q.13: Ionization energy decreases down the group, although nuclear charge increases. Explain. 8 Times**
- Q.14: Why second ionization energy of an element is always greater than first ionization energy? **6 Times**
- Q.15: Ionization energy is index to the metallic character. Why? **3 Times**
- Q.16: Define shielding effect and how it varies along period. **1 Time**
- Q.17: Define electron affinity and give an example. 9 Times**
- Q.18: What factors influence the electron affinity? **2 Times**
- Q.19: How does electron affinity vary in periodic table? **5 Times**
- Q.20: Define Ionization Energy (IE) and Electron Affinity (EA). **3 Times**
- Q.21: How electronegativity changes in periodic table? **11 Time**
- Q.22: How the electronegativity difference of the two bonded atoms can be used to predict the ionic/covalent nature of the bond? **5 Times**
- Q.23: Why CO is polar but CO_2 is non-polar? **2 Times**
- Q.24: Why BF_3 is non-polar but SO_2 is polar? **1 Time**

Types of Bonds

- Q.25: Define covalent bond. Give two examples. **4 Times**
- Q.26: Why ionic bonds are non-directional? **1 Time**
- Q.27: Why polar bond is stronger than non-polar bonds? **1 Time**
- Q.28: No bond in chemistry is 100% ionic. Justify it. **1 Time**
- Q.29: Differentiate between polar and non-polar covalent bonds with examples. **3 Times**



- Q.30: The distinction between a co-ordinate covalent bond and a covalent bond vanishes after formation in NH_4^+ why? 3 Times
- Q.31: Define co-ordinate covalent bond with the help of two examples.** 12 Times
- Q.32: Draw the geometry of SO_2 and SO_3 on the basis of VSEPR Theory. 1 Time
- Q.33: Both NH_3 and BF_3 are tetra atomic but different geometries why. 3 Times
- Q.34: Explain the structure of NH_3 molecule on the basis of VSEPR theory. 5 Time2
- Q.35: Why the lone pair electrons repel strongly than the bond pair of electrons? 7 Times
- Q.36: Write down two / four postulates of VSEPR theory. 6 Times
- Q.37: Write the Lewis structures for the following compounds. (a) HCN (b) CCl_4 . 3 Time
- Q.38: Explain geometry of H_2S molecule on the basis of VSEPR theory. 2 Times
- Q.39: What is AB_3 type molecule according to VSEPR theory? Give an example. 1 Time
- Q.40: What is meant by symmetry? Give elements of symmetry. 3 Times
- Q.41: Write two points of valence Bond Theory. 5 Times
- Q.42: Differentiate between sigma and pi bond. 6 Times
- Q.43: How sigma and pi bonds are formed? 4 Times
- Q.44: Why π -bonds are weaker than σ bond?** 13 Time
- Q.45: What is π -bond? Give an example. 5 Times
- Q.46: Draw the structure of H_2O Molecule on the basis of VBT and explain it. 4 Times
- Q.47: Why the bond distance in the compromise distance between two atoms?** 12 Time
- Q.48: NH_3 and NF_3 have different bond angles. Justify. 3 Times
- Q.49: NH_3 can form coordinate covalent bond with H^+ but CH_4 not. Justify. 1 Time
- Q.50: Bond angle in CH_4 is 109.5° but in H_2O is 104.5° although carbon and oxygen are sp^3 hybridized. Give reason. 3 Times
- Q.51: Explain sp_2 - hybridization given example of BF_3 . 1 Time
- Q.52: Why the bond angle in H_2O and NH_3 are different, although O and N atom are sp^3 hybridized? 6 Times
- Q.53: Why molecular orbital theory is superior to that VSEPR and VB theories?** 8 Times
- Q.54: Differentiate between bonding and anti-bonding molecular orbitals. 5 Times
- Q.55: Draw a diagram showing relative energies of bonding and antibonding molecular orbitals with reference to those of respective atomic orbitals. 4 Times
- Q.56: Discuss He-molecule on the basis of MOT. 2 Times



- Q.57: Represents the molecular orbital of N_2 molecule in the increasing order of energy. 3 Times
- Q.58: Helium is diamagnetic in nature justify. 2 Times
- Q.59: Why He_2 molecule does not exist under normal conditions? 7 Times
- Q.60: What is meant by Bond order? Calculate bond order for H_2 -molecule. 14 Times**
- Q.61: Why oxygen show paramagnetic character? 5 Times

Bond Energy, Bond length and Dipole Moment

- Q.62: What is bond energy? Give an example. 1 Time
- Q.63: How bond length is affected by change in Hybridization state? 1 Time
- Q.64: 75.4 pm is compromise distance between two hydrogen atoms. Justify? 1 Time
- Q.65: Why sigma bond is stronger than Pi bond? 7 Times
- Q.66: On what factors bond energy depends? 1 Time
- Q.67: The abnormality of bond length and bond strength in HI is less prominent than that of HCl. Why? 3 Times
- Q.68: What factors affect the strength of bond? 2 Times
- Q.69: Define dipole moment and give its mathematical expression. 9 Times**
- Q.70: Why liquids are less common then solids and gases? 1 Time
- Q.71: The dipole moment of CO_2 and CS_2 is zero, but that of SO_2 is 1.61 D. Give reasons. 6 Times
- Q.72: The dipole moment of CO_2 is zero and that of water is 1.85 D. Give reason. 5 Times
- Q.73: Why the dipole moment of CH_4 is zero? 1 Time
- Q.74: The dipole moment of CO_2 is zero but that of CO is 0.12 D. Give reason. 3 Times
- Q.75: Why water is angular and CO_2 is linear molecule? 2 Times
- Q.76: How the percentage ionic character of a covalent bond is determined by dipole moment? 1 Time

The Effect of Bonding on the Properties of Compounds

- Q.77: Why the covalent compounds show isomerism, but ionic compounds does not?

Unit 7: Thermochemistry

Introduction

- Q.1: What is difference between heat and temperature? 5 Times
- Q.2: Differentiate between endothermic and exothermic reactions. Give one example of each. 10 Times**



Q.3: What is thermochemical equation? Give example. 2 Times

Spontaneous and Non-Spontaneous Reactions

- Q.4: Differentiate between spontaneous and non-spontaneous reactions. 9 Times
 Q.5: Describe that burning of candle is a spontaneous process. Justify. 11 Time
 Q.6: Define non-spontaneous reaction with an example. 2 Times
Q.7: Differentiate between system and surroundings. 15 Times
Q.8: Define with example system and state function. 22 Times
 Q.9: Why it is necessary to mention the physical states of reactants and products in thermo chemical reaction? 4 Times

Internal Energy and First Law of Thermodynamics

- Q.10: Differentiate between internal energy of the system and the enthalpy of the system. 5 Times
Q.11: State first law of thermodynamics. Give its mathematical formula. 25 Times

Enthalpy

- Q.12: Define heat of solution. Give example. 7 Times
Q.13: Explain the term enthalpy. 8 Times
 Q.14: Define the terms standard enthalpy of neutralization and standard enthalpy of atomization. 6 Time
Q.15: Define standard enthalpy of atomization with an example. 11 Time
 Q.16: The enthalpy of neutralization of all strong acids and strong bases has the same value. Justify. 3 Times
 Q.17: Differentiate between the terms standard enthalpy of neutralization and standard enthalpy of atomization. 2 Times
Q.18: Define enthalpy of neutralization and enthalpy of combustion. 18 Times
 Q.19: Define enthalpy of solution with an example. 7 Times

Enthalpy

- Q.20: State Hess's law of constant Heat summation. 4 Times
 Q.21: Define Born-Haber cycle and Lattice energy. 4 Times

Unit 8: Chemical Equilibrium

Reversible and Irreversible Reactions

- Q.1: How does a catalyst affect a reversible reaction? 1 Time
Q.2: Differentiate between reversible and Irreversible Reactions. 10 Times
 Q.3: Derive the units of K_c for the system $N_2 + 3H_2 \rightleftharpoons 2NH_3$ 4 Times



- Q.4: State law of mass action.** 14 Times
Q.5: Write down the equilibrium constant expression for the dissociation of PCl_5 . 4 Times
Q.6: Give the relationship of equilibrium constants K_c and K_p . 3 Times
Q.7: Prove $K_p = K_c (RT)$. 1 Time
Q.8: How the direction of reversible reaction any instant can be determined by K_c of a value. 9 Times
Q.9: Define Le-chatelier's Principle. 12 Times
Q.10: How does a catalyst affect a reversible reaction? 9 Times
Q.11: Write down K_c for the following reaction. Suppose the volume of reaction mixture is " V " dm^3 at equilibrium stage. 1 Time

Application of Chemical Equilibrium in Industry

- Q.12: What are optimum conditions for the synthesis of NH_3 ?** 8 Times
Q.13: What conditions are required for the best possible yield of SO_3 ? 2 Times

Ionic Product of Water

- Q.14:** What is ionic product of water? 2 Times
Q.15: Define pOH of solution. Give its equation. 7 Times
Q.16: Define pH and give the pH of milk and eggs. 1 Time
Q.17: Find out the pH of 0.1 M HCl solution. 3 Times
Q.18: Calculate pH of $10^{-4} \text{ mol dm}^{-3}$ of $\text{Ba}(\text{OH})_2$. 3 Times
Q.19: What is meant by percentage ionization of acids? 1 Time

Ionization Constant of Bases K_b

- Q.20: Define pK_a and pK_b .** 9 Times

Lowry Bronsted Acid and Base Concept

- Q.21:** Prove that $\text{pK}_a + \text{pK}_b = 14$ at 25°C . 4 Times
Q.22: Define Lowry Bronsted concept of acid and basis. 2 Times

Common Ion Effect

- Q.23: Define common ion effect with one example** 13 Times
Q.24: What is the effect of common ion on solubility? 3 Times

Buffer Solutions

- Q.25:** Define buffer solution. 6 Times
Q.26: How Buffer solutions are prepared? 17 Times



- Q.27: What do you mean by acidic buffers and basic buffers? Give one example of each. **6 Times**
- Q.28: Give the equations for calculating pH and pOH for acidic and basic buffers. **1 Time**
- Q.29: What is Henderson's equation and for which purpose it used? **2 Times**
- Q.30: How does a Buffer act? Explain with an example. **4 Times**
- Q.31: Give two applications of Buffer solution. **5 Times**
- Q.32: Why do we need buffer solution? **4 Times**
- Q.33: What is meant by Buffer Capacity? Write down Henderson equation for acidic buffers. **10 Times****
- Q.34: Explain that a mixture of NH_4OH and NH_4Cl gives us the basic buffer. **1 Time**

Equilibria of Slightly Soluble Ionic Compound (Solubility Product)

- Q.35: Define solubility principle? Give example. **4 Times**
- Q.36: What is solubility? What is solubility product expression of PbCl_2 ? **7 Times**
- Q.37: What is the solubility product? Derive solubility product expression for AgCrO_4 . **3 Times**
- Q.38: Define solubility product. Give its one application. **6 Times**

Unit 9: Solutions

Concentration Units of Solutions

- Q.1: Calculate the percentage by weight of NaCl , if 2g of NaCl is dissolved in 20g of NaCl is dissolved in 20g of water. **1 Time**
- Q.2: The concentration in terms of molarity is independent of temperature but molality depends on temperature justify it. **4 Times**
- Q.3: What is molality? Give its formula. **11 Time****
- Q.4: One molal solution of urea, in water is dilute as compared to one molar solution of urea, but the number of particles of the solute is same. **8 Times****
- Q.5: Differentiate between molarity and molality. **10 Time****
- Q.6: What is meant by molar and molal solutions? **1 Time**
- Q.7: Explain with reasons 100g of 98% H_2SO_4 has a volume of 54.34 cm^3 of H_2SO_4 . (Density = 1.84 g cm^{-3}) **1 Time**
- Q.8: How will you prepare 10% w/v glucose solution in water? **1 Time**
- Q.9: Define mole fraction and parts per million. **9 Times****
- Q.10: Sum of the mole fraction of components of solution is always equal to unity. Justify it. **4 Times**
- Q.11: Sea water has 5.65×10^{-3} g of dissolved oxygen in one kg of water. Calculate the concentration of oxygen in sea water in parts per million (ppm). **1 Time**



Types of Solutions

- Q.12: What is meant by the term critical solution temperature? Also give its value of temperature and composition for phenol-water system at critical temperature. 4 Times
- Q.13: Define critical solution temperature and conjugate solutions. 1 Time
- Q.14: What is upper consolute temperature? Give names of two liquids which are partially miscible with each other. 1 Time

Ideal and Non-Ideal Solutions

- Q.15: Write four characteristics of an ideal solvent. 3 Times
- Q.16: Define non-ideal solution. Give example. 1 Time
- Q.17: Define Raoult's Law. Give one of its mathematical forms. 8 Times**
- Q.18: Non-ideal solutions do not obey the Raoult's law. Justify. 3 Times
- Q.19: Differentiate between ideal and non-ideal solution. 8 Times**

Vapour Pressure of Liquid Solution

- Q.20: Define non ideal solution. Give example. 1 Time
- Q.21: Define Azeotropic mixtures with example. 4 Times
- Q.22: What are the advantages of vacuum distillation. 1 Time

Solubility and Solubility Curves

- Q.23: What is solubility principle? Give example. 3 Times
- Q.24: What is solubility curve? Name its two types. 3 Times
- Q.25: What are continuous solubility curve? Give an example also. 3 Times
- Q.26: What is discontinuous solubility curve? Give one example. 8 Times**
- Q.27: What is the effect of rise in temperature on the solubility of KI in water? 1 Time
- Q.28: Define Colligative properties. Name four colligative properties. 13 Times**
- Q.29: What are colligative properties? And why they are called so? 2 Times
- Q.30: Lowering of vapour pressure is a colligative property. Explain it. 5 Times
- Q.31: Define Boiling Point Elevation. 1 Time
- Q.32: Boiling points of the solvents increase due to the presence of solutes. Give reason. 8 Times**
- Q.33: Define ebullioscopic constant with an example. 4 Times
- Q.34: Write graphical explanation for elevation of boiling point of a solution. 1 Time
- Q.35: Define cryoscopy constant with an example. 5 Times
- Q.36: The presence of non-volatile solutes increases the boiling point of solvent. Give reason. 3 Times



- Q.37: What are the names of major parts of apparatus used in Landsberger's method for elevation of Boiling Point? 1 Time
- Q.38: NaCl and KNO₃ are used to lower the melting point of ice. Justify it.** 8 Time
- Q.39: In summer the antifreeze solutions protect liquid of the radiator from boiling over. Justify it. 4 Times
- Q.40: How do you justify that freezing points are depressed due to the presence of solutes? 1 Time

Energetics of Solution

- Q.41: Why hydration energy of sodium (Na⁺) ion is less than Li⁺ ion? 4 Times

Hydration and Hydrolysis

- Q.42: Define Hydration energy of ions. 7 Times
- Q.43: Why heat of hydration of Li⁺ is greater than that of Cs⁺? 5 Times
- Q.44: Differentiate between hydration and hydrolysis.** 16 Time
- Q.45: Define hydrates and give its two examples. 6 Times
- Q.46: What is water of crystallization? Give example.** 8 Times
- Q.47: Why hydration energy of Mg⁺⁺ is higher than Na⁺ ion? 1 Time
- Q.48: Define hydrolysis with example. 5 Times
- Q.49: Aqueous solution of CH₃COONa is basic why?** 9 Times
- Q.50: Why the aqueous solution of NH₄Cl is acidic? 4 Times
- Q.51: Cane sugar cannot be dissolved in benzene. Give reason. 2 Times
- Q.52: Aqueous solution of Na₂CO₃ is alkaline in nature, Why? 1 Time
- Q.53: Why ethylene glycol is added in the radiator of automobile? 3 Times

Unit 10: Electrochemistry

Introduction

- Q.1: Define Electrochemistry. 3 Times
- Q.2: Define oxidation number. What is oxidation number of elements in free state?** 8 Times
- Q.3: Write down the oxidation states of oxygen in peroxide and super oxides. 1 Time
- Q.4: Calculate oxidation number of Mn in**
i) KMnO₄ ii) K₂MnO₄ iii) Na₂MnO₄ 14 Times
- Q.5: Calculate oxidation number of sulphur in SO₄⁻². 5 Times
- Q.6: Calculate oxidation number of chromium in the following compounds.
 i) CrCl₃ ii) K₂CrO₄ 7 Times
- Q.7: Determine the oxidation number of Phosphorus in H₃PO₄. 3 Times



- Q.8: Calculate oxidation number of S in H_2SO_4 . 1 Time
- Q.9: Define oxidation number and calculate the oxidation state of underlined element (a) H_3PO_3 (b) $\text{Ca}(\underline{\text{C}}\text{I}\text{O}_3)_2$ 4 Times
- Q.10: Define oxidizing agent and reducing agent. 2 Times
- Q.11: Calculate oxidation number of "P" in Na_2PO_4 . 1 Time
- Q.12: How Zn can displace iron from its solution? 3 Times

Electrolytic Conduction

- Q.13: What is electrolytic conduction? 1 Time
- Q.14: Explain the difference between Electrolytic and Voltaic cell. 9 Times
- Q.15: What is ionization and electrolysis? 8 Time
- Q.16: Differentiate between primary and secondary cell giving one example each. 3 Times
- Q.17: What is Anodized Aluminium? 5 Times
- Q.18: How is Anodized Aluminium prepared? Give the advantages of Anodization of Al. 7 Times
- Q.19: Impure copper can be purified by electrolytic process. Explain. 11 Time
- Q.20: Mention the function of salt bridge. 21 Time
- Q.21: How a Voltic Cell is represented? 1 Time
- Q.22: What is salt bridge? How it maintains electrical neutrality in the half cell solution. 15 Times
- Q.23: Voltaic cell is Reversible cell state. Justify. 4 Time

Electrode Potential

- Q.24: What is electrode potential? 8 Times
- Q.25: What is meant by standard hydrogen electrode (SHE)? 13 Times
- Q.26: Write the importance of standard hydrogen electrode, (SHE). 3 Times
- Q.27: SHE acts as an anode when connected with copper (Cu) electrode but as cathode with Zinc (Zn) electrode. Why? 13 Time

The Electrochemical Series

- Q.28: What is electrochemical series? Give its four application. 10 Times
- Q.29: Give any two applications of electrochemical series. 1 Time
- Q.30: What is meant by electromotive force (emf) of cell? 4 Times
- Q.31: Feasibility of chemical reaction can be predicted by electrochemical series. Justify. 2 Times
- Q.32: How relative chemical reactivity of metals is studied with the help of electrochemical series? 3 Times

Modern Batteries and Fuel Cells

- Q.33: What are primary cells? Give two examples. 1 Time



- Q.34: What are secondary cells? Give their two examples. 1 Time
- Q.35: Lead accumulator is a chargeable battery. Justify it. 7 Time
- Q.36: Describe Cathode-reactions which occur during discharging of lead accumulator battery. 8 Time
- Q.37: A porous plate or a salt bridge is not required in lead storage cell given reason. 6 Times
- Q.38: Write down reactions taking place in alkaline battery. 6 Times
- Q.39: Give anodic and cathodic reactions of silver oxide battery. 3 Times
- Q.40: Write chemical reaction taken place in NICAD cell. 3 Times
- Q.41: Write two advantages of Fuel cell. 3 Times
- Q.42: Na^+ and K^+ can displace hydrogen from acids but Pt, Pd and Cu can not explain. 8 Times
- Q.43: The standard oxidation potential of Zn is 0.76 V and its reduction potential is -0.76V. Why? 5 Times

Unit 11: Reaction Kinetics

Introduction

- Q.1: What is rate of reaction, also give name of four physical methods used to determine the rate of reaction? 11 Time
- Q.2: The unit of rate constant of a second order reaction is $\text{dm}^{-3}\text{mol}^{-1}\text{S}^{-1}$, but the unit of rate of reaction is $\text{mole dm}^{-3}\text{S}^{-1}$. Justify. 3 Times
- Q.3: Rate of reaction decreases with the passage of time. Explain it. 3 Times
- Q.4: Differentiate between Average and instantaneous rate of reaction. 14 Times
- Q.5: What is specific rate constant or velocity constant? 8 Times
- Q.6: What is meant by order of reaction? Give an example. 9 Times
- Q.7: Define order of reaction and specific rate constant. 6 Times
- Q.8: Define first order reaction with example. 3 Times
- Q.9: What is pseudo first order reaction? Give an example. 11 Time
- Q.10: What is Zero-order reaction? Give one example. 6 Times
- Q.11: Define with example 2nd order reaction. 1 Time
- Q.12: The radioactive decay is always a first order reaction. Justify. 15 Time
- Q.13: The sum of the coefficients of a balanced chemical equation is not necessarily important to give the order of a reaction. 2 Times
- Q.14: Define half life period. How it is used to determine the order of reaction? 16 Times
- Q.15: What are reaction intermediates? 1 Time
- Q.16: Write names of physical methods to determine the rate of reaction. 3 Times
- Q.17: How rate of reaction is determined by electrical conductivity method? 2 Times



- Q.18: Write Spectrometry and Optical Rotation Method for the determination of rate of reaction. 1 Time

Energy Activation

- Q.19: What do you mean by Activation Complex of a reaction? 3 Times
 Q.20: What do you mean by activation energy? 11 Time
 Q.21: Under what conditions activated complex is formed? 1 Time
 Q.22: What is the effect of temperature on energy of activation of a reaction?

Factors Affecting Rates of Reactions

- Q.23: How the rates of reaction depend upon the nature of reactants? 3 Times
 Q.24: Justify that rate of chemical reaction is an ever changing parameter under the given conditions. 4 Times
Q.25: What is effect of surface are on rate of reaction? 9 Times
 Q.26: What is effect of light on the rate of reaction? 3 Times
 Q.27: How does Arrhenius equation helps us to calculate the energy of activation of a reaction? 1 Time

Catalysis

- Q.28: What is catalyst? And what is catalysis? 3 Times
Q.29: Differentiate between homogeneous catalysis and heterogeneous catalysis. 26 Times
 Q.30: How does a catalyst affect a reversible reaction? 3 Times
 Q.31: What is catalysis? Name its two types. 3 Times
 Q.32: Describe two characteristics of a catalyst. 4 Times
 Q.33: What is negative catalysis? Give one example. 6 Times
 Q.34: A finely divided catalyst may prove more effective. Give reason. 6 Times
Q.35: How catalyst is specific in its action? 10 Times
Q.36: What is poisoning of a catalyst? 10 Time
Q.37: Define the terms (i) Promotor (ii) Auto catalyst 11 Time
 Q.38: What is meant by a statement "catalyst for catalyst"? 5 Times
 Q.39: What is enzyme catalyst? Give an example. 4 Times
 Q.40: Give two characteristics of enzyme catalysis. 7 Times
 Q.41: Enzymes are specific in action justify. 4 Times
 Q.42: What do you mean by inhibitor? Give an example. 1 Time

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