

**CHEMISTRY PAPER-I GROUP-I MTN-41-21** TIME ALLOWED: 20 Minutes  
**OBJECTIVE** MAXIMUM MARKS: 17

**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 bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

## Q.No.1

- (1) For which system does the equilibrium constant,  $K_C$  has units of (concentration)<sup>-1</sup> ?  
 (A)  $N_2 + 3H_2 \rightleftharpoons 2NH_3$  (B)  $H_2 + I_2 \rightleftharpoons 2HI$   
 (C)  $2NO_2 \rightleftharpoons N_2O_4$  (D)  $2HF \rightleftharpoons H_2 + F_2$
- (2) The molal boiling point constant is the ratio of the elevation in boiling point to:  
 (A) Molarity (B) Molality (C) Mole fraction of solvent (D) Mole fraction of solute
- (3) If a strip of Cu metal is placed in a solution of  $FeSO_4$  :  
 (A) Cu will be deposited (B) Fe is precipitated out  
 (C) Cu and Fe both dissolve (D) No reaction takes place
- (4) In zero order reaction, the rate is independent of:  
 (A) Temperature of reaction (B) Concentration of reactants  
 (C) concentration of products (D) None of these
- (5) The comparative rates at which the solutes move in paper chromatography, depend upon:  
 (A) The size of paper (B)  $R_f$  values of solutes  
 (C) Temperature of the experiment (D) Size of the chromatographic tank used
- (6) A pair of elements having single isotope are:  
 (A)  ${}^9F^{19}$ ,  ${}^{79}Au^{197}$  (B)  ${}^{53}I^{127}$ ,  ${}^{35}Br^{81}$  (C)  ${}^8O^{16}$ ,  ${}^7N^{14}$  (D)  ${}^{33}As^{75}$ ,  ${}^7N^{14}$
- (7) 1 mole of  $CH_3OH$  and  $C_2H_5OH$  have:  
 (A) Equal number of molecules (B) Equal number of atoms  
 (C) Equal number of ions (D) Equal number of protons
- (8) Dalton's law of partial pressure can be derived from:  
 (A) Avogadro's law (B) General gas equation (C) Charles's law (D) All of these
- (9) At absolute zero total Kinetic energy of gas molecules is:  
 (A) Maximum (B) Zero (C) Never becomes lower than 20 KJ (D) Minimum
- (10) Deby forces are also called:  
 (A) Dipole-dipole forces (B) Dipole-Induced dipole forces (C) London forces (D) Ion-dipole forces
- (11) Acetone and chloroform are soluble in each other due to:  
 (A) Intermolecular H - bonding (B) Ion-dipole interaction  
 (C) Instantaneous dipole forces (D) All of these
- (12) The total number of Fundamental particles in an atom of Carbon - 14 is:  
 (A) 6 (B) 8 (C) 14 (D) 20
- (13) Bohr model of an atom is contradicted by:  
 (A) Plank's quantum theory (B) Dual nature of matter  
 (C) Heisenberg Uncertainty Principle (D) All of these
- (14) Among the following quantum a pair of molecule having similar geometry:  
 (A)  $BF_3$ ,  $NH_3$  (B)  $BF_3$ ,  $AlF_3$  (C)  $BeF_2$ ,  $H_2O$  (D)  $BCl_3$ ,  $PCl_3$
- (15) Which one of following has the highest bond order?  
 (A)  $O_2^{+1}$  (B)  $O_2^{+2}$  (C)  $O_2^{-1}$  (D)  $O_2^{-2}$
- (16) Energy of universe remains constant it is called:  
 (A) First law of thermodynamics (B) First law of thermochemistry  
 (C) Second law of thermochemistry (D) Second law of thermodynamics
- (17) Which statement about the following equilibrium is correct?  
 $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)} \quad \Delta H = -188.3 \text{ KJ mol}^{-1}$   
 (A) The  $K_p$  value falls with a rise in temperature (B) The  $K_p$  value falls with increasing pressure  
 (C) Adding  $V_2O_5$  catalyst increase the equilibrium yield of  $SO_3$  (D) The  $K_p$  value is equal to  $K_C$

INTERMEDIATE PART-I (11<sup>th</sup> CLASS)

CHEMISTRY PAPER-I GROUP-I **MTN-41-21** TIME ALLOWED: 2.40 Hours  
**SUBJECTIVE** MAXIMUM MARKS: 68

NOTE: - Write same question number and its part number on answer book,  
as given in the question paper.

SECTION-I

2. **Attempt any eight parts.** 8 × 2 = 16
- Write assumptions of stoichiometry.
  - Why does actual yield is always less than theoretical yield?
  - Define Avogadro's number and give one example.
  - Define  $R_f$  value (retardation factor).
  - What are different types of chromatography?
  - Derive numerical value of gas constant  $R$  in S.I units.
  - Derive an expression for calculating density of a gas from general gas equation.
  - Explain Avogadro's law by giving one example.
  - State Dalton's Law of Partial Pressure.
  - What are different types of solubility curves?
  - Write names of different types of colligative properties of solutions.
  - Explain hydration energy of ions briefly.
3. **Attempt any eight parts.** 8 × 2 = 16
- What are Debye forces?
  - Why  $HF$  has lower boiling point than  $H_2O$ ?
  - What are crystalline solids?
  - What is a unit cell?
  - What is atomic absorption spectrum?
  - What is Stark effect?
  - What is uncertainty principle?
  - Calculate wavelength of electron moving with velocity  $2.188 \times 10^6 \text{ ms}^{-1}$ .
  - What are conditions to maximize yield of  $NH_3$ ?
  - How  $K_C$  is used to find the direction of reaction?
  - What is reaction intermediate, give example?
  - Define order of reaction, with example.
4. **Attempt any six parts.** 6 × 2 = 12
- Explain with reason that  $\pi$  bonds are more diffused than  $\sigma$  bonds.
  - Ionization energy decreases down the group and increases along the period, give reason.
  - Write two postulates of VSEPR theory.
  - Prove  $\Delta E = qv$
  - Prove  $qp = \Delta H$
  - Define covalent bond. Give one example.
  - Calculate the oxidation number of  $Mn$  in  $KMnO_4$ .
  - What is function of salt bridge in Galvanic cell?
  - What is difference between oxidation and reduction process, give one example of each?

SECTION-II

NOTE: **Attempt any three questions.** 3 × 8 = 24

- 5.(a) 10g of  $H_3PO_4$  has been dissolved in excess of water to dissociate it completely into ions.  
Calculate (i) masses of individual ions  
(ii) number of positive and negative charges dispersed in solution 4
- (b) Give uses of liquid crystals. 4
- 6.(a) What is Boyle's law of gases? Give its experimental verification. 4
- (b) What is spectrum? Differentiate between continuous spectrum and line spectrum. 4
- 7.(a) Explain atomic orbital hybridization with reference to structures for  $C_2H_4$  and  $C_2H_2$ . 4
- (b) Define the following enthalpies and give one example for each.  
(i) standard enthalpy of atomization (ii) standard enthalpy of formation 4
- 8.(a) Define the following terms: 4  
(i) Instantaneous rate (ii) Specific rate constant (iii) order of reaction (iv) Activated complex
- (b)  $N_{2(g)}$  and  $H_{2(g)}$  combine to give  $NH_{3(g)}$ . The value of  $K_C$  in this reaction at  $500^\circ C$  is  $6.0 \times 10^{-2}$ .  
Calculate the value of  $K_p$  for this reaction. 4
- 9.(a) What do you mean by depression of freezing point and describe Beckmann's method  
for measurement of depression of freezing point. 4

**CHEMISTRY PAPER-I GROUP-II MTN-92-21** TIME ALLOWED: 20 Minutes  
**OBJECTIVE** MAXIMUM MARKS: 17

**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 bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. No credit will be awarded in case BUBBLES are not filled. Do not solve question on this sheet of OBJECTIVE PAPER.

## Q.No.1

- (1) Total number of electrons in  $f$  orbital is:  
 (A) 14 (B) 10 (C) 6 (D) 2
- (2) Bohr model of atom is contradicted by:  
 (A) Plank's quantum theory (B) Dual nature of matter  
 (C) Heisenberg's uncertainty principle (D) All of these
- (3) The bond order of  $He_2$  is:  
 (A) Two (B) Three (C) Zero (D) One
- (4) How many types of bonds in  $NH_4Cl$  are:  
 (A) One type (B) Two types (C) Three types (D) Four types
- (5)  $\sum \Delta H$  (cycles) = 0 The above law is known as:  
 (A) Henry's law (B) Hess's law (C) Kohlarus law (D) Darwins law
- (6)  $2O_3 \rightleftharpoons 3O_2$   $K_C$  at  $25^\circ C$  is:  
 (A)  $10^{55}$  (B)  $10^{-13}$  (C) 2.5 (D)  $10^4$
- (7) Among the following which equation has no unit of  $K_C$ :  
 (A)  $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$  (B)  $PCL_5 \rightleftharpoons PCL_3 + Cl_2$   
 (C)  $CH_3 - \overset{\overset{O}{\parallel}}{C} - OC_2H_5 + H_2O \xrightleftharpoons{H^+} CH_3 - \overset{\overset{O}{\parallel}}{C} - OH + C_2H_5OH$   
 (D)  $N_2O_4 \rightleftharpoons 2NO_2$
- (8) The correct equation of Raoult's law:  
 (A)  $\frac{\Delta p}{p^0} = X_2$  (B)  $\frac{\Delta p}{p^0} = X_1$  (C)  $\frac{p^0}{\Delta p} = X_2$  (D)  $\frac{p^0}{\Delta p} = x_2 - x_1$
- (9) The standard redox potential of following reaction is  $Zn^{2+} + 2e^- \longrightarrow Zn$   
 (A)  $-0.76 V$  (B)  $2.87 V$  (C)  $-0.026 V$  (D)  $-3.045 Volt$
- (10) The order of following reaction is  $CHCl_3(l) + Cl_{2(g)} \longrightarrow CCl_4(l) + HCl(g)$   
 (A) 1<sup>st</sup> (B) 1.5 (C) 2.5 (D) Zero
- (11) In 98g of sulphuric acid  $H_2SO_4$  number of  $O$  atoms:  
 (A)  $6.02 \times 10^{23}$  (B)  $2.408 \times 10^{24}$  (C)  $1.2 \times 10^{24}$  (D)  $6.02 \times 10^{24}$
- (12)  $S_n$  (Tin) has number of isotopes:  
 (A) 10 (B) 11 (C) 5 (D) 6
- (13) The solvent extraction technique is particularly useful when the product is:  
 (A) Volatile and thermally unstable (B) Volatile and thermally stable  
 (C) Non volatile and thermally stable (D) Non volatile and thermally unstable
- (14) Kinetic equation  $PV = \frac{1}{3} mNc^2$  is derived by:  
 (A) Maxwell (B) Boltzmann (C) Clausius (D) Bernulli
- (15) The sun is a \_\_\_\_\_ ball of plasma heated by nuclear fusion process.  
 (A) 1.5 million kilometer (B) 1.5 billion kilometer (C) 3 million kilometer (D) None of these
- (16) The order of acidic strength:  
 (A)  $HF > HCl > HBr > HI$  (B)  $HCl > HF > HI > HBr$   
 (C)  $HI > HBr > HCl > HF$  (D)  $HBr > HF > HI > HCl$
- (17) London dispersion forces are the only forces present among:  
 (A) The molecules of  $H_2O$  in liquid state at high temperature  
 (B) The atoms of Helium in gaseous state at high temperature

INTERMEDIATE PART-I (11<sup>th</sup> CLASS)

CHEMISTRY PAPER-I GROUP-II MTN-62-21 TIME ALLOWED: 2.40 Hours

SUBJECTIVE

MAXIMUM MARKS: 68

NOTE: - Write same question number and its part number on answer book,  
as given in the question paper.

SECTION-I

2. Attempt any eight parts. 8 × 2 = 16

- (i) Why actual yield is always less than theoretical yield?
- (ii) Define limiting reactant with an example.
- (iii) Define Stoichiometry.
- (iv) Give examples of subliming solids.
- (v) What are three ways used for paper chromatography?
- (vi) State Boyle's law with its equation.
- (vii) State Charles's law with its equation.
- (viii) Briefly derive general gas equation.
- (ix) Derive value of 'R' in S.I units.
- (x) Define heat of solution with one example.
- (xi) Justify all solutions containing 1 mole of non-volatile, non-electrolyte solutes in same solvent will have the same freezing point depression.
- (xii) What is Raoult's Law?

3. Attempt any eight parts. 8 × 2 = 16

- (i) Explain Dipole-Dipole forces in chloroform ( $CHCl_3$ ).
- (ii) Describe solubility of Hydrogen bonded molecules.
- (iii) Define polymorphism. Write one example.
- (iv) Describe triclinic system. Give its dimensions.
- (v) Why positive rays are called canal rays?
- (vi) Differentiate between frequency and wave length.
- (vii) Describe atomic emission spectrum.
- (viii) State Heisenberg's uncertainty principle. Write its mathematical form.
- (ix) Define acid and base according to Lowry Bronsted.
- (x) Define Buffer solutions. Write its two characteristics.
- (xi) Define rate of reaction. Write its unit.
- (xii) What is Pseudo first order reaction? Give one example.

4. Attempt any six parts. 6 × 2 = 12

- (i) Define polar covalent bond. Give two examples.
- (ii) Differentiate between covalent bond and co-ordinate covalent bond.
- (iii) Discuss  $AB_2$  type molecules in the light of VSEPR theory. Give two examples.
- (iv) Define atomic orbital hybridization. Name its two types.
- (v) Differentiate between system and surroundings.
- (vi) State first law of thermodynamics. Also define enthalpy of a system.
- (vii) What is Standard Hydrogen Electrode(SHE)? Explain with the help of diagram.
- (viii) Define electrochemical series.
- (ix) Calculate the oxidation number of chromium in the following compounds.  
(a)  $K_2Cr_2O_7$                       (b)  $K_2CrO_4$

SECTION-II

NOTE: Attempt any three questions. 3 × 8 = 24

- 5.(a) What are liquid crystals? Give their uses in daily life. 4
- (b) Magnesium metal reacts with  $HCl$  to give hydrogen gas. What is minimum volume of  $HCl$  solution (27% by weight) required to produce 12.1g of  $H_2$ . The density of  $HCl$  solution is  $1.14 g/cm^3$   $Mg_{(s)} + 2HCl_{(aq)} \longrightarrow MgCl_{2(aq)} + H_{2(g)}$  4
- 6.(a) Derive Boyle's and Charles's law with the help of kinetic theory of gases. 4
- (b) Explain Rutherford's atomic model. Give its defects. 4
- 7.(a) Define  $sp^3$  hybridization. Draw the structure of ammonia molecule according to hybridization concept. 4
- (b) Explain the following terms: 4  
(i) Standard heat of Neutralization              (ii) Standard Enthalpy of solution
- 8.(a) What's the percentage Ionization of acetic acid in a solution in which 0.1 mole of it has been dissolved per  $dm^3$  of solution while  $K_a$  of acetic acid is  $1.85 \times 10^{-5}$ . 4
- (b) Explain the Rate determining step with suitable example. 4