Practice Paper-II
Subject : Chemistry (Theory)
Class : XI

Time : 3 Hrs.   **M.M. : 70**

(i) All questions are compulsory.

(ii) Q. No. 1 to 5 are Very Short Answer Question carrying 1 mark each.

(iii)Q. No. 6 to 12 are Short Answer Questions and carrying 2 marks each.

(iv)Q. No. 13 to 24 are Short Answer Questions and carrying 3 marks each.

(v) Q. No. 25 to 27 are Long Answer Questions and carrying 5 marks each.

(vi)Use log tables, if necessary, Use of calculator is not allowed.

1. In a reaction $A + B_2 \rightarrow AB_2$, identify the limiting reagent when 2 mole of A are mixed with 3 mole of B_2.

2. Write the general outer electronic configuration of f-block elements.

3. Define critical temperature.

4. Classify the following as Lewis acid or Lewis base :
$$NH_4^+ \text{ and } NH_3$$

5. What is the oxidation number of Mn in $KMnO_4$?

6. (a) How many sub-shells are associated with $n = 5$?

   (b) How many electrons will be present in these sub-shell having m_s value of $- ½$ for $n = 4$?

7. Give one point to differentiate the following thermodynamic terms :

   (a) Extensive properties and intensive properties.

   (b) Isothermal process and isobaric process.

8. Account for the following :

   (a) K_2CO_3 cannot be prepared by Solvay process.

   (b) Alkali metals are not found in nature in free state.

Or

Write balanced equations for the reaction between :

(a) Na_2O_2 and water (b) Na_2O and CO_2

9. Give suitable reasons for the following :

   (a) $[SiF_6]^{2-}$ is known whereas $[SiCl_6]^{2-}$ not.

   (b) Diamond is covalent, yet it has high melting point.

10. (a) What type of isomerism is shown by pentane and 2-methylbutane ?

(b) Write the name of isomerism among the following compounds :

$$CH_3—CH_2—CHO \text{ and } CH_3—\overset{\overset{\displaystyle O}{\|}}{C}—CH_3$$
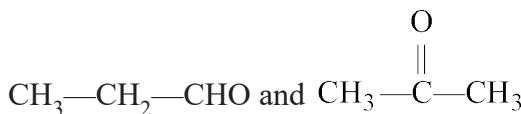
11. How green chemistry has helped in the dry cleaning of cloths and laundry?

12. What is the impact of use of pesticides on soil pollution?

13. Calculate the concentration of nitric acid in moles per litre in a sample which has density 1.40 g mL^{-1} and the mass percent of nitric acid in it being 69%. Molar mass of $HNO_3 = 63$ g mol^{-1}.

14. Account for the following :

(a) An anion is always bigger than its parent atom.

(b) Chlorine (Cl) have more negative electron gain enthalpy than fluorine (F).   [Given: Atomic No. F = 9, Cl = 17]

15. Give the shapes of following covalent molecules using VSEPR theory :

(a) CIF_3 (b) XeF_4 (c) AsF_5

16. Compare the relative stability of the following species on the basis of molecular orbital theory and indica their magnetic properties :

$$O_2^+, O_2^-, O_2^{2-}$$
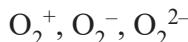
17. (a) In terms of Charle's law, explain why – 273°C is the lowest temperature ?

(b) Calculate the total pressure in a mixture of 8 g of dioxygen and 4 g of dihydrogen confined in a vess of 1 dm^3 at 27°C.

[R = 0.083 bar dm^3 K^{-1} mol^{-1}]

18. (a) For the reaction, $2Cl(g) \rightarrow Cl_2(g)$, what are the signs of ΔH and ΔS ?

(b) For the reaction at 298 K, $2A + B \rightarrow C$, $\Delta H = 400$ kJ mol^{-1} and $\Delta S = 0.2$ kJ K^{-1} mol^{-1}. At what temperature will the reaction becomes spontaneous ?

19. Balance the following redox reaction in basic medium : (Write steps of any one method used)

$$MnO_4^-(aq) + I^-(aq) \rightarrow MnO_2(s) + I_2(s) \text{ [In basic medium]}$$
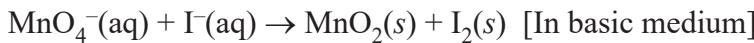
20. (a) Draw the structure of hydrogen peroxide (H_2O_2).

(b) How do we obtain demineralised water from hard water after passing it from synthetic ion exchange resins ? Give reactions.

21. (a) Mention two similarities in the behaviour of Be and Al to show that they have diagonal relationship.

(b) What is the biological importance of Na in our body ?

22. What happens when :

(a) Boric acid is added to water.

(b) Al is treated with dil. NaOH.

(c) BF_3 is treated with NH_3.

23. Write the IUPAC names of the following :

(a) COOH

(b)

(c)
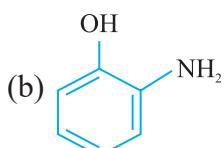
Or

(a) Identify the reagent shown underlined as electrophile or nucleophile :

$$CH_3COOH + \underline{OH}^- \rightarrow CH_3COO^- + H_2O$$
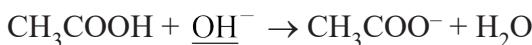
(b) On complete combustion of 0.246 g of an organic compoundgave 0.198 ga of CO_2 and 0.1014 g of H_2O. Determine the percentage composition of carbon and hydrogen in the compound.

24. Complete the following reactions :

(a) CH_3—$CH{=}CH_2 + HBr \longrightarrow$

(b) C_2H_5—$Cl + Na \xrightarrow{\text{Dry ether}}$

(c) $CH_3 - CH-CH_2 - CH_3 \xrightarrow[\Delta]{\text{Alc. KOH}}$
    $\qquad\quad |$
    $\qquad\quad Cl$
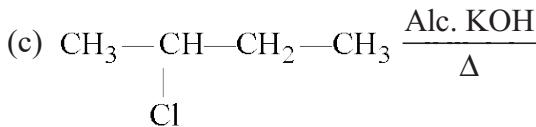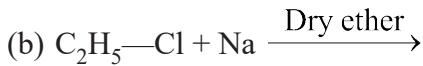
25. (a) Write the electronic configuration of Cr(Z = 24). Why is it differen from the expected configuration ?

(b) The mass of an electron is 9.1×10^{-31} kg and its kinectic energy is 3×10^{-25} J. Calculate its wavelength.

(c) Which of the following orbitals is not possible and why ?

2*d*, 2*s*, 3*p*, 3*s*

Or

(a) Calculate the wavelength and frequency of limiting line of Lyman series (Rydberg constant = 109677 cm^{-1}).

(b) Give quantum numbers for electrons with highest energy in sodium atom (Atomic number of sodium = 11).

(c) Which of the following sets of quantum number are not possible ? Give reasons :

(i) $n = 1$, $l = 0$, $m_l = 0$, $m_s = -\frac{1}{2}$

(ii) $n = 2$, $l = 0$, $m_l = 0$, $m_s = 0$

26. (a) Equilibrium constant for a reaction is 10. What will be the equilibrium constant for the reverse reaction ?

(b) Write the conjugate acids for the Bronsted base OH^- and CH_3COO^-.

(c) Determine the pH of 10^{-8} M HCl solution taking into account the H^+ produced by water also. (Given: log 11 = 1.0414)

Or

(a) At certain temperature and total pressure of 10^5 Pa, iodine vapour contains 40% by volume of I atoms :

$$I_2(g) \rightleftharpoons 2I(g)$$
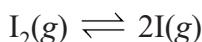
Calculate K_p for the equlibrium.

(b) What is the effect of :

(i) Addition of H_2

(ii) Removal of CO

on the equilibrium : $2H_2(g) + CO(g) \rightleftharpoons CH_3OH(g)$

(c) Mention one application of solubility product.

27. (a) Propanal and pentan-3-one are the ozonolysis product of an alkene. What is the structural formul of the alkene ?

(b) Give the main products of the reactions :

(i) + CH$_3$COCl $\xrightarrow{\text{Anhy. AlCl}_3}$

(ii) $CH_3 - C = CH_2 + H_2O \xrightarrow{H^+}$
         $\underset{\displaystyle CH_3}{|}$

(iii) + Cl$_2$ $\xrightarrow[\text{(light)}]{h\upsilon}$?
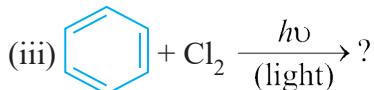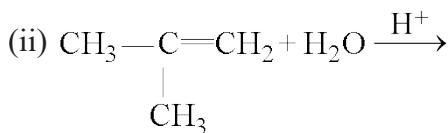
Or

(a) An alkyl halide (A) of formula $C_6H_{13}Cl$ on treatment with alcoholic KOH give two isomeric alkenes (B) and (C) (C_6H_{12}). Both alkenes on hydrogenation give 2, 3-Dimethylbutane. Predict the structure of A, B and C.

(b) Why does benzene show electrophilic substitution easily ?

(c) Name the compound that will be required to obtain butane using Kolbe's electrolysis process.