BHARATIYA VIDYA BHAVAN'S V.M. PUBLIC SCHOOL, BARODA
PRACTICE PAPER 4
CHEMISTRY

MM : 70 Marks **Time : 3 Hrs**
Date : **Std : XII**

General Instructions :

1) All the questions are compulsory
2) Use log tables, if necessary. Calculators are not permitted
3) Weightage of questions
    a. Q1 to Q5 are of 1 mark each
    b. Q6 to Q10 are of 2 marks each
    c. Q11 to Q22 are of 3 marks each
    d. Q23 is of 4 marks
    e. Q24 to Q26 are of 5 marks each

Q1. Write the relation between cell potential and equilibrium constant. (1)

Q2. Draw the structure of 4-tertbutyl-3-iodo heptane. (1)

Q3. Which will react faster in SN^1 displacement : 1-bromobutane or 2-bromobutane and why? (1)

Q4. Name the product formed when aniline reacts with Conc. H_2SO_4 at 455-475K.(1)

Q5. Carbon is not used as a reducing agent at high temperature. Why? (1)

Q6. Write the electronic configuration of the valence electrons of the metal ion having configuration d^4 in terms of t_2g and eg. (2)

Q7. An element crystallizes in bcc structure. The edge length of it unit cell is 288 pm. If the density of crystal is $7.2gcm^{-3}$, what is the atomic mass of the element?

OR

Calculate the density of silver which crystallizes in the face-centered cubic structure. The distance between the nearest silver atoms in this structure is 287 pm. (molar mass of Ag = $107.87g\ mol^{-1}$). (2)

Q8. What is meant by Pseudo first order reaction? Give an example of Pseudo first order reaction and write the rate equation for the same. (2)

Q9. (a) Nitrogen exists as diatomic molecule but phosphorous as P_4. Why?

(b) Why is dioxygen a gas but sulphur a solid? (2)

Q10. Among 1^0,$2^{0,}$ 3^0 amines 2^0 which is most basic? Justify. (2)

Q11 Find the type of cubic lattice formed by palladium atoms in it crystal from the following data : atomic mass = 108.4, edge of unit cell = 388 pm, density = 12.16 gcm^{-3}. Also calculate the radius of Pd atom. (3)

Q12. Explain the following :
(a) Zone refining
(b) Vapour phase refining and
(c) Van-Arkel method of refining (3)

Q13. Give reason for the following :
(a) Oxygen does not show oxidation state of +4 and +6.
(b) HF has abnormally high boiling point.
(c) In aqueous solution, the acidic strength in the order
HCl < HBr < HI (3)

Q14. Using the valence bond theory, explain the diamagnetic nature and square planar structure $[Ni(CN)_4]^{2-}$ ion. (Atomic number of Ni is 28) (3)

Q15. (a) Show that for a first order reaction, time required for 99% completion is twice for the time required for the completion of 90% of the reaction.

(b) Define half-life of a reaction ($t_{½}$). Write the relation between half-life and first order rate constant. (3)

Q16. (a) What are multi molecular and macro molecular colloids? Give one example for each.
(b) What are lyophilic and lyophobic sols. Give one example of each type. (3)

Q17. a) Arrange the following polymers in increasing order of their molecular forces (3)
Nylon-6, Buna-S, Polythene
b) Write a reaction for the formation of Nylon-66 from its monomers.
c) Write the name and structure of one of the common initiators used in free radical addition polymerization.

Q18. (a) State Raoults Law for solution containing volatile components. How does Raoults law become a special case of Henry's Law?

(b) 1 gm of a non-electrolyte solute dissolved in 50gm of benzene lowered the freezing point of benzene by 0.4K. Find the molar mass of the solute. (K_f for benzene = 5.12K Kg mol^{-1})

OR

(a) Differentiate between molarity and molality for a solution. How does a change in temperature influences their values? (3)

(b) Calculate the freezing point of an aqueous solution containing 10.5g of $MgBr_2$ in 200g of water. (Molar mass of $MgBr_2$ = 184g, K_f for water = 1.86 K Kg/mol^{-1})

Q19. Write short notes on :
a) Gabriel phthalimide reaction
b) Hoffman bromamide degradation reaction (3)

Q20. (a) Give one structural difference between amylase and amylopectin.
(b) If base sequence of one strand of DNA molecule is C AATGGCTA, what is the base sequence of the complimentary strand?
(c) Write differences between fibrous and globular proteins. (3)

Q21. Give reason: (3)
(a) Chloroethane is insoluble in water.
(b) Alcohols are mainly prepared by the use of sulphonyl chloride.
(c) Chloroform is stored in dark coloured bottles.

Q22. An optically active compound having molecular formula $C_7H_{15}Br$ reacts with aqueous KOH to gives a racemic mixture of products.Write the mechanism involved for this reaction. (3)

Q23. Kabir observed that his friend Abhay was showing a change in behavior from past couple of weeks. Abhay stayed aloof, did not play and mingle with friends. He avoided in going in any functions and parties. Kabir shares his concerns with his class teacher. The teacher calls Manish'sparent and advises them to consult a doctor. Doctor prescribes antidepressant drugs for him. (4)
(a) Name some antidepressant drugs.
(b) Mention the values shown by Kabir.
(c) How should Abhay's family help him other than medicines?

Q24 : (a) An unknown aldehyde A on reacting with alkali gives β-hydroxy aldehyde, which loses water to form an unsaturated aldehyde, 2-butenal. Another aldehyde undergoes disproportionation reaction in the presence of conc. Alkali to form product C and D. C is an aryl alcohol with formula C_7H_8O

(5)

(a) Identify A and B
(b) Write the sequence of reaction involved
(c) Name the product when 'B' react with zinc amalgam and hydrochloric acid

(b) Arrange the following in the increasing order of the property indicated :
(i) Benzoic Acid, 4-nitro benzoic acid, 3,5-di nitro benzoic acid, 4-methoxy benzoic acid (Acid strength)
(ii) Acetaldehyde, acetone, Di-tertbutylketone, methyltert-butyl ketone (reactivity towards HCl)

OR

(a) Complete each synthesis by filling the missing starting materials, reagents or product (X, Y, Z)

(i) $C_6H_5CHO + CH_3CH_2CHO \xrightarrow{NaOH} X$

Y

(ii) $CH_3CH_2CH_2CH_2OH \rightarrow CH_3CH_2CH_2COOH$

Z

(iii) $CH_3(CH_2)_9COOC_2H_5 \rightarrow CH_3(CH_2)_9CHO$

(b) How will you bring about the following conversions in not more than two steps?

(i) Toluene to benzaldehyde

(ii) Ethyl cyanide to 1-phenylpropanone

Q25 : (a) The chemistry of corrosion of iron is essentially an electro chemical phenomenon. Explain the reactions occurring during the corrosion of iron in the atmosphere. (5)

(b) A voltaic cell is set up at 25*C with the following half cells :

Al/Al^{3+} (0.01 M) and Ni/Ni^{2+} (0.5 M)

Write an equation for the reaction that occurs when the cell generates an electric current and determine the cell potential.

$E^0\ Ni^{2+}/Ni = -0.25V$, $E^0\ Al^{3+}/Al = -1.66V$ ($\log 8x10^{-6} = -0.54$)

OR

(a) Define conductivity and molar conductivity for the solution of an electrolyte. Discuss the variation of molar conductivity with concentration for a weak and strong electrolyte in an aqueous solution.

(b) In the button cell widely used in watches and other devices, the following reactions take place :

$Zn(s) + Ag_2O(s) + H_2O(l) \rightarrow Zn^{2+}(aq) + 2Ag(s) + 2OH^-(aq)$

Determine E^0 and ΔG^0 for the reaction.

Given $Zn \rightarrow Zn^{2+} + 2e^-$, $E^0 = 0.76V$ and $Ag_2O + H_2O + 2e^- \rightarrow 2Ag + 2OH^-$, $E^0 = 0.344V$

Q26 : (a) Explain giving reason : (5)

(i) Transition metals and many of their compounds show paramagnetic behavior.

(ii) The enthalpies of atomization of the transition metals are high.

(iii) The transition metals generally form coloured compounds.

(b) (i) What is lanthanide contraction? What is its effect on the chemistry of the elements which follow the lanthanoids.

(ii) Zn^{2+} salts are white while Cu^{2+} salts are blue. Explain.

OR

(a) How are interhalogen compounds formed? What general compositions can be assigned to them ?

(b) Give reason:

(i) Hydrogen iodide is a stronger acid than hydrogen fluoride in aqueous solution.

(ii) The two O-O bond lengths in the ozone molecule are equal.

(iii) PCl_5 is more covalent than PCl_3.

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