GOVERNMENT OF KARNATAKA

DEPUTY DIRECTOR, DEPT. OF SCHOOL EDUCATION (PRE-UNIVERSITY)

PUC-II YEAR PREPARATORY EXAMINATION-2024

Time : 3 Hours 15 Minutes | SUBJECT : **CHEMISTRY (34)** | MARKS : 70

Instructions : i) The question paper has 7 questions. All are compulsory.
ii) Write balanced chemical equations and draw diagrams wherever necessary. Use log table and simple calculators if necessary. (Use of scientific calculator is not allowed)
iii) Mention the correct unit for numerical problems.

PART - A

I. Select the correct option from the given choices : **15X1=15**

1) Which is an application of Henry's law
   a) Spray paint b) Bottled water
   c) Filling up attire d) Soft drinks (Soda) bottle

2) Which one of the following cells can convert chemical energy of H_2 and O_2 directly into electrical energy ?
   a) Mercury cell b) Daniel cell c) Fuel cell d) Lead storage cell

3) The quantity of charge required to obtained one mole of Aluminium from Al_2O_3 is
   a) 6 F b) 3 F c) 2 F d) 1 F

4) Half life a 1st order reaction is 4 seconds, and the initial concentration of the reaction is 0.12 M, the concentration of the reactant left after 16 seconds
   a) 0.0075 M b) 0.06 M c) 0.03 M d) 0.0015 M

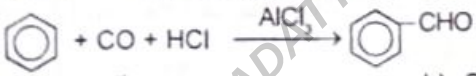
5) The metallic bond strength in 1st transition series increases from
   a) Sc to Cu b) Sc to Cr c) Cr to Zn d) Sc to Mn

6) How many ions formed when potassium hexacyanidoferrate (II) is dissolved in aqueous solution.
   a) 3 b) 4 c) 5 d) 6

7) A Grignard reagent may be made by reacting magnesium with
   a) Methyl amine b) Diethyl ether c) Ethyl iodide d) Ethyl alcohol

8) Which enzyme converts Glucose and Fructose both into Ethanol
   a) Diastase b) Invertase c) Zymase d) Maltase

9) Which of the following alcohol would react fastest with Lucas reagent at room temperature ?
   a) Tertiary alcohol b) Secondary alcohol c) Primary alcohol d) Tertiary amine

10) The reaction  + CO + HCl $\xrightarrow{AlCl_3}$ -CHO
   a) Rosenmund's reaction b) Stephen's reaction
   c) Cannizzaro's reaction d) Gutterman-Koch reaction

11) The strongest carboxylic acid among the following is
   a) Acetic acid b) Chloro-acetic acid
   c) Dichloro-acetic acid d) Trichloro-acetic acid

12) Which of the following amine cannot be prepared by Gabriel phthalimide synthesis
   a) Methanamine b) Ethanamine c) Propanamine d) Aniline

13) The correct order of basic character among the followings, in aqueous solution
   i) NH_3 ii) CH_3-NH_2 iii) $(CH_3)_2-NH$ iv) $(CH_3)_3-N$
   a) i < iv < ii < iii b) iv < i < ii < iii c) iv < ii < i < iii d) i < ii < iii < iv

14) Glucose on oxidation with Conc nitric acid to give
   a) Gluconic acid b) Glycolic acid c) Saccharic acid d) Glucaric acid

15) Which of the following nitrogenous base is not present in the DNA molecule
   a) Adenine b) Thymine c) Cytosine d) Uracil

II. Fill in the blanks by choosing the appropriate word from those given in the brackets : **5X1=5**
[Alkyl fluorides, Mn, Cr, Unimolecular reaction, $C_6H_5-SO_2-Cl$, van't Hoff factor]

16) The value of ..... is account for the extent of association and dissociation of solute in solution.
17) A reaction involving two different reactants in an elementary reaction can never be .....
18) The maximum number of unpaired electrons are present in the ground state of .....
19) Swart's reaction is useful in the synthesis of .....
20) Hinsberg's reagent is .....

PART-B

III. Answer ANY THREE of the following questions. Each questions carries two marks. **3X2=6**

21) State Raoult's law for two volatile liquid and write its mathematical expression. (2)
22) Define Pseudo-first order reaction ? Give an example. (2)
23) Write any two postulates of Werner's theory of coordination compound. (2)
24) Give reason : i) Chloroform is stored in closed dark bottles (1+1)
ii) p-dichlorobenzene has higher melting point than ortho and para isomers

25) How do you prepare acetaldehyde from acetyl chloride ? Write the equation. (2)

26) How peptide bonds are formed ? How many peptide bonds present in a tetrapeptides ? (2)

PART-C

IV. Answer ANY THREE of the following questions. Each carries three marks. 3X3=9

27) a) Transition metals and their compounds are used as good catalyst. Give any one reason. (1+2)
b) Calculate the spin only magnetic moment of Fe^{2+} ion.

28) What is Lanthanide contraction ? Write any two differences between Lanthanides and Actinides. (3)

29) Describe the process of manufacture of potassium dichromate from chromite ore. (3)

30) Write the IUPAC name and the Type of isomerism for the following complexes. (3)
i) $[Co(NH_3)_2(H_2O)_3(NO_2)_2]Cl_2$ and ii) $[Co(NH_3)_2(H_2O)_3(ONO)]Cl_2$

31) Justify the Hybridization, Geometry and Magnetic property of hexaamminecobalt (III) ion, on the basis of Valence Bond Theory. (3)

32) a) Write energy level diagram for splitting of orbital in octahedral complexes. (2)
b) Give an example for heteroleptic complex.

PART-D

V. Answer ANY TWO of the following questions : 2X3=6

33) a) What is Reverse osmosis ? Mention its application. (2+1)
b) Azeotropic mixtures cannot be separated by distillation. Give reason.

34) Draw a neat labelled diagram of SHE and write half-cell reaction. Give its E^0 value. (3)

35) What is corrosion ? Name two methods to prevent it. (3)

36) Derive integrated rate equation for rate constant of first order reaction. (3)

VI. Answer ANY FOUR of the following questions : Each carries five marks. 4X5=20

37) a) Write the mechanism of S_N1 reaction by taking ter-butyl bromide as example. (2)
b) Give any two reason : for less reactivity of Chlorobenzene towards nucleophilic substitution reactions than Chloromethane. (2)
c) Complete the reaction : $CH_3-CH=CH_2 + HI \longrightarrow$ _____ (1)

38) a) Write the mechanism of dehydration of alcohol to alkenes (3)
b) Name the product formed when Phenol is heated with
i) Zn dust and ii) Chromic acid (1+1)

39) a) Explain the preparation of Salicyclic acid from phenol by Kolbe's reaction. (2)
b) Explain the preparation of Anisole form Williamson's ether synthesis. (2)

40) a) Explain the Etard's reaction with suitable reaction (3)
b) Complete the following reaction : i) $CH_3-CO-CH_3 \xrightarrow{Zn\ /\ Hg\ in\ HCl}$ _____ $+ H_2O$
ii) $CH_3-CO-CH_3 + H_2N-NH_2 \longrightarrow$ _____ $+ H_2O$

41) a) How do you prepare the Carboxylic acid from Grignard reagent ? Write the equation. (2)
b) Explain HVZ reaction with an example. (2)
c) Write the end product $CH_3COOH + NH_3 \xrightarrow{\Delta}$ _____ $+ H_2O$ (1)

42) a) Explain Hoffman's bromamide degradation reaction for the preparation of Methanamine. (2)
b) Explain the coupling reaction of Benzene diazonium chloride with Phenol. (2)
c) Write the IUPAC name of $(CH_3)_2-N-C_2H_5$ (1)

43) a) Write and explain chemical reaction to elucidate that glucose contain six carbon atom in straight chain. (2)
b) What is denaturation of protein ? Give an example. (2)
c) Name the Vitamin stored in adipose tissues and liver. (1)

VII. Solve ANY THREE of the following : 3X3=9

44) The Boiling point of benzene is 353.23K when 1.80 gm of non-volatile solute was dissolved in 90 g of benzene, the boiling point is raised to 354.11 K. Calculate the molar mass of the solute [Given K_b for benzene 2.53 Kkg/ mol].

45) Calculate the vapour pressure of a mixture containing 50 g of liquid A (molar mass is 100g/ mol) and 75 g of liquid B (molar mass 200 g/ mol)

46) Calculate EMF of the cell for the reaction.
$Mg + Cu^{2+}_{(0.0001\ M)} \longrightarrow Mg^{2+}_{(0.001\ M)} + Cu$ Given that $E^0_{Mg^{2+}/Mg} = -2.37V$ $E^0_{Cu^{2+}/Cu} = +0.34V$.

47) The molar conductivity ($\wedge m$) of 1.028×10^{-3} M acetic acid is 48.15 $Scm^2\ mol^{-1}$. Calculate its dissociation constant (K) if limiting molar conductivity for acetic acid is 390.5 Scm^2mol^{-1}.

48) The rate of a particular reaction doubles when the temperature changes from 300 to 310 K. Calculate the energy of activation of the reaction [Given $R=8.314JK^{-1}mol^{-1}$]

49) If a first order reaction is 80% complete in 60 minute. Find the half-life period ($t_{1/2}$) of the reaction.