Chemistry   (Objective)   (Group - II)   Paper (I)

Time Allowed:- 20 minutes   **PAPER CODE 2488**   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. $SGD-2-24$ 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) $CC\ell_4$
   - (D) $A\ell C\ell_3$

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 × 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. $Sn^{+2}_{(aq)} + 2Fe^{+3}_{(aq)} \rightleftharpoons Sn^{+4}_{(aq)} + 2Fe^{+2}_{(aq)}$
(xii) The solubility of Glucose increases by increasing the temperature. Give reason.

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