**[CLASS - XI]**

**CHEMISTRY (THEORY)**

**[SAMPLE PAPER-IV]**

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

1. How many helium atoms are present in 52 u He? (1)
2. Write the electronic configuration of 26Fe3+. (1)
3. Which of the following ion is unlikely to exist and why? (1)
4. Predict the hybridization of c in CH4. (1)
5. What is the sign of ∆S for the following reaction?

2H2(g) + O2(g) 🠖 2H2O(l) (1)

1. Write the relation between the molar solubility (S) and Ksp for Al2S3(s). (1)
2. What is the IUPAC name of (CH3)3 C CH2C(CH3)2CH3  (1)
3. Complete the following reaction.

CH3CH = CH2  . (1)

1. Chlorophyll, the green colouring matter of plants responsible for photosynthesis contains 2.68 % of magnesium by mass. Calculate the number of magnesium atoms in 2.00g chlorophyll. (2)
2. The kinetic energy of a subatomic particle is 5.65 x 10-25 J. Calculate the frequency of the particle wave. (h = 6.62 x 10-34 Js) (2)
3. Give four points to distinguish between sigma & pi bonds. (2)
4. (a) How many antibonding electrons are present in O2molecule and how many are unpaired?

(b) Predict the hybridization of oxygen in H3O+. What is the shape of H3O+ ion? (2)

1. (a) At what temperature will the hydrogen molecules have the same kinetics energy as nitrogen molecules at 35°C?

(b)Under what condition, the real gas behaves ideally? (2)

1. Pressure of 1g of an ideal gas A at 27°C is found to be 2 bar. When 2g of another ideal gas B is introduced in the same flask at the same temperature, the pressure becomes 3 bar. Find the relationship between their molecular masses. (2)
2. Determine the solubility of barium sulphate in 0.05 M barium chloride solution.

(Ksp of BaSO4 = 1.1 x 10-10) (2)

1. Comment on each of the following observations:
2. Lithium is the only alkali metal to form nitrides.
3. BeSO4 is soluble in water, while BaSO4 is insoluble. (2)
4. Why are boron halides and diborane referred to as ‘electron deficient compounds’? (2)
5. Explain the following:
6. Wurtz reaction
7. Markovnikov’s rule. (2)
8. (i) Calculate the number of radial nodes in 3s.

(ii) State Hund’s rule of maximum multiplicity.

1. What is the significance of y2? (3)
2. Account for the following:
3. First ionisation enthalpy of magnesium is greater than that of aluminium.
4. Lithium ad magnesium show similarity in their chemical properties.
5. Oxygen has a lower electron gain enthalpy that sulphur. (3)
6. One mole of H2O and one mole of CO are taken in a 10L vessel and heated to 725 K. At equilibrium, 40% of water by mass reacts with CO according to the equation H2O(g) + CO(g) ⇌ H2(g) + CO2(g) Calculate the equilibrium constant for the reaction. (3)
7. (a) What is the oxidation state of sulphur in each compound?

Na2S2O3, SO42-

(b) Balance the following redox reaction:

Cr2O72- + I⁻ + H+ 🠖 Cr3+ + I2 + H2O (3)

1. (a) What happens when ionic hydrides are treated with water?

(b) What happens when water reacts with cyanamide of calcium?

(c) How will you prepare H2O2 commercially? (3)

1. (a) Arrange the carbonates of group 2 in order of increasing thermal stability.

(b) Complete the following equation:

NaHCO3

1. Potassium forms KO2, while Na forms Na2O2. Explain. (3)
2. (a) Give the structure of 2, 3-dibromo-3-ethylheptane.

(b) Write the IUPAC name of

O

H

(c) Why is CH3CHCH2CH2CH3 more stable carbocation than CH3CH2C+HCH2CH3 (3)

1. What are electrophiles and nucleophiles? Give two examples of each. (3)
2. (a) What do you understand by Eutrophication? How does it threatens the development of fish?

(b) Name the two gases which cause greenhouse effect. (3)

1. (a) Write an equation when ethyne is passed through a red and hot tube.

(b) Write a short note on Friedel-Craft alkylation.

(c) Convert benzene into acetophenone.

(d) Complete the equation.

CH3 C CH

(e) Alkene (X) on oxidation gives propanoic acid and propanone. What is the structure and the IUPAC name of X? (5)

1. (a) Account for the following:
2. CO2 is a gas while SiO2 is a solid at room temperature.
3. Aluminium sulphide gives a foul odour when it becomes damp.
4. Elemental silicon does not exist in graphite-like structure.

(b) What happens when aluminium is added to strong NaOH solution?

(c) C forms CF4 but Si forms (SiF6)2-. Explain. (5)

1. (a) Define free energy.

(b) For the reaction

Ag2O(s) ⇌ 2Ag(s) + ½ O2g

∆H°r = 40 kJ/mol and ∆S°r = + 110 JK-1 mol-1

Calculate the temperature at which ∆G° becomes zero. What will be the sign of ∆G° above this temperature?

(c) Calculate the heat evolved in the following reaction:

CH4(g) + 2O2(g) 🠖 CO2(g) – 2H2O(l)

Given:

DH°*f* CH4 = - 72 kJ/mol

DH°*f*CO2 = - 393 kJ/mol

DH°*f*H2O = - 286 kJ/mol (5)