**[CLASS - XI]**

**CHEMISTRY (THEORY)**

**[SAMPLE PAPER-VI]**

**Time Allowed: 3 hrs M.M.: 70**

1. Predict the position of the elements in the periodic table satisfying the electronic configuration (*n* – 1)d1 *ns*2 for *n* = 4. (1)
2. Define the term Avogadro’s number. (1)
3. Why the change in enthalpy cannot the sole criterion for the spontaneity of a process?

(1)

1. Arrange the following metal in the order in which they displace each other from the solution of their salts: Al, Cu, Fe, Mg and Zn. (1)
2. What are fullerenes? (1)
3. Define the term empirical formula and molecular formula. (1)
4. Calculate the number of protons, neutrons and electrons in 8035Br. (1)
5. Write the main features of the long form of periodic table. (1)
6. Write structural formulas of the following compounds:
7. 3, 4, 4, 5-Tetramethylheptane
8. 2, 5-Dimethylhexane. (2)
9. 0.3780 g of an organic compound gave 0.5740 g of silver chloride in carius estimation. Calculate the percentage of chlorine present in the compound.

Or

In the estimation of sulphur by Carius method 0.468 g of an organic sulphur compound afforded 0.668 of barium sulphate. Find out the percentage of sulphur in the given compound. (2)

1. Diamond is covalent, yet it has high melting point. Why? (2)
2. Draw the structure of C60, Buckminsterfullerene. Why is it called as Buckminsterfullerene? (2)
3. The enthalpy of formation of hypothetical CaCl (s) theoretically found to be – 188 kJ mol-1 and ∆*f*H° for CaCl2 (s) is -795 kJ mol-1. Calculate the ∆*f*H° for the disproportionation reaction. (2)
4. Density of a gas is found to be 5.46 g dm-3at 27°C at 2 bar pressure. What will be its density at STP? (2)
5. What sorts of information can you draw from the following reaction?

(CN)2 (g) + 2OH⁻ (aq) 🠖 CN- (aq) + CNO⁻ (aq) + H2O(l) (2)

1. What are the harmful effects of photochemical smog and how can they be controlled? (2)
2. Calculate the molarity of a solution of ethanol in water in which the mole fraction of othanol is 0.040.0. (2)
3. Give the significance of principal quantum number. (2)
4. (a) why does the benzene undergo electrophilic substitution reactions easily and nucleophilic substitutions with difficulty?

(b) Arrange the following compounds according to their increasing boiling points:

Hexane, heptanes, 2-Methylpentane, 2-2-Dimethylpentane

Or

Calculate number of sigma and pi bonds in the given structure:

1. CH2 = C(CH2CH2CH3)2
2. CH3CH2CH2 – CH2 CH2CH3

CH3 – CHCH = C – CH2 – CH – CH3

CH3 (3)

1. Complete the following reaction:

Br

1. + Na +H3CCH2Br

MgBr

1. + H3C – CH – CH3
2. CH3 – C CH (3)
3. Emission transitions in the Paschen series end at orbit *n* = 3 and start from orbit n and can be represented as *n* = 3.2 x 1015 Hz \*. Calculate the value of n if the transition is observed at 1285 nm. Find the region of the spectrum. (3)
4. What are the various factors due to which the ionisation enthalpy of the main group elements tends to decrease down a group? (3)
5. When metal (X) is treated with sodium hydroxide, a white precipitate (A) is obtained, which is soluble in excess of NaOH to give soluble complex (B)? Compound (A) is soluble in dilute HCl to form compound (C). The compound (A) when heated strongly gives (D), which is used to extract metal. Identify (X), (A), (B), (C) and (D). Write suitable equations to support their identities. (3)
6. Explain the following reactions:
7. Silicon is heated with methyl chloride at high temperature in the presence of copper.
8. Silicon dioxide is treated with hydrogen fluoride.
9. Hydrated alumina is treated with aqueous NaOH solution. (3)
10. When an alkali metal dissolves in liquid ammonia the solution can acquire different colours. Explain the reason for this type of colour change. (3)
11. Discuss the principle and method of softening of hard water by synthetic ion-exchange resins. (3)
12. At 700 K, equilibrium constant for the reaction: H2 (g) + I2 (g) ⇌ 2HI (g) is 54.8. If 0.5 mol L-1 of HI (g) is present at equilibrium at 700 K, what are the concentration of H2(g) and I2 (g) assuming that we initially started with HI (g) and allowed it to reach equilibrium at 700 K. (3)
13. (a) For each of the following compounds, write a condensed formula and also their bond line formula.
14. HOCH2CH2CH2CH(CH3)CH(CH3)CH3

OH

1. N C – C – CH – C N

(b) Give the wedge and dash representation of CH4.

(c) Arrange the following alkyl radicals in increasing order of their stability.

+ + + +

CH3, CH2CH3, CH(CH3)2, C(CH3)2

**OR**

1. Name the method used for the quantitative estimation of carbon and hydrogen in an organic compound.
2. How can you confirm the purity of a compound?
3. Structures and IUPAC names of some hydrocarbons are given below. Explain, why the names given in parentheses are incorrect? (5)
4. (a) Two litres of an ideal gas at a pressure of 1 atm expands isothermally into a vacuum until its total volume is 10 litres. How much heat is absorbed and how much work is done in the expansion.

(b) Derive a relationship between heat of reaction at constant pressure and constant volume e.g., ∆*H* = ∆*U* + ∆*n*8*RT*.

OR

1. A swimmer coming out from a pool is covered with a film of water weighing about 18 g. How much heat must be supplied to evaporate this water at 298 K? Calculate the internal energy of Vapourisation at 100°c.

∆vapH° for water at 373 K = 4066kJ mol-1

1. Derive a relationship between Cp and Cv for an ideal gas. (5)
2. (a) What is meant by the conjugate acid base pair? Find the conjugate acid/base for the following species:

(b) The ionisation constant of phenol is 1.0 x 10-10. What is the concentration of phenolate ion in 0.05M solution of phenol? What will be its degree of ionization if the solution is also 0.01 M in sodium phenate.

**OR**

1. The first ionisation constant of H2S is 9.1 x 10-8 and second dissociation constant of H2S is 1.2 x 10-13. Calculate the concentration of HS⁻ ion in its 0.1 M solution and how will this concentration be effected if the solution is 0.1 M in HCl also. Calculate the concentration of S2.
2. The ionisation constant of acetic acid is 1.74 x 10-5. Calculate the degree of dissociation of acetic acid in its 0.05 M solution. Calculate the concentration of acetate ion in the solution and its pH. (5)