**SAMPLE PAPER-03 (solved)**

CHEMISTRY (Theory)

**Class – XI**

Time allowed: 3 hours | Maximum Marks: 70

**General Instructions:**

a) All the questions are compulsory.
b) There are **26** questions in total.
c) Questions **1** to **5** are very short answer type questions and carry **one** mark each.
d) Questions **6** to **10** carry **two** marks each.
e) Questions **11** to **22** carry **three** marks each.
f) Questions **23** is value based question carrying **four** marks.
g) Questions **24** to **26** carry **five** marks each.
h) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions in five marks each. You have to attempt only one of the choices in such questions.
i) Use of calculators is **not** permitted. However, you may use log tables if necessary.

1. Why the molar enthalpy of vapourisation of acetone is less than that of water?
2. How many electrons are present in 16g of methane?
3. How many grams of $Na_2CO_3$ should be dissolved to make 100 cc of 0.15M $Na_2CO_3$?
4. What will be the volume of ammonia formed if 2L of nitrogen is mixed with 2L of hydrogen at constant temperature and pressure?
5. Give two examples of state functions.
6. a) Is it possible to achieve equilibrium between water and its vapour in an open vessel?
   b) Explain your answer and say what happens eventually.
7. How does electronegativity vary i) down the group and ii) across the period?
8. The standard solution of NaOH cannot be prepared by weighing. Why?
9. Give reason: "Although geometries of ammonia and water molecules are distorted tetrahedral, bond angle in water is less than that of ammonia".

   Or

   Why is benzene extra-ordinary stable though it contains three double bonds?
10. In the estimation of sulphur by Carius method, 0.468 g of an organic sulphur compound afforded 0.668 g of barium sulphate. Find out the percentage of sulphur in the given compound.

11. What happens when alkali metals reacts in air?

12. Give the Lewis representation of:

    i. Nitric acid

    ii. Ammonia

    iii. Ozone molecule

**13.** In the reaction: $2SO_2(g) + O_2 \rightleftharpoons 2SO_3(g) + 189.4\ kJ$

Indicate the direction in which the equilibrium will shift when:

i) Concentration of $SO_2$ is increased.

ii) Concentration of $SO_3$ is increased.

iii) Temperature is increased.

**14.** Calculate the wavelength in nm, of visible light having a frequency of $4.37 \times 10^{-14}$/s.

15. Comment on each of the following observations:

a) Lithium forms a nitride directly like magnesium. Give equation involved.

b) BaO is soluble but $BaSO_4$ is insoluble in water.

16. Give reasons: "The reaction $2\ Na(s) + H_2(g) \rightarrow 2\ NaH\ (s)$ is a redox change".

17. Give reason:

(i) Graphite is used as lubricant.

(ii) Diamond is used as an abrasive.

(iii) Aluminium alloys are used to make aircraft body.

Or

Explain isomerization in alkanes with examples.

18. An alkyl halide compound 'A' ($C_5H_{11}Br$) reacts with ethanolic KOH to give compound 'B', an alkene. 'B' on reaction with bromine gives compound 'C'. 'C' on further dehydrobromination gives compound 'D'. When one mole of 'D' is treated with sodium metal in liquid ammonia, it gives one mole of sodium salt of 'D' and half a mole of hydrogen gas. On complete hydrogenation, 'D' gives a straight reactions involved.

19. Calculate the amount of ammonia formed when 50 kg of $N_2$ (g) and 10.0 kg $H_2$ (g) of are mixed to produce $NH_3$ (g). Identify the limiting reagent.

20. Give reasons:

i. Evaporation causes cooling.

ii. Falling liquids drops are spherical.

iii. Vapour pressure of acetone is less than that of ether at same temperature.

21. Give a note on:
    i. Mist
    ii. Smoke
    iii. Fumes
    iv. Dust

22. Calculate the enthalpy change when 2.38g of CO vaporizes at its normal boiling point, if the enthalpy of vaporization of CO is 6.04 kJ/mol.

23. John takes snacks every day to school, but Mala takes vegetables, chapattis and curd. Chips and snacks packet are filled with nitrogen gas. If they are filled with oxygen, they will get rancid.

a) What is meant by rancidity?

b) How do you preserve butter?

c) Why chips are packed with nitrogen gas?

24. Three students, A, B and C were asked to prepare the Lassaigne's extract independently by fusing the compound with sodium. Then, they added solid ferrous sulphate and dilute sulphuric acid to a part of Lassaigne's extract. Both A and B got Prussian blue colour but C got red colour. Can you help them with equations and reasons? Write the chemical equations to explain the formation of compounds of different colours.

Or

a) What is the principle of chromatography?
b) How can forgery be detected with the help of chromatography?
c) Is it possible to separate components of orange ink by chromatography?
d) Name the stationary and mobile phase in paper chromatography.
e) What is the suitable adsorbent in the process of column chromatography?

25. Give reasons:
    a) Why silicones are used for nipples of feeding bottles?
    b) Why are silicones used in cosmetic plants?
    c) Why silicones are water-repellant?
    d) Why are silicones thermally stable?
    e) Are silicones safe for environment?

Or

i) If a salt 'A' gives the following results:
    a) Its aqueous solution is alkaline to litmus.

b) On strong heating, 'A' swells up to a glassy material 'B'.

c) When concentrated HCl is added to a hot solution of 'A' white crystals of an acid 'C' separates out.

Write the chemical equations for the reactions and identify 'A', 'B' and 'C'.

ii) Complete the equations:

a) $2Al + 6HCl \rightarrow$

b) $8BF_3 + 6LiH \rightarrow$

26.

i) What is the change in internal energy in a process, 701 J of heat is absorbed by a system and 394 J of work is done by the system.

ii) The equilibrium constant for the reaction is 10. Calculate the value of $\Delta G^{\theta}$. Given R = 8.0 J/mol, T = 300 K.

Or

Calculate the lattice energy for the change of $Li^+(g) + Cl^-(g) \rightarrow LiCl(s)$,

$\Delta_{sub} H^{\theta}$ of Li = 160.67 kJ/mol, $\Delta_{diss} H^{\theta}$ of $Cl_2$ = 244.34 kJ/mol,

$\Delta_{le} H^{\theta}$ of Li (g) = 520.07 kJ/mol, $\Delta_{eg} H^{\theta}$ of Cl (g) = - 365.26 kJ/mol,

$\Delta_r H^{\theta}$ of LiCl (s) = - 401.66 kJ/mol.

Is the reaction spontaneous or not?