

CHEMISTRY  
GROUP : FIRST

NOTE: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

## QUESTION NO. 1

- 1 A limiting reactant is one which  
(A) is taken in lesser quantity in grams as compared to other reactants  
(B) is taken in lesser quantity in volume as compared to the other reactants  
(C) Gives the maximum amount of the product which is required  
(D) Gives the minimum amount of the product under consideration
- 2 The branch of chemistry which tells us the quantitative relationship between reactants and products is called  
(A) Stoichiometry (B) Thermometry (C) Organic chemistry (D) Physical chemistry
- 3 Solvent extraction method is a particularly useful technique for separation when the product to be separated is  
(A) Non volatile or thermally unstable (B) Volatile or thermally stable  
(C) Non volatile or thermally stable (D) Volatile or thermally unstable
- 4 Temperature and number of moles are kept constant in  
(A) Boyle's law (B) Charles's law (C) Avogadro's law (D) Dalton's law of partial pressure
- 5 Equal masses of methane and oxygen are mixed in an empty container at 25 °C. The fraction of total pressure exerted by oxygen is  
(A)  $\frac{1}{3}$  (B)  $\frac{8}{9}$  (C)  $\frac{1}{9}$  (D)  $\frac{16}{17}$
- 6 NH<sub>3</sub> shows a maximum boiling point among the hydrides of Vth group elements due to  
(A) Very small size of nitrogen (B) Lone pair of electrons present in nitrogen  
(C) Enhanced electronegative character of nitrogen (D) Pyramidal structure of NH<sub>3</sub>
- 7 Amorphous solids  
(A) Have sharp melting points (B) Good conductivity in solid state  
(C) Have perfect arrangement of atoms (D) Can possess small regions of orderly arrangement of atoms
- 8 Mass of an electron is  
(A)  $9.1095 \times 10^{-31}$  kg (B)  $6.022 \times 10^{23}$  (C)  $6.022 \times 10^{22}$  (D)  $10.10 \times 10^{30}$
- 9 The velocity of photon is  
(A) Independent of its wave length (B) Depends on its wave length (C) Equal to square of its amplitude  
(D) Depends on its source
- 10 Minimum amount of energy required to remove an electron from its gaseous atom is called  
(A) Ionization energy (B) Electron - Affinity (C) Oxidation (D) Reduction
- 11 Methane molecule contains type of hybridization  
(A) SP (B) SP<sup>2</sup> (C) SP<sup>3</sup> (D) dSP<sup>2</sup>
- 12 The property of a system which has some definite values for initial and final states is called  
(A) State (B) State function (C) System (D) Surroundings
- 13 The reaction which proceeds in both forward and backward directions is called  
(A) Irreversible reaction (B) Reversible reaction (C) Spontaneous reaction (D) Non spontaneous reaction
- 14 The pH of 10<sup>-3</sup> moles of an aqueous solution of H<sub>2</sub>SO<sub>4</sub> is  
(A) 3.0 (B) 2.7 (C) 2.0 (D) 1.5
- 15 Osmotic pressure is an example of  
(A) Colligative properties (B) Additive properties (C) Constitutive properties (D) Internal energy
- 16 Stronger the oxidizing agent greater is the  
(A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.M.F of the cell
- 17 If the rate equation of the reaction 2A + B → products is rate = k [A]<sup>2</sup>[B], and A is, present in large excess, the order of the reaction is  
(A) 1 (B) 2 (C) 3 (D) 4

QUESTION NO. 2 Write short answers of any Eight (8) parts of the following

16

1	N <sub>2</sub> and CO have the same number of electrons, protons and neutrons
2	Law of conservation of mass has to be obeyed during stoichiometric calculations, explain
3	Why actual yield is always less than theoretical yield?
4	Write down any two uses of chromatography
5	In solvent extraction technique, why repeated extraction using small portions of solvent are more efficient than using a single extraction but larger volume of solvent
6	Write formulas to interconvert various scales of temperature
7	State Dalton's law of partial pressures
8	Write down two characteristics of plasma
9	How density of an ideal gas can be calculated from ideal gas equation?
10	Write two points of differences between ideal and non-ideal solutions
11	State Raoult's law in any two forms
12	What are Colligative properties? Why are they called so?

QUESTION NO. 3 Write short answers of any Eight (8) parts of the following

16

1	Why ethyl alcohol is soluble in water?
2	Why HF is a weaker acid than HCl?
3	What is Habit of crystal?
4	What is meant by geometrical shape of solid?
5	What are canal rays?
6	What is reason for production of positive rays?
7	What is planks constant? Give its value
8	What is defect of Rutherford's atomic model
9	Why do we need Buffer Solutions?
10	What is effect of catalyst on equilibrium constant?
11	Define rate of reaction and give its units
12	What is Half life period of a reaction?

QUESTION NO. 4 Write short answers of any Six (6) parts of the following

12

1	Write two causes of chemical combination
2	What is the difference between ionic Radii and covalent Radii?
3	Define ionization energy. Give one example
4	Differentiate between Bonding and Anti-Bonding molecular orbital
5	Differentiate between system and surrounding
6	Define Enthalpy of atomization. Give one example
7	Calculate the Oxidation Number of Manganese in KMnO <sub>4</sub>
8	Write the difference between ionization and electrolysis
9	Explain that a salt bridge maintains the neutrality in the cell

## SECTION-II

Note: Attempt any Three questions from this section

8 x 3 = 24

Q.5 (A)	Define hydrogen bonding. Explain any three applications of hydrogen bonding
(B)	Calculate the number of grams of K <sub>2</sub> SO <sub>4</sub> and water produced when 14 g of KOH are reacted with excess of H <sub>2</sub> SO <sub>4</sub> . Also calculate the number of molecules of water produced
Q.6 (A)	Discuss in detail the practical applications of Daltons law of partial pressure
(B)	Give the characteristics of cathode rays
Q.7 (A)	Explain structure of CH <sub>4</sub> and CH <sub>2</sub> = CH <sub>2</sub> by atomic Hybridization process
(B)	State Hess's law and explain it with at least two examples
Q.8 (A)	N <sub>2</sub> and H <sub>2</sub> gases combine to give ammonia (NH <sub>3</sub> ) gas. The value of equilibrium constant (K <sub>c</sub> ) for this reaction at 500 °C is 6 × 10 <sup>-2</sup> . Calculate the value of K <sub>p</sub> for this reaction
(B)	Name any three methods for finding order of a reaction and explain half life method
Q.9 (A)	Write not on elevation of Boiling point of a solution and relate it with molecular mass of solute in a solution
(B)	Explain working of voltaic cell along with its diagram

CHEMISTRY  
GROUP : SECOND

NOTE: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

## QUESTION NO. 1

- |    |   |
|----|---|
| 1  | Isotopes differ in<br>(A) Properties which depend upon mass (b) Arrangement of electrons in orbitals (C) Chemical properties (D) The extent to which they may be affected in electromagnetic field  |
| 2  | 27 g of Al will react completely with how much mass of O <sub>2</sub> to produce Al <sub>2</sub> O <sub>3</sub><br>(A) 8 g of oxygen (B) 16 g of oxygen (C) 32 g of oxygen (D) 24 g of oxygen   |
| 3  | Solvent extraction method is a particularly useful technique for separation when the product to be separated is<br>(A) Non volatile or thermally unstable (B) Volatile or thermally stable<br>(C) Non volatile or thermally stable (D) Volatile or thermally unstable   |
| 4  | Number of molecules in one dm <sup>3</sup> of water is close to<br>(A) $\frac{6.02}{22.4} \times 10^{23}$ (B) $\frac{12.04}{22.4} \times 10^{23}$ (C) $\frac{18}{22.4} \times 10^{23}$ (D) $55.6 \times 6.02 \times 10^{23}$  |
| 5  | Which of the following will have the same number of molecules at STP ?<br>(A) 280 cm <sup>3</sup> of CO <sub>2</sub> and 280 cm <sup>3</sup> of N <sub>2</sub> O (B) 11.2 dm <sup>3</sup> of O <sub>2</sub> and 32 g of O <sub>2</sub><br>(C) 44 g of CO <sub>2</sub> and 11.2 dm <sup>3</sup> of CO (D) 28 g of N <sub>2</sub> and 5.6 dm <sup>3</sup> of oxygen |
| 6  | When water freezes at 0 °C, its density decreases due to<br>(A) Cubic structure of ice (B) Empty spaces present in the structure of ice<br>(C) Change of bond lengths (D) Change of bond angles   |
| 7  | Amorphous solids<br>(A) Have sharp melting points (B) Undergo clean cleavage when cut with knife<br>(C) Have perfect arrangement of atoms (D) Can possess small regions of orderly arrangement of atoms   |
| 8  | Orbitals having same energy are called<br>(A) Hybrid orbitals (B) Valence orbitals (C) Degenerate orbitals (D) d orbitals   |
| 9  | The wave number of light emitted by a certain source is $2 \times 10^6 \text{ m}^{-1}$ . The wavelength of this light will be<br>(A) 500 nm (B) 500 m (C) 200 nm (D) $5 \times 10^7 \text{ m}$  |
| 10 | The amount of energy released by absorbing electron in the valence shell is<br>(A) Ionization energy (B) Electron affinity (C) Electronegativity (D) Atomization energy   |
| 11 | The bond angle in ammonia molecule is<br>(A) 109.5° (B) 107.5° (C) 104.5° (D) 180°  |
| 12 | The net heat change in a chemical reaction is same wheather it is brought about in two or more different ways in one or several steps. It is known as<br>(A) Henry's Law (B) Joule's Principle (C) Hess's Law (D) Law of conservation of energy   |
| 13 | The term pH was introduced by<br>(A) Henderson (B) Millikan (C) Le-Chatilier (D) Sorenson   |
| 14 | In Haber process, for formation of NH <sub>3</sub> , the process used is<br>(A) 100 atm (B) 200-300 atm (C) 600 atm (D) 1000 atm  |
| 15 | The molal boiling point constant is the ratio of the elevation of boiling point to<br>(A) Molarity (B) Molality (C) Mole fraction of solvent (D) Mole fraction of solute  |
| 16 | Stronger the oxidizing agent, greater is the<br>(A) Oxidation potential (B) Reduction potential (C) Redox potential (D) E.M.F of cell   |
| 17 | In zero order reaction, the rate is independent of<br>(A) Temperature of reaction (B) Concentration of reactants (C) Concentration of product<br>(D) Nature of product  |

24-92-21

QUESTION NO. 2 Write short answers of any Eight (8) parts of the following 16

1	Why 23 g of Na and 238 g of uranium have equal number of atoms in them ?
2	How Mg-atom is twice heavier than that of C-atom ? Explain
3	Define gram formula giving one example
4	What do you mean by partition chromatography ?
5	Define sublimation with an example
6	Write any two applications of plasma
7	Why pilots feel uncomfortable breathing at higher altitude and divers cannot use normal air ?
8	Deduce the SI unit of 'R'
9	What are isotherms ? What happens to the positions of isotherms when they are plotted at high temperature ?
10	Why the relative lowering of vapour pressure is independent of temperature ?
11	What is ebullioscopic constant ?
12	Define solubility with a suitable example

QUESTION NO. 3 Write short answers of any Eight (8) parts of the following 16

1	Draw the shape, axes and angles of Hexagonal System
2	Define Allotropy, with an example
3	In a very cold winter the fish in garden ponds owe their lives to hydrogen bonding ? Justify
4	Define Debye forces, give an example
5	Differentiate between continuous spectrum and line spectrum
6	Write down any two defects of Bohr's Atomic Model
7	Give any two postulates / points of Planck's Quantum theory
8	What is magnetic quantum number ? Give its value
9	Justify mixture of sodium acetate and acetic acid gives us the acidic buffer
10	Define common ion effect, with an example
11	Differentiate between Activated complex and Activation Energy
12	What is half life period ? Give an example

QUESTION NO. 4 Write short answers of any Six (6) parts of the following 12

1	Find out the oxidation number of chromium in chromium chloride (CrCl <sub>3</sub> )
2	What is the basic difference between Galvanic cell and electrolytic cell ?
3	Give difference between metallic and electrolytic conduction
4	Why it is necessary to mention physical state of reactants and products in a thermo chemical equation ?
5	Define the standard enthalpy of atomization by giving an example
6	Define Oxidizing agent, Justify with an example
7	Why oxygen molecule show paramagnetic behaviour
8	Distinguish between sigma and Pi bond
9	Predict the shapes of following molecules according to VSEPR Theory (i) Water (ii) BeCl <sub>2</sub>

## SECTION-II

Note: Attempt any Three questions from this section

8 x 3 = 24

Q.5 (A)	Mg metal reacts with HCl to give hydrogen gas. What is the minimum volume of HCl solution (27 % by weight) required to produce 12.1 g of H <sub>2</sub> . The density of HCl solution is 1.14 g/cm <sup>3</sup> $\text{Mg}_{(s)} + 2 \text{HCl}_{(aq)} \rightarrow \text{MgCl}_{2(aq)} + \text{H}_{2(g)}$
(B)	Define H - bonding, explain any three applications of H - bonding
Q.6 (A)	What is Kinetic Interpretation of temperature ? Explain
(B)	Derive a relation for the energy of the revolving electron
Q.7 (A)	Discuss the structure of CH <sub>4</sub> and NH <sub>3</sub> by orbital Hybridization Method
(B)	Calculate Lattice energy of NaCl by Born - Haber Cycle
Q.8 (A)	Calculate pH of (i) 10 <sup>-4</sup> mol dm <sup>-3</sup> of Ba(OH) <sub>2</sub> (ii) 1.0 mol dm <sup>-3</sup> of NH <sub>4</sub> OH which is 1 % dissociated
(B)	Explain half life method to find out order of a reaction
Q.9 (A)	Describe Beckmann's freezing point method for measurement of ΔT <sub>f</sub>
(B)	Describe the electrolysis of molten sodium chloride and a concentrated solution of sodium chloride