SAMPLE PAPER-01 (unsolved)
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. Give reason: "The droplets of water are spherical in shape".

2. Name the alkaline earth metal which shows diagonal relationship with aluminium.

3. State Gay Lussac's law of combining volume.

4. What is meant by isolated system?

5. Give the structure of:

$$CH_3-CH=CH-C-CH_3$$
$$\overset{\|}{O}$$

6. A sample containing 1.0 mole of an ideal gas is expanded isothermally and reversibly to ten times of the original volume in two separate experiments at 200K and 400K respectively. What will be the ratio of their workdone? What will be the value of ΔU in both experiments?

7. Calculate the number of atoms in each of the following: a) 5.6L of ammonia b) 4.4g of carbon dioxide.

8. Give reasons: Though the melting and boiling points of sodium and potassium chlorides are high, the alkali metals are obtained by the electrolytic reduction of their metal oxides.

Or

Give the reaction of heat on a) $CaCO_3$ b) $CaCO_3.2H_2O$

9. Draw the shape of xenon fluoride based on VSEPR theory. Discuss the shape of ammonia molecule based on hybridization.

10. What is meant by enthalpy of neutralization? Why the enthalpy of neutralization for strong acid and strong base remain constant?

11. If concentrated sulphuric acid is 49% by mass and has density 1.84 g/cm3, what volume of concentrated acid is required to make 4.0L of 0.5M of H_2SO_4 solution?

12. a) An orbital has n = 3, what are the possible values of l and m?

    b) What is the maximum number of emission lines when excited electron of H-atom in n=6 level drops to ground state?

    c) Why are half-filled and completely filled orbitals more stable?

    Or

    a) What is atomic spectrum?

    b) Describe the hydrogen spectrum and also describe the series of hydrogen spectrum and the region to which they belong.

13. A photon of wavelength 4×10^{-7} m strikes on the metal surface, the work function of metal being 2.13eV. Calculate $[1eV = 1.602 \times 10^{-19} J]$

    a) The energy of photon in eV.

    b) The K.E of the emitted electron.

    c) The velocity of the photoelectron.

14. Give postulates of kinetic theory of gases. Why do gases deviate from ideal gas behaviour?

15. State third law of thermodynamics. Calculate ΔU for the following reaction at 27^0C

    $2Zn(s) + O_2(g) \phi \iota 2ZnO(s); \Delta H = -693.8kJ, R = 8.314J/K/mol$

16. a) Give an example of the reducing properties of hydrogen peroxide and the oxidising properties of hydrogen peroxide.

    b) Why ice is lighter than water?

17. define the following:

    a) Green chemistry

    b) Green-house effect

    c) Chemical oxygen demand

18. Arrange N, P, O and S in the order of:

    a) Increasing non-metallic character.

    b) Increasing 1_{st} ionisation enthalpy.

Give reasons for your arrangement.

19. a) What are free radicals? How are they formed?

b) Which of the following has dipole moment and why? 2,2,3,3-Tetramethylbutane, 2,2-Dimethylpropane, trans-Pent-2-ene, cis-Hex-2-ene.

c) Why does nitro group present on benzene ring deactivate and m-directing in electrophilic substitution reaction?

20. Describe the reactions taking place in Solvay's process. Why potassium carbonate cannot be prepared by Solvay's process?

21. A sample of 0.50g of organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in 25ml of 0.5 M H_2SO_4. The residual acid required is 30ml of 0.5M solution of NaOH for neutralization. Find the percentage composition of nitrogen in the compound.

22.

Balance the following redox reaction by ion-electron method:

$$MnO_4^- + SO_2 \rightarrow Mn^{2+} + HSO_4^- \text{ (acidic medium)}$$
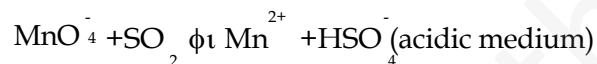
Depict the galvanic cell in which the following reaction takes place:

$$Zn(s) + 2Ag_+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$$
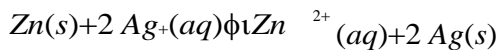
Show a) Which of the electrode is negatively charged? b) The carrier of the current in the cell.

23. We know that 75% of solar energy reaching the earth is absorbed by earth's surface which increases its temperature. The rest of the heat radiates back to the atmosphere. Some heat gets trapped by gases present in the atmosphere. This causes global warming. Mr. Sham has four cars and uses them to create pollution whereas Mr. Vinay takes metro to reach his place of work.

a) What values are possessed by Mr. Vinay?

b) How can we protect ozone layer?

c) Suggest a measure to decrease carbon monoxide gas in the atmosphere.

d) Do you think the use of solar energy solve our problems?

24. A. Give the balanced equations for the following equations:

a) $BCl_3 + H_2O \rightarrow$

b) $NaH + B_2H_6 \rightarrow$

c) $BF_3 + LiH \rightarrow$

B. Why does silicon not form graphite like structure?

C. What are silicones? How are they manufactured?

Or

Give reasons:

    a) $AlCl_3$ is Lewis acid.

    b) PbO_2 is stronger oxidising agent than SnO_2.

    c) Boric acid is aprotic acid.

    d) Carbon tetrachloride cannot be hydrolysed.

    e) The dipole moment of carbon dioxide is zero.

25.   a) Define solubility product?

    b) How does the value of solubility product changes with the change in temperature?

    c) What is the effect of common ion on the solubility of ionic salt?

    d) The value of K_{sp} of two sparingly soluble salts $Ni(OH)_2$ and $AgCN$ are 3×10^{-15} and 9×10^{-17} respectively. Which salt is more soluble? Why?

    Or

    a) Write the conjugate base of NH_3.

    b) State Lechatelier's principle.

    c) Give the effect of temperature in exothermic and endothermic reversible reactions.

    d) Why a solution of copper sulphate has pH less than 7.

    e) In qualitative analysis, hydrogen sulphide is passed in acidic medium for group II. Why?

26.   a) Distinguish between 1-hexene and 1-hexyne.

    b) Why does nitration of benzene with nitric acid need the use of concentrated sulphuric acid?

    c) Convert: benzene to cyclohexane and benzene to benzene hexachloride.

    d) Give a note on conformations of ethane.

    Or

    a) A conjugated diene 'X' having molecular formula $C_{13}H_{22}$ on ozonolysis gave ethyl methyl ketone, cyclohexanol and glyoxal. Identify 'X'. Write the reaction involved.

    b) What happens when benzene reacts with concentrated nitric acid and concentrated sulphuric acid at 333 K? Give the reaction.

    c) Define Huckel rule.

    d) How is cyclopentadienyl anion aromatic?