QUARTERLY EXAMINATION - 2024

CHEMISTRY

12 – STD

Time allowed : 3.00 hours Total marks : 70

SECTION – I

Note: 1) Answer all the questions. 2) Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer. 15 X 1 = 15

1. The incorrect statement among the following is
   a) Nickel is refined by Mond's process b) Titanium is refined by Van Arkel's process
   c) Zinc blende is concentrated by froth floatation
   d) In the metallurgy of gold, the metal is leached with dilute sodium chloride solution.
2. Boric acid is an acid because its molecule
   a) contains replaceable H^+ ion b) gives up a proton
   c) combines with proton to form water moleculed) accepts OH^- from water, releasing proton
3. Assertion : bond dissociation energy of fluorine is greater than chlorine gas
   Reason : Chlorine has more electronic repulsion than fluorine
   a) Both assertion and reason are true and reason is the correct explanation of assertion.
   b) Both assertion and reason are true but reason is not the correct explanation of assertion.
   c) Assertion is true but reason is false. Both assertion and reason are false.
4. Permanganate ion changes to ---------- in acidic medium.
   a) MnO_4^{2-} b) Mn^{2+} c) Mn^{3+} d) MnO_2
5. CsCl has bcc arrangement, its unit cell edge length is 400pm, its inter atomic distance is
   a) 400pm b) 800pm c) $\sqrt{3}$ x 100pm d) $\left(\frac{\sqrt{3}}{2}\right)$ x 400pm
6. For a reaction Rate = k[acetone]$^{\frac{3}{2}}$ then unit of rate constant and rate of reaction respectively is
   a) $(mol\,L^{-1}s^{-1}),(mol^{-\frac{1}{2}}L^{\frac{1}{2}}s^{-1})$ b) $(mol^{-\frac{1}{2}}L^{\frac{1}{2}}s^{-1}),(mol\,L^{-1}s^{-1})$
   c) $(mol^{\frac{1}{2}}L^{\frac{1}{2}}s^{-1}),(mol\,L^{-1}s^{-1})$ d) $(mol\,Ls^{-1}),(mol^{\frac{1}{2}}L^{\frac{1}{2}}s)$
7. Conjugate base of Bronsted acids H_2O and HF are
   a) OH^- and H_2FH^+, respectively b) H_3O^+ and F^-, respectively
   c) OH^- and F^-, respectively d) H_3O^+ and H_2F^+, respectively
8. On reacting with neutral ferric chloride, phenol gives
   a) red colour b) violet colour c) dark green colour d) no colouration
9. The formation of cyanohydrin from acetone is an example of
   a) nucleophilic substitution b) electrophilic substitution
   c) electrophilic addition c) nucleophilic addition
10. The number of close packed spheres is 'n'. The number of tetrahedral voids generated is equal to ----
    a) n b) 2n c) $2n^2$ d) 3n
11. Which one of the following is true for acidic solution?
    a) $[H_3O^+] > [OH^-]$ b) $[H_3O^+] < [OH^-]$ c) $[H_3O^+] = [OH^-]$d) $[H_3O^+] \leq [OH^-]$
12. In which of the following reactions new carbon – carbon bond is not formed?
    a) Aldol condensation b) Friedel craft reaction
    c) Kolbe's reaction d) Wolf kishner reduction
13. Chromyl chloride when dissolved in NaOH solution gives yellow solution. The yellow solution contains
    a) $Cr_2O_7^{2-}$ b) CrO_4^{2-} c) CrO_5 d) Cr_2O_3
14. The basicity of hypophosphorus acid is a) 1 b) 2 c) 3 d) 4
15. Elements like silicon and Germanium to be used as a semiconductor is purified by
    a) heating under vaccum b) Van – Arkel method
    c) Zone refining d) Electrolytic refining

SECTION – II

Answer any six questions and question number 24 is compulsory. 6 X 2 = 12

16. What are the differences between minerals and ores?
17. Give the balanced equation for the reaction between chlorine with cold NaOH and hot NaOH.
18. Among Cr^{2+} and Fe^{2+}, which is stronger reducing agent? Why?
19. Distinquish tetrahedral and octahedral voids.
20. Write Arrhenius equation and explain the terms involved.
21. Explain Williamson's synthesis.
22. What is urotropine? How is it prepared?
23. Write any two tests for aldehydes.
24. Calculate pH of 0.04M HNO_3 solution.

SECTION – III

Answer any six questions and question number 33 is compulsory. 6 x 3 = 18

25. Describe the role of the following in the process mentioned.
    i) Cryolite in the extraction of Aluminium. ii) Sodium cyanide in the froth flotation method.
26. Describe the structure of diborane.
27. Describe the preparation of potassium dichromate.
28. What are isotropy and anisotropy?
29. Give the differences between order and molecularity of a reaction.
30. Define common ion effect. Give an example.
31. Explain Lucas test to differentiate three types of alcohols.
32. Write the mechanism for aldol condensation.
33. How will you prepare Malachite green and Cinnamic acid from benzaldehyde?

SECTION – D

Answer all the questions. 5 x 5 = 25

34. A) (i) Explain Van Arkel method for refining Titanium. (2)
    (ii) Explain froth flotation process with an example. (3)

    (OR)

    B) (i) How will you identify borate radical? (2)
    (ii) Write the anomalous properties of the first element of p – block elements. (3)
35. A) (i) Give reason to support that sulphuric acid is a dehydrating agent. (2)
    (ii) Write the properties of interhalogen compounds. (3)

    (OR)

    B) (i) Out of $Lu(OH)_3$ and $La(OH)_3$ which is more basic and why? (2)
    (ii) Compare Lanthanoids and Actinoids. (3)
36. A) Explain Schottky and Frenkel defect. (5)

    (OR)

    B) (i) What are pseudo first order reaction? (2)
    (ii) Derive integrated rate law for first order reaction. $A \longrightarrow$ Product (3)
37. A) (i) What are Lewis acid and Lewis base? (2)
    (ii) Derive an expression for Ostwald's dilution law. (3)

    (OR)

    B) (i) Define solubility product. (2)
    (ii) Derive Henderson - Hasselbalch equation. (3)
38. A) (i) Explain Kolbe's reaction. (2)
    (ii) How is phenol prepared from (i) chlorobenzene (ii) isopropyl benzene. (3)

    (OR)

    B) A compound (A) with molecular formula C_2H_3N on acid hydrolysis gives (B) which reacts with thionyl chloride to give compound (C). Benzene reacts with compound (C) in the presence of anhydrous $AlCl_3$ to give compound (D). Compound (D) on reduction with Zn / Hg and conc.HCl gives (E). Identify (A), (B), (C), (D) and (E). Write the equations. (5)