1124 Warning:- Please write your Roll No. in the space provided and sign Roll No-------------------
(Inter Part – I)   (Session 2020-22 to 2023-25)   Sig. of Student -------------------
Chemistry (Objective)   (Group - I)   Paper (I) SGD-1-24
Time Allowed:- 20 minutes   **PAPER CODE 2485**   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 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. Write **PAPER CODE**, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) The Cathodic reaction in the electrolysis of dil. H_2SO_4 with Pt electrode is
   (A) Reduction   (B) Oxidation   (C) Both reduction and Oxidation   (D) Neither oxidation nor reduction

2) Catalyst for a catalyst is also called
   (A) Promotor   (B) Inhibitor   (C) Poisoning   (D) Retarder

3) 27 g of $A\ell$ will react completely with how much mass of O_2 to produce $A\ell_2O_3$
   (A) 8 gm of oxygen   (B) 16 gm of oxygen   (C) 32 gm of oxygen   (D) 24 gm of oxygen

4) The mass of one mole of electron is
   (A) 1.008 mg   (B) 0.55 mg   (C) 0.184 mg   (D) 1.673 mg

5) The comparative rates at which the solute moves in paper chromatography, depends on
   (A) The size of paper   (B) R_f values of solute   (C) Temperature of the experiment   (D) Size of chromatographic tank used

6) During the process of crystallization, the hot saturated solution
   (A) Is cooled very slowly to get large size crystals   (B) Is cooled at a moderate rate to get medium sized crystals   (C) Is evaporated to get the crystals of the product   (D) Is mixed with an immiscible liquid

7) The molar volume of CO_2 is maximum at
   (A) STP   (B) 127°C and 1atm   (C) 0°C and 2atm   (D) 273°C and 2atm

8) Which of the following will have same number of molecules at STP
   (A) 280 cm³ of CO_2 and 280 cm³ of N_2O (B) 11.2 dm³ of O_2 and 32g of O_2 (C) 44g of CO_2 and 11.2 dm³ of CO_2 (D) 28g of N_2 and 5.6 dm³ of oxygen

9) Acetone and chloroform are soluble into each other due to
   (A) Intermolecular hydrogen bonding   (B) Ion dipole interaction   (C) Instantaneous dipole   (D) Hydrolysis

10) Which of the following pair do not show isomorphism
   (A) $NaNO_3$, KNO_3 (B) $ZnSO_4$, $NiSO_4$ (C) Cu, Ag   (D) $NaCl$, $CuCl_2$

11) Which of the following sub-atomic particle do not show ionization
   (A) Electron   (B) Proton   (C) Neutron   (D) Alpha ray

12) When 6d orbital is complete, the entering electron goes into
   (A) 7f   (B) 7s   (C) 7p   (D) 7d

13) The type of hybridization in molecule of ethene ($CH_2 = CH_2$) is
   (A) sp   (B) sp^3 (C) sp^2 (D) dsp

14) Which of the following compounds possess ionic bonding
   (A) CaO   (B) CH_4 (C) CH_3Cl (D) C_2H_6

15) The change in heat energy of a chemical reaction at a constant temperature and pressure is called
   (A) Enthalpy change   (B) Bond energy   (C) Heat of sublimation   (D) Internal energy

16) For which system, does the equilibrium constant (K_c) has units of (Concentration)$^{-1}$
   (A) $N_2 + 3H_2 \rightleftharpoons 2NH_3$ (B) $H_2 + I_2 \rightleftharpoons 2HI$ (C) $2NO_2 \rightleftharpoons N_2O_4$ (D) $2HF \rightleftharpoons H_2 + F_2$

17) Colligative properties are the properties of
   (A) Dilute solutions which behaves as nearly ideal solutions   (B) Concentrated solutions which behaves as nearly non-ideal solutions   (C) Both A and B   (D) Neither A nor B

Chemistry (Subjective) (Session 2020-22 to 2023-25) Group (I) Paper (I)

Time Allowed: 2.40 hours Section ---------------- I Maximum Marks: 68

2. **Answer briefly any Eight parts from the followings:-** 8 × 2 = 16

SGD-1-24

(i) Calculate percentage of phosphorus and Nitrogen in $(NH_4)_2HPO_4$

(ii) 10g of Magnesium and 5g of Carbon have equal number of atoms. Justify.

(iii) Define Stoichiometry. Give its basic conditions.

(iv) Differentiate between Qualitative and Quantitative analysis.

(v) Write down method to separate iodine from its aqueous solution.

(vi) How cooling can be done for Crystallization? (Any two methods)

(vii) Water vapours don't behave ideally at 273 K . Explain with reason.

(viii) Calculate the value of "R" in ideal gas equation. (Any units)

(ix) Give characteristics of Plasma. **(x)** Calculate the pH of 10^{-4} mol.dm^{-3} of $Ba(OH)_2$

(xi) Write down K_c units for the following reaction $PCl_{5\,(g)} \rightleftharpoons PCl_{3\,(g)} + Cl_{2\,(g)}$

(xii) Explain that a Mixture of NH_4OH and NH_4Cl gives us a basic buffer.

3. **Answer briefly any Eight parts from the followings:-** 8 × 2 = 16

(i) Why diamond is hard and electrical insulator.

(ii) Heat of sublimation of substance is greater than it's heat of vaporization, give it's reason.

(iii) What are Debye forces. **(iv)** What is effect of temperature and surface area on evaporation.

(v) Calculate mass of electron from it's charge and e/m value.

(vi) How does neutron interact with $^{14}_{7}N$ and $^{65}_{29}Cu$

(vii) e/m value of positive rays depends on nature of gas which is used in discharge tube, explain it.

(viii) Differentiate between Zeeman effect and Stark effect.

(ix) Differentiate between molarity and molality. **(x)** Justify that aqueous solution of NaCl is neutral.

(xi) What is catalytical poisoning. **(xii)** Differentiate between homogenous catalysis and heterogenous catalysis.

4. **Answer briefly any Six parts from the followings:-** 6 × 2 = 12

(i) Write down the cause of chemical combination. **(ii)** Why atoms have no sharp boundary?

(iii) Why lone pair of electrons occupies more space than a bond pair?

(iv) Bond angle in NF_3 shrinks to $102°$ why? **(v)** What is meant by internal energy?

(vi) Define standard enthalpy of formation. Give example.

(vii) Define standard enthalpy of reaction. Give example.

(viii) Calculate oxidation number of Cr in Cr_2O_3.

(ix) A porous plate or a salt bridge is not required in lead storage cell. Why?

Section -------- II

Note: Attempt any three questions. (8 × 3 = 24)

5. **(a)** What is Stoichiometry? Give its assumptions? Mention two important Laws, which help to perform the Stoichiometric calculations?

(b) Define ionic solids. Discuss Any six properties of ionic solids in detail.

6. **(a)** A sample of Krypton with a volume of 6.25 dm^3, a pressure of 765 torr and a temperature of 20 °C is expanded to a volume of 9.55 dm^3 and a pressure of 375 torr. What will be its final temperature in °C

(b) Explain Millikan's oil drop experiment to determine the charge of an electron.

7. **(a)** Discuss sp^2-hybridization with example of ethene.

(b) Calculate the pH of a buffer solution in which 0.11 molar CH_3COONa and 0.09 molar acetic acid solution are present. K_a for CH_3COOH is 1.85×10^{-5}

8. **(a)** Define Hess's law of constant heat summation. How the enthalpy of formation of CO can be calculated with it.

(b) Describe fuel cell in detail with diagram.

9. **(a)** Explain the terms Molarity and Molality with their formulas.

(b) Write four characteristics of Enzyme catalysis.

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Chemistry   (Objective)   (Group - II)   Paper (I)
Time Allowed:- 20 minutes   **PAPER CODE 2488**   Maximum Marks:- 17

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SGD-2-24 Q.1

1) 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

2) During a redox reaction, an oxidizing agent
   (A) gains electrons   (B) is oxidized   (C) loses electrons   (D) Is hydrolyzed

3) If the rate equation of a reaction $2A + B \longrightarrow$ Products   is Rate = K[A][B], and A is present in large excess, then order of reaction is
   (A) 2.5   (B) 3   (C) 1.5   (D) 1

4) One dm^3 of N_2 at S.T.P contains about
   (A) 5.37×10^{22} atoms   (B) 3.01×10^{23} atoms   (C) 6.02×10^{23} atoms   (D) 2.68×10^{19} atoms

5) The number of moles of CO_2 which contain 8.0g of oxygen is
   (A) 0.25   (B) 0.50   (C) 1.0   (D) 1.50

6) The molar volume of CO_2 is maximum at
   (A) STP   (B) 127°C and 1atm   (C) 0°C and 2atm   (D) 273°C and 2atm

7) A real gas obeying Vander Waals equation will resemble ideal gas if
   (A) Both 'a' and 'b' are large   (B) 'a' is small and 'b' is large   (C) 'a' is large and 'b' is small   (D) Both 'a' and 'b' are small

8) The comparative rates at which the solutes move in paper chromatography depend on
   (A) The size of paper   (B) Temperature of the experiment   (C) R_f values of solutes   (D) Size of the chromatographic tank used

9) In the presence of KI, iodine dissolves in water due to formation of
   (A) I_2 (B) I_3^{-} (C) I^{-} (D) I_2^{-}

10) When water freezes at 0°C, its density decreases due to
    (A) Cubic structure of ice   (B) Change of bond lengths   (C) Change of bond angles   (D) Empty spaces present in the structure of ice

11) The molecules of CO_2 in dry ice form the
    (A) Ionic crystals   (B) Covalent crystals   (C) Molecular crystals   (D) Atomic crystals

12) Splitting of spectral lines when atoms are subjected to strong magnetic field is called
    (A) Zeeman effect   (B) Stark effect   (C) Photoelectric effect   (D) Compton effect

13) The maximum number of electrons in a subshell is given by
    (A) $2\ell - 1$ (B) $2\ell + 1$ (C) $2(2\ell - 1)$ (D) $2(2\ell + 1)$

14) Which of the following molecules has net dipole moment?
    (A) SiH_4 (B) SO_2 (C) CCl_4 (D) $AlCl_3$

15) Which of the following species has unpaired electrons in antibonding molecular orbitals?
    (A) O_2^{2+} (B) O_2^{2-} (C) N_2^{2-} (D) F_2

16) For a given process, the heat change at constant pressure (q_p) and at constant volume (q_v) are related to each other as
    (A) $q_p > q_v$ (B) $q_p < q_v$ (C) $q_p = q_v$ (D) $q_p = q_v/2$

17) The pH of 10^{-3} mol dm^{-3} of an aqueous solution of H_2SO_4 is
    (A) 3.0   (B) 2.7   (C) 2.0   (D) 1.5

Chemistry (Subjective) (Session 2020-22 to 2023-25) Group (II) Paper (I)

Time Allowed: 2.40 hours Section ----------------- I Maximum Marks: 68

2. **Answer briefly any Eight parts from the followings:-** $8 \times 2 = 16$
   SGD-2-24
   (i) Calculate the number of moles in 52 g of Aspartame ($C_{14}H_{18}N_2O_5$)
   (ii) Write down the two steps to calculate the empirical formula.
   (iii) Atomic masses of elements show many examples of fractional values. Justify.
   (iv) How decolourization of undesirable colours can be done during crystallization.
   (v) Define Sublimation. Name any two substances that can be sublimed.
   (vi) What is safe and reliable method for drying the crystals? Briefly explain.
   (vii) Calculate the mass of 10^{20} molecules of CO_2 at STP.
   (viii) CO_2 is more non-ideal of 0°C than at 100°C. Explain with reason.
   (ix) What is Joule-Thomson effect? Give its significance.
   (x) Calculate the pH of 10^{-4} mole dm^{-3} of $Ba(OH)_2$
   (xi) Write down K_c units for following reactions. $Sn_{(aq)}^{+2} + 2Fe_{(aq)}^{+3} \rightleftharpoons Sn_{(aq)}^{+4} + 2Fe_{(aq)}^{+2}$
   (xii) The solubility of Glucose increases by increasing the temperature. Give reason.

3. **Answer briefly any Eight parts from the followings:-** $8 \times 2 = 16$
   (i) Why melting and boiling points of halogens increase down the group.
   (ii) Give one application of hydrogen bonding. (iii) Define isomorphism with one example.
   (iv) Give two uses of Liquid Crystals. (v) Why positive rays are also called cannal rays.
   (vi) What is Zeeman's effect. (vii) Give two postulates of Plank's theory.
   (viii) State Hund's rule. (ix) Define energy of activation.
   (x) Discuss homogeneous catalysis with example.
   (xi) What is ebullioscopic constant. (xii) $NaCl$ lowers the melting point of water. Justify.

4. **Answer briefly any Six parts from the followings:-** $6 \times 2 = 12$
   (i) Why the second ionization energy is always greater than first ionization energy?
   (ii) No bond in compounds is 100% ionic. Why? (iii) Sketch molecular orbital picture of N_2.
   (iv) Define dipole moment. Give relationship between its various units.
   (v) Define heat and temperature. (vi) What is thermochemical equation? Give two examples.
   (vii) $\Delta H \approx \Delta E$ for reaction in solution form. Why?
   (viii) Differentiate between oxidation and reduction with examples.
   (ix) What electrode reactions occur in nickel cadmium battery?

Section ------------ II

Note: Attempt any three questions. $(8 \times 3 = 24)$

5. (a) Define empirical formula. Write down any three steps involved in the determination of empirical formula.
   (b) Define ionic solids. Write down its only three properties.

6. (a) A sample of krypton with a volume of 6.25 dm^3, a pressure of 765 torr and a temperature of 20 °C is expanded to a volume of 9.55 dm^3 and a pressure of 375 torr. What will be its final temperature in °C?
   (b) Explain Millikan's oil drop experiment to determine the charge of an electron.

7. (a) Define hybridization. Explain sp^2 hybridization by taking example of Ethene.
   (b) The solubility of PbF$_2$ at 25 °C is 0.64 g dm^{-3}. Calculate K_{sp} of PbF_2.

8. (a) Describe the measurement of enthalpy of a reaction by Bomb Calorimeter.
   (b) Describe fuel cells. Give their uses.

9. (a) Describe Landsberger's method for the measurement of boiling point elevation.
   (b) Write any four characteristics of a catalyst.

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