AS PER NEW PATTERN 2023-2024

PREPARATORY EXAMINATION-2024

SUPER COLLECTION OF QUESTION PAPERS FOR
POCKET MARKS 70/70

PUC II YEAR CHEMISTRY

COLLECTION OF DIFFERENT DISTRICT

PREPARATORY EXAMINATION JANUARY-2024

QUESTION PAPERS

By :

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KABBUR PUBLICATIONS SAVADATTI 9738237960

- ಅರ್ಪಣೆ -

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ಯಾವುದಾದರೂ ಅನಿಸಿಕೆಗಳನ್ನ ಅಥವಾ ಸಲಹೆಗಳನ್ನ ನನಗೆ ನೀಡಬೇಕು ಎನಿಸಿದರೆ ನನ್ನ **phone number 9738237960** ಗೆ ತಿಳುಹಿಸಬಹುದು.

CHEMISTRY
SUPER COLLECTION OF QUESTION PAPERS FOR
POCKET MARKS 70/70

KABBUR PUBLICATIONS SAVADATTI 9738237960

DEPARTMENT OF SCHOOL EDUCATION (PU), BAGALKOTE

II PUC Preparatory Examination - Jan. - 2024

Time : 3.15 hours   **Sub : CHEMISTRY (34)**   Marks : 70

Instructions :
1) Question paper has Five parts. All parts are compulsory.
2) a. Part- A carries 20 marks. Each question carries 1 mark.
    b. Part- B carries 06 marks. Each question carries 2 mark.
    c. Part- C carries 15 marks. Each question carries 3 mark.
    d. Part- D carries 20 marks. Each question carries 5 mark.
    e. Part- E carries 09 marks. Each question carries 3 mark.
3) In Part – A questions, first attempted and answer will be considered for awarding marks.
4) Write balanced chemical equations and drae near labeled diagrams and graphs wherever necessary.
5) Direct answer to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6) Use log tables and simple calculator if necessary (use of scientific calculator is not allowed).

PART – A

I. Select the correct option from the given choices.   1x15 = 15

1. Increasing the temperature of an aqueous solution will cause
   a) decrease in molarity   b) decrease in molality
   c) decrease in mole fraction   d) decrease in mass % (w/w)

2. In an electrolytic cell, the flow of electrons is from
   a) cathode to anode in solution   b) cathode to anode through external supply
   c) cathode to anode through internal supply   d) anode to cathode through internal supply

3. In the electrolysis of dil H_2SO_4, the gas librated at anode is
   a) H_2 b) SO_4^{2-} c) SO_2 d) O_2

4. Half life period is independent of initial concentration of reactant for
   a) 1st order reaction   b) 2nd order reaction   c) zero order reaction   d) 3rd order reaction

5. The basic character of the transition metal monoxides follows the order
   a) VO> CrO > TiO > FeO   b) CrO > Vo > FeO > TiO
   c) TiO > FeO > VO > CrO   d) TiO > VO > CrO > FeO

6. The more stable complexes containing
   a) unidentate ligand   b) Bi dentate ligand   c) chelate ligand   d) ambidentate ligand

7. Haloarenes undergo usually
   a) Addition reactions   b) electrophillic reactions   c) nucleophillic reactions   d) Elimination reactions

8. Quinol is an example for
   a) 1° alcohol   b) dihydric alcohol   c) Phenol   d) dihydroxy benzene

9. In case of anisole, by protonation of ether, the ion formed is
   a) carbanion   b) carbocation   c) methyphenyl oxonium ion   d) methyl ion

10. The reagent used to stop the oxidation of methyl benzene to benzoic acid is
   a) CrO_2Cl_2 b) $CrOCl_2$ c) Cr_2OCl_2 d) Cr_2O_2Cl

11. On nitration of benzoic acid, the electrophile is subistituted at
   a) ortho position   b) meta-position   c) para position   d) both O & P position

12. Between Arylamine & ammonia Which has higher Pk_b value
   a) Arylamine higher   b) Ammonia higher   c) Arylamine lower   d) none of these

13. The colour of p-aminoazobenzene is
   a) Red   b) orange   c) Green   d) Yellow

14. The monosaccharide found in honey is
   a) Glucose   b) Fructose   c) Maltose   d) sucrose

15. Pick out which is not a hormone
   a) cytosine   b) glucagon   c) steroid   d) epinephrine

II. Fill in the blanks by choosing the appropriate word from those given in the brackets: (Internal compensation, positive, steric factor, hydrogen, V_2O_5)   1x5 =05

16. A solution of acetone in ethanol shows _____ deviation from raoults law.

17. In collision theory, rate $= PZ_{AB}^{-Ea/RT}$ P stands for _____

18. _____ is amphoteric in nature.

19. The optical inactivity of racemic mixture is because of _____

20. Solubility of $C_2H_5NH_2$ in water is due to the formation of _____ bonding

PART –B

III. Answer any Three of the following. Each question carries two marks.   3x2 = 6

21. State Raoult's law. Write its mathematical expression

22. Define pseudo First order Reaction. Give an Example.

23) What are cationic complexes ? give one example.

24) Name the reagent used in Finkelstein reaction. Mention its role.

25) How does ethanal (acetaldehyde) reacts with hydroxyl amine ? Write chemical equation.

26) Draw Haworth structure of sucrose.

PART – C

IV. Answer any Three of the following. Each question carries three marks   3x3= 09

27) Write balanced equations for the manufacture of potassium dichromate from chromite ore

28) Transition metals act as good catalyst. Write three reasons.

29) Give any three differences between lanthanides & actinides.

30) Mention the type of isomerism exhibited by $[C_0(H_2O)_6] Cl_3$ & $[C_0(H_2O)_5Cl] Cl_2. H_2O$.
Write IUPAC names of the complexes.

31) Using VBT, explain hybridization, geometry & magnetic property of $[Co(NH_3)_6]^{3+}$ ion.
(atomic number of cobalt = 27)

32) Draw energy level diagram for crystal field splitting in octahedral complexes.
Write relation between Δ_0 & pairing energy in weak field ligands.

V. Answer any two of the following. Each question carries three marks.   2x3=06

33) Write any three characteristics of ideal solutions.

34) State kohlrausch law of independent migration of ions? Mention two applications of it.

35) Explain the experimental determination of conductance of electrolytic solution by using wheatstone bridge.

36) Derive integrated rate equation for zero order reaction.

PART – D

VI Answer any four of the following. Each question carries five marks.   4 x 5 = 20

37) a) Write the mechanism of SN^1 reaction of $(CH_3)_3$ C- Br. Why protic solvent is used in SN^1 mechanism.
b) Define stereocenter ? How many asymmetric carbon atoms are there in 2,3 dichlorobutane ?

38) a) Explain with equation cumene process. Name the products.
b) Convert salicylic acid into acetyl salicylic acid with equation

39) a) An organic compound A having molecular formula C_6H_5Cl, react with sodium methoxide compound B is formed. B is treated with acetyl choride in the presence of Lewis acid gives two organic compounds C & D. Write chemical reactions & names of B,C,D.
b) What denaturation of alcohol ?

40) a) Identify B $C_6H_6 \xrightarrow[\text{An Alcl}_3/\text{CuCl}]{B} C_6H_5CHO$. Name the reaction
b) Explain aldol condensation reaction of ethanal
c) Name a test to distinguish between acetone & acetaldehyde.

41) a) A grignard reagent 'X' reacts with CO_2 (dry ice) followed by acid hydrolysis gives ethanoicacid. Write chemical equation. Name the compound 'X' ?
b) Write decarboxylation reaction of sodium benzoate.

42) a) Explain Gabriel phthalimide synthesis for the preparation primary amines.
b) Illustrate with equation carbylamine reaction.

43) a) Write chemical reactions to show glucose contains.
i) Six carbon atoms in a straight chain   ii) presence of carbonyl group   iii) five –OH groups
b) What is Zwitter ion of an amino acid? Give its general structure.

PARR – E

VII Answer Any three of the following. Each question carries three marks.   3x3 =09

44) 12.6g of non- electrolyte is dissolved in 75g of water. The freezing point of this solution is 271.9K Calculate molar mass of the solute. (Freezing point of pure water & molar depression constant of water are 273. 15K & $1.86 K Kgmol^{-1}$ respectively)

45) The boiling point of benzene is 353.23 K. When 1.8 of non – voltaile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11K. calculate the molar mass of the solute.
(Given K_b for benzene is $2.53 K Kgmol^{-1}$)

46) Calculate the emf of the cell in which the following reaction takes place and represent the cell.
$$Ni_{(s)} + 2Ag^+_{(0.002M)} \longrightarrow Ni^{2+}_{(0.160M)} + 2Ag_{(s)} \quad (given\ E^0_{cell} = 1.05V)$$

47) The resistance of 0.01M acetic acid solution is found to be 220Ω, when measured in a cell has two electrodes of area of cross section $3.8 cm^2$ placed 10.5cm apart. Calculate conductivity.

48) The initial concentration of N_2O_5 in the following first order reaction
$N_2O_5(g) \to 2NO_2(g) + 1/2O_2$ (g) was 1.24×10^{-2} mol L^{-1} at 318 K. The concentration of N_2O_5 after 60 minutes was 0.20×10^{-2} mol L^{-1} at 318 K. calculate the rate constant of the reaction at 318 K.

49) The rate of a particular reaction doubles when temperature changes form 27^0 C to 37^0C, calculate the energy of activation. (R = 8.314 JK^{-1} mol^{-1}.)

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DISTRICT LEVEL II PUC PREPARATORY EXAM, JANUARY – 2024

Time: 3 Hrs. 15 Mins.   Sub: CHEMISTRY (34)   Max. Marks: 70

General Instructions:
1. The question paper has five parts. All the four parts are compulsory.
2. (a) Part – A carries 20 marks, each question carries one mark.
   (b) Part – B carries 06 marks, each question carries two marks.
   (c) Part – C carries 15 marks, each question carries three marks.
   (d) Part – D carries 20 marks, each question carries five marks.
   (e) Part – E carries 09 marks, each question carries three marks.
3. In Part – A question, first attempted answer will be considered for awarding marks.
4. Write balanced chemical equations and draw diagrams wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks
6. Use log table and simple calculators if necessary. (Use of scientific calculator is not allowed).

PART – A

I. **Select the correct option from the given choices:** $15 \times 1 = 15$

1. Acetic acid dissolved in benzene shows a molecular mass of
   (A) 30   (B) 60   (C) 120   (D) 180

2. Molar conductivity of electrolytic solution
   (A) increase with dilution
   (C) remains same
   (B) decreases with dilution
   (D) None of these

3. A certain half cell reaction $X + e^{\ominus} \rightarrow X^-$ has very large value of negative reduction potential, this implies that
   (A) X can be readily reduced
   (B) X can be readily oxidized
   (C) X^- can be readily reduced
   (D) X^- can be readily oxidized

4. Which of the following is an acceptable value of molecularity?
   (A) 5   (B) 0   (C) 3 / 2   (D) 2

5. In the transition series the element with highest melting point is
   (A) Mn   (B) Fe   (C) Cr   (D) Cu

6. The IUPAC name of $\left[Co(NH_3)_5 (NO_2) \right] Cl_2$ is
   (A) pentaammine nitrito – N – cobalt (III) chloride
   (B) pentaammine nitrito – O – cobalt (III) chloride
   (C) pentaammine nitrato – N – cobalt (III) chloride
   (D) None of these

7. The reactivity the following alkyl halides towards SN^2 reaction is in the order
   (A) $CH_3F < CH_3Cl > CH_3Br > CH_3I$
   (B) $CH_3F < CH_3Cl > CH_3Br > CH_3I$
   (C) $CH_3F < CH_3Cl > CH_3Br > CH_3I$
   (D) None of these

8. Which of the following has lowest boiling point?
   (A) Phenol   (B) o – nitrophenol   (C) p – nitrophenol   (D) m – nitrophenol

9. Rectified spirit is
   (A) ethyl alcohol mixed with methyl alcohol
   (C) 95.6% ethanol + 4.4% water
   (B) 50% ethanol + 50% water
   (D) 75% ethanol + 25% water

10. Highest boiling point among the following compounds CH_3CHO, CH_3CH_2OH, CH_3COCH_3, $CH_3 - CH_2 - CH_3$
    (A) CH_3COCH_3
    (C) $CH_3 - CH_2 - CH_3$
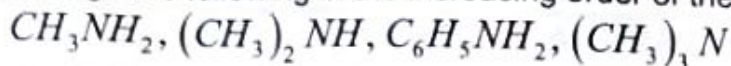   (B) CH_3CHO
    (D) CH_3CH_2OH

1

P.T.O.

11. $CH_3 - CHO + HCN \rightarrow A$; compound A on hydrolysis gives

(A) $CH_3 - CH_2 - COOH$

(B) $CH_3 - CH_2 - CH_2 - NH_2$

(C) $CH_3 - CO - COOH$

(D) $CH_3 - CH - COOH$
$\quad\quad\quad\quad\quad\quad\;\;|$
$\quad\quad\quad\quad\quad\quad\;\;OH$

12. Which of the following gives carbylamines reaction

(A) Aniline

(B) N - methylaniline

(C) N, N – dimethylaniline

(D) dimethylamine

13. Arrange the following in the increasing order of their basic strength

$CH_3NH_2, (CH_3)_2 NH, C_6H_5NH_2, (CH_3)_3 N$

(A) $C_6H_5NH_2 > (CH_3)_3 N > CH_3NH_2 > (CH_3)_2 NH$

(B) $(CH_3)_3 N > C_6H_5NH_2 > (CH_3)_2 NH > CH_3NH_2$

(C) $CH_3NH_2 > C_6H_5NH_2 > (CH_3)_3 N > (CH_3)_2 NH$

(D) $C_6H_5NH_2 < (CH_3)_3 N < CH_3NH_2 < (CH_3)_2 NH$

14. The carbohydrate which is essential constituent of plant cells is

(A) Starch

(B) Cellulose

(C) Fructose

(D) Maltose

15. Which of the following constitute the genetic material of the cell?

(A) Nucleic acid

(B) Proteins

(C) Lipids

(D) Carbohydrates

II. **Fill in the blanks choosing the appropriate word from those given in the brackets:** 5 × 1 = 5

[*whole number, higher, decreases, Hydrogen bonding, DDT, low solubility*]

16. The solubility gas in liquids _____ with the increase in temperature.

17. Molecularity of the reaction is always _____.

18. Interstitial compounds have _____ melting point then those of pure metals.

19. The substance which is not metabolized by the animals and many species of insects developed resistance to _____.

20. Tertiary amine have low boiling point than primary amines and secondary amines due to absence of _____.

PART – B

III. **Answer any THREE of the following questions. Each question carries two marks:** 3 × 2 = 6

21. What are azeotropes? Give example.

22. Define collision frequency and temperature co-efficient.

23. What is heteroleptic complex? Give an example.

24. Explain Swartz reaction with example.

25. $CH_3 - CHO$ is more reactive than CH_3COCH_3 towards nucleophilic addition reaction. Give reason.

26. What are hormones? Give an example.

P.T.O.

2

PART – C

IV. Answer any **THREE** of the following. Each question carries three marks: $3 \times 3 = 9$

27. Describe the preparation of potassium permanganate from pyrolusite using chemical equations.

28. Calculate the spin only magnetic moment of $Mn^{+2}_{(aq)}$ ion (Z = 25).

29. What is lanthanoid contraction? Write any two of its consequences.

30. Write any three postulation of Werner's theory of coordination compounds.

31. Using VBT, explain geometry, hybridization and magnetic property of $\left[Ni(CN)_4 \right]^{-2}$ ion. [Atomic number of Ni is 27]

32. What are facial and meridional isomers? Give example.

V. Answer any **TWO** of the following. Each question carries three marks: $2 \times 3 = 6$

33. (a) State Roult's law of relative lowering of vapour pressure and Henry's law. [2M]
    (b) Define osmotic pressure. [1M]

34. Describe the construction and working of SHE with neat labelled diagram.

35. Write the cathodic, anodic and overall reactions taking place in $H_2 - O_2$ fuel cell.

36. Derive the integrated rate equation for first order gas phase reaction.

PART – D

VI. Answer any **FOUR** of the following. Each question carries FIVE marks: $4 \times 5 = 20$

37. (a) Explain the mechanism of SN^2 reaction with example. [3M]
    (b) What are enantiomers? Give example. [2M]

38. (a) Explain the mechanism of hydrolysis of ethene to ethanol. [3M]
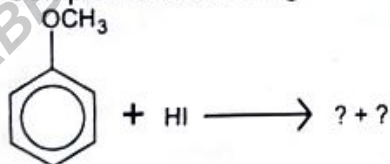   (b) Describe Williamson's ether synthesis. [2M]

39. (a) What happens when phenol is treated with NaOH solution in the presence of CHCl$_3$? Give reaction. [3M]
    (b) Complete the following: [2M]
    OCH$_3$

    ⬡ + HI ⟶ ? + ?

40. (a) An organic compound with molecular formula C_6H_5Br on treatment with Mg in dry ether gives compound 'A'. The compound 'A' on treatment with CO_2 (dry ice) to form an addition compound 'B'. Then 'B' on acid hydrolysis gives 'C'. Identify the compound A, B and C.
    (b) Explain Clemmenson's reduction with an example. [3M]
    [2M]

3

P.T.O.

41. (a) Explain aldol condensation reaction with example. [3M]
    (b) Write Hell – Volhard – Zelinsky reaction with example. [2M]
42. (a) Describe Gabriel's reaction with example. [3M]
    (b) Explain carbylamines reaction. [2M]
43. (a) Write the reaction two show six unbranched carbon atoms in glucose. [2M]
    (b) Write Haworths structure of $\alpha - D(+)$ glucopyranose. [2M]
    (c) Name the disease caused by the deficiency of Vitamin C. [1M]

PART – E

VII. **Answer any <u>THREE</u> of the following. Each question carries THREE marks:** $3 \times 3 = 9$

44. An aqueous solution of glucose is 10% by mass of glucose at 303K. the vapour pressure of pure water at 303K is 32.8 mm of Hg. What is the vapour pressure of solution?

45. An aqueous solution of 0.6 g of a solute 'X' in 27.1 g of water freezes at 272.187 K. If the cryoscopic constant of water is $1.86 K\,Kg\,mol^{-1}$, calculate the molecular mass of X.

46. The equilibrium constant for the following cell reaction was found to be 6.509×10^8. Calculate the standard cell potential. $Cd_{(s)} + Sn^{+2}_{(aq)} \rightarrow Cd^{+2}_{(aq)} + Sn_{(s)}$

    $(R = 8.314 Jk^{-1}mol^{-1}, \ F = 96500\,C)$

47. Calculate the molar conductance of 0.15M acetic acid solution if its conductivity at 298K is $1.6 \times 10^{-4}\,Scm^{-1}$.

48. Half-life period of a first order reaction is 30 seconds. Calculate the time required for the 2/3rd completion of the reaction.

49. A reaction is found to have a rate constant 3.46×10^{-5} at 25°C and a rate constant 4.87×10^{-3} at 65°C. Calculate activation energy for the reaction. $(R = 8.314 Jk^{-1}mol^{-1})$..

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4

II PUC PREPARATORY EXAMINATION, JANUARY- 2024

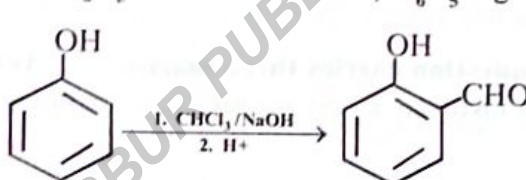Time : 3 Hrs. 15 Mins. **SUBJECT : CHEMISTRY (34)** Max Marks : 70

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   c) Part-C carries 15 marks. Each question carries 3 marks.
   d) Part-D carries 20 marks. Each question carries 5 marks.
   e) Part-E carries 09 marks. Each question carries 3 marks.
3) In Part-A questions first attempted answer will be considered for awarding marks.
4) Write balanced chemical equations and draw neat labeled diagram and graphs wherever necessary.
5) Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6) Use log tables and simple calculators if necessary. (Use of Scientific Calculator is not allowed)

PART - A

I Select the correct option from the given choices. 1x15=15

1) Relative lowering of vapour pressure is equal to the
   a) Mole fraction of the solute
   b) Mole fraction of the solvent
   c) Molarity of the solution
   d) Molality of the solution

2) When the Daniel cell is in use
   a) Zn^{2+} are reduced to Zn
   b) Zn is oxidized to Zn^{+2}
   c) Cu is oxidized to Cu^{+2}
   d) Copper goes on dissolving

3) The SI unit of molar conductivity is
   a) S
   b) m^{-1}
   c) Sm^{-1}
   d) $Sm^2 \, mol^{-1}$

4) Order of a reaction is determined by
   a) balanced chemical equation
   b) unbalanced chemical equation
   c) experimental rate expression
   d) Thermo-Chemical equation

5) Which of the following elements are not regarded as transition metals
   a) Zn, V and Cd
   b) Zn, CO and Mn
   c) Cd, Ti and Mn
   d) Zn, Cd and Hg

6) The denticity of the ethylene diamine tetra acetate ligand is
   a) 2
   b) 3
   c) 1
   d) 6

7) Chlorobenzene reacts with magnesium in dry ether to give a compound A, A is
   a) C_6H_5OH
   b) $C_6H_5 MgCl$
   c) $C_6H_5CH_2 MgCl$
   d) $MgCl_2$

8)

   This reaction is known as
   a) Reimer-Tiemann reaction
   b) Kolbe's reaction
   c) Cumene process
   d) Wurtz reaction

9) Which one of the following on oxidation gives a ketone
   a) Primary alcohol
   b) Secondary alcohol
   c) Tertiary alcohol
   d) All of these

10) Oxidising agent used in Etards reaction is
   a) $H_2 - Pd$
   b) CrO_3
   c) CrO_2Cl_2
   d) $KMnO_4$

11) Sodium salt of carboxylic acids are converted into hydrocarbons by
   a) Dehydration
   b) Dehydrohologenation
   c) Decarboxylation
   d) Dehalogenation

12) Which of the following amines cannot be prepared by Gabriel Synthesis.
   a) Methanamine
   b) Ethanamine
   c) Propanamine
   d) Aniline

(P.T.O.)

13) During diazotization, the nitrous acid is produced in the reaction mixture by the reaction of
   a) $NaNO_2$ & HCl   b) $NaNO_3$ & HCl   c) $NaNO_2$ & HNO_3 d) $NaNO_3$ & HNO_3

14) Lysine is
   a) Basic amino acid
   b) Acidic amino acid
   c) Amino acid synthesised in body
   d) Non-essential amino acid

15) In DNA, complementary bases are
   a) A = T and G ≡ C   b) A = T and G ≡ U   c) A = G and T ≡ U   d) A ≡ U and T = G

II   Fill in the blanks by choosing the appropriate word from those given in the brackets: 5x1=5

(Effective nuclear charge, ppm, nitrogen, Instantaneous rate, molarity, freons)

16) If solute is present in trace amounts, then conc is expressed in _____.
17) The rate of reaction at a particular moment of time is called _____.
18) Lanthanoid contraction is due to increase in _____.
19) The chlorofluorocarbon compounds of methane and ethane are called _____.
20) The gas liberated when ethyl amine reacted with HNO_2 at low temperature is _____.

PART-B

III   Answer any THREE of the following. Each question carries two marks.   3x2=6

21) Mention any two application of Henry's law.
22) Define order of a reaction. For which order reaction the unit of rate of reaction and rate constant is same ?
23) What is an ambidentate ligand ? Name the type of structural isomerism that arise in the co-ordination compound containing such a ligand.
24) Explain the Swart's reaction with an example.
25) How do you prepare an aldehyde from acid chloride ? Name the reaction.
26) Which hormone
   a) Decreases blood sugar level
   b) Responsible for preparing the uterus for implementation of fertilized egg ?

PART-C

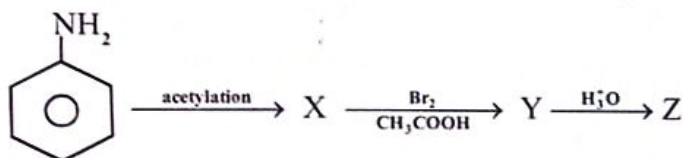**IV   Answer any THREE of the following. Each question carries three marks.**   3x3=9

27) Write the chemical equations for the reactions involved in the manufacture of Potassium dichromate from chromite ore.
28) Write the differences between lanthanoides and actinoides with reference to
   i) Strucutral variability   ii) Chemical reactivity   iii) Electronic configuration
29) Calculate the Magnetic moment of Mn^{+2} ion. (atomic number of Mn = 25)
30) Explain hybridization, geometry and Magnetic Property of $[Ni(CN)_4]^{-2}$ ion using valence bond theory (atomic number of Ni is 28)
31) a) Write the IUPAC nomenclature of the complex $[Cr(NH_3)_3(H_2O)_3]Cl_3$
   b) Define ionization isomerism. Give an example.   (1+2)
32) a) What is Spectrochemical Series ?
   b) Differentiate between strong field ligands and weak field ligands.   (1+2)

(P.T.O.)

-3-

V   **Answer any TWO of the following. Each question carries three marks.**   2×3=6

33)   a) What is reverse osmosis ? Give one application of its practical utility.

     b) What is the SI unit of molality.   (2+1)

34)   Draw the schematic diagram of Hydrogen-oxygen Fuel cell and write the overall cell reaction.

35)   a) Name any two methods to prevent corrosion.

     b) State Faraday's First law of electrolysis.   (2+1)

36)   Derive an integrated rate equation for a first order reaction.

PART-D

VI   **Answer any FOUR of the following. Each question carries Five marks.**   4×5=20

37)   a) Explain : SN^2 mechanism with an example.

     b) Give one reason : Aryl halides are less reactive towards nucleophilic substitution reaction.

     c) Explain Fittig reaction with an equation.   (2+1+2)

38)   a) How is phenol manufactured by Cumene process ?

     b) Explain Kolbe's reaction with equation.   (3+2)

39)   a) Explain the mechanism of acid catalyzed dehydration of ethanol to ethene.

     b) Name the main product formed in the following reactions

      i) $CH_3 - CH = CH - CH_2OH \xrightarrow[(O)]{PCC}$

      ii) $CH_3 - CH_2 - OH \xrightarrow[573K]{Cu/Ag}$ (3+2)

40)   a) How does propanone reacts with hydrazine ? Give equation.

     b) Name the reagent used in the Clemmensen reduction.

     c) Explain Cannizzaro's reaction taking benzaldehyde as an example write equation. (2+1+2)

41)   a) pKa values of three Carboxylic acids A, B and C are 12.3, 14.6, 9.8 respectively. Arrange them in the increasing order of their acidic strength.

     b) Explain esterification reaction and write the Chemical equation for the same.

     c) What is the effect of electron releasing group on the acidity of carboxylic acids ?(2+2+1)

42)   a) Give reason

      In the isomeric amines Butanamine has more boiling point than N, N - dimethylmethanamine

     b) What is Hinsberg reagent ?

     c) Identify the products X, Y and Z in the following conversion

NH₂

$$\bigcirc \xrightarrow{acetylation} X \xrightarrow[CH_3COOH]{Br_2} Y \xrightarrow{H_2O} Z$$

     (1+1+3)

43)   a) Write the Haworth's structure of "Lactose".

     b) What are non-essential amino acids ? Give one example.

     c) Name the disease caused by the deficiency of vitamin D.   (2+2+1)

(P.T.O.)

PART-E (Problems)

VII Answer any THREE of the following. Each question carries three marks.   3x3=9

44) Vapour pressure of dichloromethane (molar Mass = 119.5g/mol) and chloroform (molar Mass 85g/mol) at 298K are 200 and 415 mm Hg respectively. Calculate the Vapour pressure of the solution prepared by mixing 25.5g dichloromethane and 40g of chloroform at 298 K.

45) The boiling point of benzene is 353.23 K. When 1.80g of a non-volatile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11 K. Calculate the molar mass of the solute. K_b for benzene is 2.53 K kg mol^{-1}.

46) The resistance of 0.1 MKCl solution is found to be 520Ω and shows a conductivity value of 0.248 S cm^{-1}. Find the value of cell constant.

47) The molar conductivity at infinite dilution of $Al_2(SO_2)_3$ is 858 Scm^2 mol^{-1}. Calculate the molar ionic conductivity of Al^{3+} ion, Given that $\lambda^0 SO_4^{-2}$ = 160 Scm^2 mol^{-1}

48) For the first order reaction, half-life period of the reaction is 120 minutes, calculate the time taken to complete 90% of the reaction.

49) The specific reaction rate of a reaction triples when the temperature changes from 30°C to 50°C. Calculate the energy of activation of the reaction (R = 8.314 JK^{-1}mol^{-1})

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II PUC PREPARATORY EXAMINATION, JANUARY- 2024

SUBJECT : CHEMISTRY (34)

Time : 3 Hrs. 15 Mins.   Max Marks : 70

Instructions :
1) The question paper has FIVE parts. All parts are compulsory.
2) a) Part-A carries 20 marks. Each question carries 1 mark.
   b) Part-B carries 06 marks. Each question carries 2 marks.
   c) Part-C carries 15 marks. Each question carries 3 marks.
   d) Part-D carries 20 marks. Each question carries 5 marks.
   e) Part-E carries 09 marks. Each question carries 3 marks.
3) In Part-A questions, first attempted answer will be considered for awarding marks.
4) Write balanced chemical equations and draw neat labeled diagrams and graphs wherever necessary.
5) Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6) Use log tables and simple calculators if necessary. (Use of Scientific Calculator is not allowed)

PART - A

I   Select the correct option from the given choices.   1x15=15

1) Soda-water is an example for
   a) Binary Solution   b) Quaternary solution   c) Tertiary solution   d) Not a solution

2) Red-blood cells shrinks, when it is placed in a
   a) Hypotonic solution   b) Hypertonic solution   c) Isotonic solution   d) Saturated solution

3) The value of energy of activation for a radioactive decay is
   a) High   b) Low   c) almost zero   d) moderate

4) Which of the following is also known as 'Trial and error' method ?
   a) integrated method   b) isolation method   c) initial rate method   d) Half-life method

5) Which among is not used in the most common fuel cells ?
   a) Hydrogen gas   b) Methane   c) Methanol   d) Acetone

6) The amount of charge used to convert one mole of Al^{3+} to Al.
   a) 2,89,461 coloumbs   b) 19,2974 C   c) 96,500 C   d) 48,2435 C

7) Brass is an Alloy of
   a) Cu + Zn   b) Cu + Sn   c) Cu + Mg   d) Cu + Al

8) Actinoids belongs to _____ in the modern periodic table
   a) 7th period, III B group   b) 7th period, III A group
   c) 6th period, III B group   d) 6th period, III A group

9) The co-ordination compound is used in the treatment of cancer tumours
   a) Cis-platin   b) trans-platin   c) EDTA   d) Diethyl glyoximate

10) The molecular formula of Freon-12 is
    a) CF_4 b) CF_3Cl c) CF_2Cl_2 d) $CFCl_3$

11) Lucas reagent is a mixture of
    a) Antrydrous $ZnCl_2$ + Con HCl   b) Aqueous $ZnCl_2$ + Con HCl
    c) Anhydrous $ZnCl_2$ + Dil HCl   d) Dilute $ZnCl_2$ + Con HCl

12) The role of Conc H_2SO_4 in esterification reaction is
    a) As a catalyst   b) as a Dedydratising agent
    c) Both as a catalyst and dehydrating agent   d) None of the above

13) The Benzene Diazonium Chloride (BDC) reacts with Aniline in acidic medium at $273 - 278$ K to form coupling compound known as
    a) p-amino azobenzene   b) O-amino azobenzene
    c) m-amino azobenene   d) All the above

14) The Hybridisation of Nitrogen atom in Tertiary amine is
    a) sp^2 b) sp^3 c) sp d) sp^3d

15) The Amino-acid containing sulphur is
    a) Glycine   b) Lysine   c) Cysteine   d) Tyrosine   (P.T.O.)

II Fill in the blanks by choosing the appropriate word from those given in the brackets:

5x1=5

(paraldehyde, Darzen's process, Chirality, Achirality, Phenol, Testosterone)

16) The preparation of alkyl chloride from alcohol and thionyl chloride is known as _____.

17) The condition for optical activity is _____.

18) _____ is used in Medicine as a hypnotic.

19) Benzene diazonium chloride solution hydrolysed at a temperature of 283 K to _____.

20) _____ Harmone is reason for the development of secondary sex characters in Males.

PART-B

III Answer any THREE of the following. Each question carries two marks.   3x2=6

21) Give reasons
   a) Soda water and soft drinks are sealed under high pressure.   (1M)
   b) the i-value for aqueous KCl is more than ethanol in Benzene.   (1M)

22) What is pseudo-first order reaction ? Give one example.

23) Draw the geometrical isomers of $\left[Fe(NH_3)_2(CN)_4\right]^-$.

24) "Haloalkanes react with KCN to form alkyl cyanides as main product, while AgCN forms isocyanide as the Chief product". Give reason.

25) Explain the following reaction $A + B \xrightarrow[\substack{200-300\ atm \\ 373-673\ K}]{Zn o-Cr_2O_3} CH_3OH$.

26) Write the 'Haworth's structure for Sucrose [cane sugar].

PART-C

IV Answer any THREE of the following. Each question carries three marks.   3x3=9

27) Calculate the spin only magnetic moment of $M_{(aq)}^{3+}$ ion (Z = 24).

28) Write the equations for the preparation of potassium permanganate from MnO_2.

29) Give any three General Characteristics of Actinoids.

30) a) What is denticity ? Give one example.   (2M)
   b) Write the IUPAC name of $K_2[Zn(OH)_4]$.   (1M)

31) Using valence bond theory (VBT), explain Geometry, hybridisation and magnetic properties of $[CoF_6]^{3-}$ ion. [Atomic no. of cobalt is 27]

32) What are Metal carbonyls ? Explain Synergic pairing effect in Metal Carbonyl.

V Answer any TWO of the following. Each question carries three marks.   2x3=6

33) Write any three differences between positive and negative deviations of Non-ideal solutions.

34) What is Molar Conductivity ? Explain the variation of specific conductance (K) and molar conductivity (λ_m) with dilution.

35) Explain the working function of Lead-Storage battery.

36) Derive integrated rate equation for first order reaction.

PART-D

VI Answer any FOUR of the following. Each question carries Five marks.   4x5=20

37) a) State "Saytzeff's rule (Zaitsev) with an example.
   b) 'Aryl halides are less reactive towards nucleophilic substitution reaction."
   c) What are enantiomers ?   (2+2+1)

38) a) Explain the Mechanism of hydration of alkenes to alcohols.
   b) How do you prepare picric acid from phenols ?   (3+2)

(P.T.O.)

39) a) Give name of the reagents to bring about following transformations.
   i) Hexan-1-ol to Hexanal
   ii) Cyclohexanol to cyclohexanone
   iii) But-2-ene to ethanal.
   b) Explain the effect of substituents on the acidity of carboxylic acids.   (3+2)

40) a) What is decarboxylation ? Give one example.
   b) Explain the reaction of Ketone with 2, 4 - DNPH with an example.
   c) What is Formalin ?   (2+2+1)

41) a) What happens when vapours of 1°, 2° and 3° alcohols are passed over heated copper at 573 K ?
   b) An organic compound 'A' refluxed with alkaline $KMnO_4$ followed by Acid hydrolysis gives benzoic acid. Write chemical equation and name the compound "A".   (3+2)

42) a) An organic compound 'A' on treatment with aqueous ammonia and heating forms compound 'B', which on heating with Br_2 and KOH forms a compound 'C' of molecular formula C_6H_7N. Write the names of the compound 'A', 'B' and 'C'.
   b) Give reason
      a) Aliphatic amines of lower molecular mass soluble in water.
      b) Dimethylamine is more basic than methyl amine.   (3+1+1)

43) a) Write the reaction to show that carbonyl group in Glucose is an aldehydic group.
   b) What is 'Zwitter ion' of amino acid ? Give it's general structure.
   c) How many hydrogen bonds are present in Guanine and Cytosine.   (2+2+1)

PART-E (Problems)

VII **Answer any THREE of the following. Each question carries three marks.**   3x3=9

44) Calculate the osmotic pressure of 5% $\left(\dfrac{M}{V}\right)$ solution of urea at 300K.

   [Molar mass of urea is 60g/mol]

45) 18gm of Glucose ($C_6H_{12}O_6$) is dissolved in 1 Kg of water in a saucepan. At what temperature will water boil at 1.013 bar ? [K_b for water is 0.52 K Kg mol^{-1}, Molecular mass of Glucose is 180 g/mol. B.P of water is 100°C].

46) The resistance of a 1 M salt solution occupying a volume between two platinum electrodes 1.8 cm apart and 5.4 cm² in area was found be 32 Ω. Calculate the conductivity of a solution.

47) In the button cells, widely used in watches and other devices in the following reaction takes place

   $$Zn_{(s)} + Ag_2O_{(s)} + H_2O_{(l)} \longrightarrow Zn^{2+}_{(aq)} + 2Ag_{(s)} + 2OH^{\ominus}_{(aq)}$$

   Determine ΔG^o for the reaction.

   $$\left[E^0_{Zn} = -0.76V \text{ and } E^0_{Ag} = +0.34V \right]$$

48) The rate of a particular reaction doubles when temperature changes from 27°C to 37°C. Calculate the energy of activation.

49) The decomposition of N_2O_5 in CCl_4 at 318 K has been studied by monitoring the concentration of N_2O_5 in the solution. Initially, the concentration of N_2O_5 is 2.33 mol L^{-1} and after 184 minute it is reduced to 2.08 mol L^{-1} the reaction takes place according to the equation.

   $$2N_2O_{5(g)} \longrightarrow 4NO_{2(g)} + O_{2(g)}$$
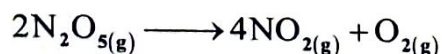
   Calculate the average rate of reaction interms of minutes and the rate of production of NO_2 during this period.

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B   **SECOND PUC PREPARATORY EXAMINATION – JANUARY 2024**
Sub: CHEMISTRY (34)

Time: 3 Hrs. 15 Min.   Total Marks: 70

Instructions:

(i)   The question paper has Five parts. All the parts are compulsory.

(ii)   Part – A carries 20 marks. Each question carries one mark.
Part – B carries 6 marks. Each question carries two marks.
Part – C carries 15 marks. Each question carries three marks.
Part – D carries 20 marks. Each question carries Five marks.

Part – E carries 9 marks. Each question carries three marks.

(iii)   In part – A questions, first attempted answer will be considered for awarding marks.

(iv)   Write necessary balanced chemical equations and draw neat labeled diagrams and graphs.

(v)   Direct answers to the numerical problems will not be considered without writing detailed steps and scientific units for find answer will not carry any marks.

(vi)   Use log tables and simple calculator if necessary. (use of scientific calculator is not allowed)

PART – A

I. Select the correct option from the given choices. $15 \times 1 = 15$

1. Solubility of a gas in a liquid.

   (a) Increases with increase in temperature

   (b) Decreases with increase in temperature

   (c) Unaffected on changing the temperature

   (d) Decreases with increase in pressure

2. When the Daniell cell in use.

   (a) Zn^{+2} are reduced to Zn (b) Zn is oxidized to Zn^{+2}

   (c) Cu is oxidized to Cu^{+2} (d) copper goes on dissolving

3. During the electrolysis of molten NaCl using platinum electrodes the products liberated at a anode and cathode are respectively

   (a) Cl_2 and Na (b) Na and Cl_2 (c) H_2 and O_2 (d) Cl_2 and H_2

4. Acid hydrolysis of ethyle acetate is an example for

   (a) Zero order reaction   (b) Pseudofirst order reaction

   (c) Second order reaction   (d) fraction order reaction

5. Acidified potassium dichromate oxidizes hydrogen sulphide to

   (a) sulphur   (b) sulphur dioxide

   (c) sulphur trioxide   (d) all of these

6. $[EDTA]^{4-}$ is a

   (a) Monodentate ligand   (b) Bidentate ligand

   (c) Polydentate ligand   (d) none of the above

7. The chemical name of phosgene is
   (a) acetyl chloride   (b) methyl chloride   (c) carbonyl chloride   (d) chloroform

8. Conversion of phenol to salicylic acid is
   (a) Williamsons reaction   (b) HVZ reaction
   (c) Kolbe's reaction   (d) Wurtz reaction

9. The enzyme which can catalyse the conversion of glucose to ethanol is
   (a) invertase   (b) maltase   (c) zymase   (d) diastase

10. Which of the following will not give aldol condednsation?
    (a) acetaldehyde   (b) phenyl acetaldehyde
    (c) benzaldehyde   (d) 2-methyl pentanal

11. Sodium salts of carboxylic acids are converted into hydrocarbons by
    (a) Dehydrogenation   (b) decarboxylation
    (c) dehydration   (d) dehalogenation

12. Methyl amine is a stronger base than aniline due to
    (a) $-$ I effect   (b) $+$ I effect   (c) $+$ R effect   (d) $-$ R effect

13. The amine which cannot be prepared by Gabriel pthalimide synthesis is
    (a) methanamine   (b) ethanamine   (c) aniline   (d) propanamine

14. Glucose on oxidation with nitric acid gives
    (a) saccharic acid   (b) gluconic acid   (c) glyceraldehyde   (d) n-hexane

15. In DNA the linkages between different nitrogenous bases are
    (a) peptide linkage   (b) phosphate linkage
    (c) H-bonding   (d) glycosidic linkage

II. Fill in the blanks by choosing the appropriate word from those given in the brackets:
($+3$, Inversion, $+4$, Slowstep, Desalination, N_2) $5 \times 1 = 5$

16. Reverse osmosis is used in _____ of seawater.

17. In a multistep reaction, rate of reaction depends on _____

18. The common oxidation state of actinide series is _____

19. S_N^2 mechanism has _____ of configuration.

20. The gas liberated when aliphatic primary amines reacts with HNO_2 is _____.

PART – B

III. Answer any Three of the following. Each question carries two marks. $3 \times 2 = 6$

21. Write any two differences between ideal and non-deal solutions.

22. What are pseudo I – order reaction? Give an example.

23. Define linkage isomerism of co-ordination compounds? Give an example.

24. Explain Fittig reaction with an equation.

25. Complete the reaction and name the reaction.

$$2CH_3CHO + NaOH \xrightarrow[\text{dil}]{\Delta} \text{_____}$$

26. What are non-essential amino acids? Name naturally occurring α-aminoacid. Which is not optically active.

PART – C

IV. Answer any THREE of the following. Each question carries Three marks. $3 \times 3 = 9$

27. (a) Write the two steps involved in the commercial process of converting MnO_2 to potassium permanganate.

    (b) Write the structure of dichromate $(Cr_2O_7)^{-2}$ ion.

28. Calculate the magnetic moment of Ti^{+3} ($Z = 22$).

29. What is lanthanoid contraction? Mention two of its consequences.

30. Write the IUPAC names and the type of isomerism for the following complex.

    (i) $[Co(NH_3)_5 Br]SO_4$ (ii) $[Co(NH_3)_5 SO_4]Br$

31. On the basis of VBT. Explain hybridization geometry and magnetic property of $[Ni(CN)_4]^{2-}$.

32. Explain crystal field splitting in octahedral complexes using energy level diagram.

V. Answer any TWO of the following. Each question carries Three marks. $2 \times 3 = 6$

33. State Henry's law, write its Mathematical form. How does Henry's constant varies with the solubility?

34. Explain the construction and working of standard hydrogen electrode with neat labeled diagram.

35. (a) Define limiting molar conductance.

    (b) Write the equations for the reactions taking place at anode and cathode for lead storage battery.

36. Derive integrated rate equation for zero order reaction.
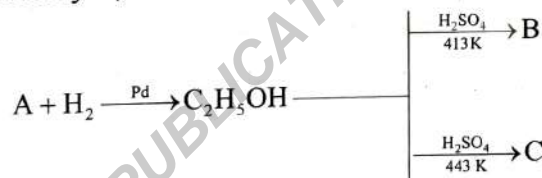
PART – D

VI. Answer any FOUR of the following. Each question carries five marks. $4 \times 5 = 20$

37. (a) Explain S_N2 mechanism with an example.

    (b) Name the product formed when chloromethane reacts with

       (i) aqueous KOH   (ii) alcoholic KCN $(3 + 2)$

38. (a) Identify A, B and C in the following reaction.

$$A + H_2 \xrightarrow{Pd} C_2H_5OH \begin{cases} \xrightarrow[413K]{H_2SO_4} B \\ \xrightarrow[443K]{H_2SO_4} C \end{cases}$$

    (b) Write equation of the following reaction and mention the products.
       Friedel – Craft's acetylation of anisole. $(3 + 2)$

39. (a) Explain the manufacture of phenol by cumene process.

    (b) Write the chemical equation for the conversion of

       (i) Phenol to 2, 4, 6 – trinitrophenol. (ii) Phenol to benzene. $(3 + 2)$

40. (a) Explain Cannizzaro's reaction for benzaldehyde.

    (b) Give the mechanism for the addition of HCN to carbonyl compound.

    (c) Mention a test to distinguish between aldehydes and ketones. $(2 + 2 + 1)$

41. (a) A Grignard reagent 'X' reacts with CO_2 (dry ice) followed b acid hydrolysis gives ethanoic acid. Write the chemical equation name the compound 'X'.

(3 + 2)

(b) Explain HVZ reaction with example.

42. (a) Explain carbylamines reaction with an example.

(b) Explain Hoffmann's bromanide reaction with an example.

(c) Give the IUPAC name of $C_2H_5NHCH_3$.

(2 + 2 + 1)

43. (a) What are the hydrolysis products of

(i) Sucrose   (ii) Lactose

(b) Define

(i) Denaturation of protein.

(ii) Peptide linkage

(c) Give an example for water soluble vitamin.

(2 + 2 + 1)

PART – E

VII. Answer any three of the following. Each question carries three marks. $3 \times 3 = 9$

44. 800 cm^3 of an aqueous solution of protein contains 2.12 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 3.89×10^{-3} bar. Calculate molar mass of protein. (R = 0.0823 L barmol^{-1} K^{-1}).

45. The vapour pressure of pure benzene at a certain temperature is 0.850 bar. When a non-volatile, non-electrolyte solid weighing 0.5 grams is added to 39 grams of benzene (Molar mass 78 grams). Vapour of the solution is 0.845 bar. What is the molar mass of the solid substance?

46. Calculate the emf of the cell in which the following reaction takes place.

$$Ni(s) + 2Ag^+ (0.002M) \longrightarrow Ni^{+2} (0.160M) + 2Ag(s)$$

Given that $E^0_{cell} = 1.05V$

47. 1 M solution of a salt surrounding two platinum electrodes 2.1 cm apart and 4.2 cm^2 in area was found to offer a resistance of 50 ohm. Calculate the conductivity of solution.

48. Rate constant of a reaction at 300 K and 400 K are 0.0345 s^{-1} and 0.1365 s^{-1} respectively. Calculate the activation energy for the reaction. (Given R = 8.314 JK^{-1} mol^{-1})

49. A first order reaction has a rate constant 1.15×10^{-3} s^{-1}. How long will 5 g of this reactant take to reduce to 3g?

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DISTRICT P.U. COLLEGES PRINCIPALS' ASSOCIATION, CHIKKABALLAPUR.

II PUC PREPARATORY EXAMINATION JANUARY--2024

Subject Code : 36
Time : 3-15 hours

CHEMISTRY

Total No.of Ques.49
Max Marks : 70

Instructions: 1] This Question paper consists of Five parts . All parts are compulsory.
2] a)Part -A carries 20marks. Each question carries 1mark.b)Part-B carries 6 marks. Each question carries 2 marks. c) Part-C carries 15 marks. Each question carries 3 marks. d) Part-D carries 20 marks. Each question carries 5 marks. e) Part-E carries 9 marks. Each question carries 3 marks.
3]In Part-A questions first attempted answer will be considered for awarding marks.
4]Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
5]Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6]Use log tables and simple calculator if necessary.[Use of scientific calculator is not allowed]

PART -A

I **Select the correct alternative from the choices given below:** 15x1=15

1) The one which is not a colligative property is _____
a]lowering of vapour pressure b] Osmotic pressure
c]elevation of boiling point d]depression of freezing point

2) During the electrolysis of molten NaCl, the reaction preferred at cathode is ___
a]$Na^+ + e^- \rightarrow Na$ b]$H^+ + e^- \rightarrow \frac{1}{2}H_2$ c]$Cl^- \rightarrow \frac{1}{2}Cl_2 + e^-$ d]$H_2O + e^- \rightarrow \frac{1}{2}H_2 + \overline{O}H$

3) In the expression Q = It, t stands for _____
a]temperature b] time in seconds c]time in minutes d] thermal stability

4) Hydrolysis of ethyl acetate (an ester) is an example for _____ reaction.
a] second order b]first order c] pseudo first order d] zero order

5) Element of 3d series which has maximum number of unpaired electrons in its ground state is _____
a]Iron b]Manganese c] Cobalt d] chromium

6) The formula of hexa ammine cobalt (III) chloride is _____
a]$[Co(NH_3)_6] Cl$ b]$Co(NH_3)_6]Cl_2$ c] $[Co(NH_3)_6] Cl_3$ d] $Co(NH_3)_6] Cl_4$

7) Among the isomeric pentyl chlorides ,the one which has lowest boiling point is ___
a]n-pentyl chloride b] iso pentyl chloride
c] neo pentyl chloride d] sec pentyl chloride

8) Acidic strength of different classes of alcohols follow the order _____
a] $3^0 > 2^0 > 1^0$ b]$1^0 > 2^0 > 3^0$ c] $2^0 > 3^0 > 1^0$ d] $1^0 > 3^0 > 2^0$

9) phenol gives benzene when treated with ___
a]CO_2 b]Zinc c] $CHCl_3$ d] $K_2Cr_2O_7$

10) The condensation product, oxime is formed when an aldehyde or a ketone reacts with _____
a]hydrazine b] semicarbazide c]ammonia d] hydroxylamine

11) Among the following carboxylic acids the strongest acid is _____
a] CH_3COOH b]$ClCH_2COOH$ c]Cl_3CCOOH d] $Cl_2CHCOOH$

12) The final product formed when a primary aliphatic amine reacts with nitrous acid [HNO_2] is _____
a]alcohol b] diazonium salt c] isocyanide d] amide

P.T.O.

13) 3^0 amine doesn't answer Hinsberg test, because_____
   a] If forms salt with Hinsberg reagent   b] It has no replaceable hydrogen
   c] It is not reactive   d] It has replaceable hydrogen

14) Maltose, a disaccharide is formed by ____
   a] two units of glucose
   b] one unit of glucose and one unit of fructose
   c] One unit of galactose and one unit of glucose
   d] two units of fructose

15) The harmone/s which regulate/s the glucose level in the blood is /are
   a]Insulin b] glucagon c] Thyroxine   d] both a and b

II   **Fill in the Blanks by choosing the appropriate word/words from those given brackets:** [one, chlorofluoro carbons, swell, zero, lanthanoid , shrink]   **5x1=5**

16) If blood cell is placed in a solution containing less than 0.9%(mass/ volume) sodium chloride , then the cell will _____

17) Molecularity of a reaction cannot be _____

18) The alloy misch metal consists of ____

19) Freons are _____ compounds of methane and ethane.

20) The number of peptide bonds present in a depeptide is ____

PART -B

III   **Answer any THREE of the following. Each question carries 2 marks.   3x2=6**

21) Give any two differences between ideal and non ideal solutions.

22) Represent graphically the effect of catalyst on reaction rates.

23) What is homoleptic complex? Give an example.

24) How is chloro benzene converted to phenol? Write the equation with experimental conditions.

25) Complete and name the following reaction.
$$R-C \equiv N \xrightarrow[\text{HCl}]{\text{SnCl}_2} R-CH=NH \xrightarrow{H_2O} \underline{\qquad}$$
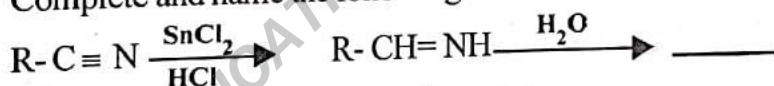
26) Write the Haworth structure of sucrose.

PART -C

IV   **Answer any THREE of the following. Each question carries 3 marks.   3x3=9**

27) What are interstitial compounds? Mention their properties (any two)

28) Write the balanced equations for the manufacture of $K_2Cr_2O_7$ from chromite ore.

29) Define Lanthanoid contraction. Mention its consequences.

30) Explain hybridisation, geometry and magnetic property of $[CoF_6]^{3-}$ ion using VBT. [Atomic number of Co = 27]

31) a] Show diagrammatically, the crystal field splitting in octahedral complex.   2
   b]What is spectrochemical series?   1

32) a] Draw the structures of optical isomers of $[CoCl_2(en)_2]^+$ 2
   b]What is the coordination number of Cr in $K_3[Cr(C_2O_4)_3]$?   1

Cont..

$$\log \frac{k_2}{k_1} = \frac{E_a}{2.303 R} \left(\frac{T_2 - T_1}{T_1 T_2} \right)$$

V   Answer any TWO of the following. Each question carries 3 marks.   2x3=6

33) a] State Henry's law. Write its mathematical form.   2

b] What is the volue of Van't Hoff factor for Na_2SO_4 [assuming complete dissociation]. 1

34) a] Write the overall reaction of lead storage battery when it is working.   2

b] Between F_2/F^- [$E^0 = 2.87V$] and Zn^{2+}/Zn [$E^0 = -0.76V$] which is stronger oxidising agent?

35) a] What is the effect of dilution of an electrolyte solution on conductivity and molar conductivity?   2

b] State Kohlrausch law.   1

36) Derive an integrated rate equation for the rate constant of a zero order reaction.

PART -D

VI   Answer any FOUR of the following. Each question carries 5 marks.   4x5=20

37) a] Explain S_{N_1} mechanism by taking 2- bromo - 2 methyl propane.   3

b] How is alcohol converted to chloroalkane using thionyl chloride? Write equation.   2

38) a] Write general equations for the formation of 1^0, 2^0 and 3^0 alcohols from carbonyl compounds using Grignard reagent.   3

b] How is phenol obtained from cumene? Write equation.   2

39) a] Explain the mechanism of acid catalysed dehydration of ethanol to ethene.   3.

b] Name the product formed when tertiary butyl bromide reacts with sodium methoxide. Write equation.

40) a] Explain Rosenmund's reduction with equation.   2

b] Give reasons for the more reactivity of aldehydes than ketones towards nucleophilic addition reactions.   2

c] Write the IUPAC name of $(CH_3)_2CHCOCH(CH_3)_2$ 1

41) a] Explain Hell-Volhard-Zelinsky reaction with equation.   2

b] $2CH_3CHO \xrightarrow{\text{dilNaOH}} A \xrightarrow{\text{heat}} B$ Identify A and B   2

c] Name the gas liberated when a carboxylic acid reacts with sodium hydrogen carbonate [$NaHCO_3$]   1

42) a] Explain Hoffmann bromamide degradation reaction with equation.   2

b] How is N-ethyl ethanamine converted to N,N-diethyle ethanamide? Write equation .   2

c] Name the product formed when benzene diazonium chloride solution is hydrolysed.   1

43) a] What is denaturation of protein? Give an example.   2

b] Write the reaction of glucose to show (i) presence of aldehyde group.
(ii) primary alcoholic (-OH) group.   2

c] Name the nitrogeneous base present in DNA but not in RNA.   1

PART -E

VII   Answer any THREE of the following. Each question carries 3 marks.   3x3=9

44) The vapour pressure of pure benzene at a certain temperature is 0.850 bar. A non volatils , non electrolyte solid weighing 0.5g when added to 39.0g benzene [molar mass= 78g/mol], the vapour pressure decreases to 0.845 bar. Calculate the molar mass of solid.

P.T.O.

45) The Boiling point of benzene is 353.23K. When 1.80g non volatile solute was dissolved in benzene the boiling point is raised to 354.11K. Calculate the molar mass of solute. K_b for benzene is 2.53 KKg/mol. *mass of benzene is 90g.*

46) Calculate conductivity and molar conductivity of 0.02 M KCl solution. Given the resistance of same solution is 520Ω and cell constant is 1.29~~s/cm.~~ *cm⁻¹.*

47) Represent the cell in which following reaction takes place.

$$Mg_{(s)} + 2Ag^+_{(0.0001M)} \rightarrow Mg^{2+}_{(0.130M)} + 2Ag_{(s)}$$

Calculate E_{cell} Given $E^0_{cell} = 3.17V$

48) Show that the time taken for 99% completion of a first order reaction is twice the time taken for 90% completion.

49) Rate constant of a first order reaction increases four times when the temperature changes from 27⁰C to 47⁰C. Calculate its activation energy. Given R= 8.314 J/K/ mol.

❖❖❖❖❖❖❖

$$\frac{P_1^0 - P}{P^0} = \frac{n_2 \times m_1}{w_1 \times m_2} \qquad m_2 = \frac{K_b \times w_2 \times 1000}{\Delta T_b \times w} \quad \frac{w_2 R T}{\pi V}$$

Second PUC Preparatory Examination—January2023

Subject: Chemistry (34)

Time: 3 Hrs 15 Min   Max marks: 70

Instructions:

i)   The question paper has FIVE parts. All parts are compulsory.

ii) a) Part-A carries 20marks and each question carries **one** mark. b) Part-B carries 06 marks and each question carries **two** marks.   c) Part-C carries 15 marks and each question carries **three** marks

   d) Part-D carries20 marks and each question carries **five** marks. e) Part-E carries 09 marks and each question carries **three** marks

iii) In part-A, first attempted answer is considered for awarding marks.

iv) Write balanced chemical equations; draw neat labelled diagrams and graphs where ever necessary.

v)   In part-E direct answer to numerical problems will not fetch any marks and specific unit for final answer is compulsory to award marks for final answer.

vi) Use log tables and simple calculators if necessary. Scientific calculators not allowed.

PART-A

I.   **Choose the correct answer from the given alternatives.**   15x1=15

1. The boiling point is lowest for the equimolar aqueous solution containing
   A) NaCl   B) $C_6H_{12}O_6$ C) $BaCl_2$ D) $La(NO_3)_3$

2. An electrochemical cell can behave like an electrolytic cell when
   A) $E_{cell} = 0$ B) $E_{cell} = E_{ext}$ C) $E_{cell} > E_{ext}$ D) $E_{cell} < E_{ext}$

3. Standard electrode potentials of three metals X, Y and Z are $-1.2V$, $+1.5V$ and $-3.2V$ respectively. then reducing power of the metals is
   A) $Y > X > Z$ B) $X > Z > Y$ C) $Z > X > Y$ D) $Z > Y > X$

4. For the reaction $2A + 3B \longrightarrow 4C + D$, which of the following does not express average rate of the reaction?
   A) $\frac{d[A]}{2dt}$ B) $\frac{-d[C]}{4dt}$ C) $\frac{+d[D]}{dt}$ D) $\frac{-d[B]}{3dt}$

5. Which one of the following ions is colourless in aqueous solution?
   A) Cr^{2+} B) Zn^{2+} C) Cu^{2+} D) Mn^{+2}

6. According to CFT the electronic configuration of the central atom in $[Fe(CN)_6]^{+3}$ with d^5 electrons is
   A) $t_{2g}^3 e_g^2$ B) $t_{2g}^2 e_g^3$ C) $t_{2g}^5 e_g^0$ D) $t_{2g}^0 e_g^5$

7. The expected stereo chemical change of optically active haloalkanes during S_N2 mechanism is
   A) Racemisation   B) inversion
   C) Retention   D) no stereo chemical change.

8. Identify the product in the reaction $CH_3CH_2OH \xrightarrow{conc. H_2SO_4}$

   A) $CH_2=CH_2$
   B) $CH_3—CHO$
   C) $CH_3—O—CH_3$
   D) $C_2H_5—O—C_2H_5$

9. The hybridisation of carbon atom in carbonyl group is
   A) sp^3
   B) sp^2
   C) sp
   D) dsp^2

10. The correct pair of compounds which gives tertiary butyl ethyl ether by Williamson's ether synthesis method, is
    A) ethyl bromide and sodium tertiary butoxide
    B) sodium ethoxide and tertiary butyl bromide
    C) ethyl bromide and sodium butoxide
    D) sodium ethoxide and butyl bromide

11. Methanal on treating with Grignard reagents and followed by hydrolysis will give
    A) 1° alcohols
    B) 2° alcohols
    C) 3° alcohols
    D) mixture of alcohols

12. The number of aldol condensation products obtained when propanal and methanal are heated with dilute NaOH
    A) 4
    B) 3
    C) 2
    D) 1

13. The amide which gives ethanamine by Hoffmann bromamide reaction is
    A) methanamide
    B) ethanamide
    C) propanamide
    D) butanamide

14. The oxidation of glucose to gluconic acid by bromine water confirms that glucose molecule has
    A) carbonyl group
    B) ketonic group
    C) hydroxyl group
    D) aldehydic group

15. Xerophthalmia is due to the deficiency of
    A) vitamin-A
    B) vitamin-E
    C) vitamin-D
    D) vitamin-C

II. **Fill in the blanks by choosing the appropriate word from those given in the brackets.** $5 \times 1 = 5$
    [copper, zero, formalin, DDT, saturated, manganese]

16. A solution in which no more solute can be dissolved is called _____ solution

17. For _____ order reaction, units of both rate and rate constant are same.

18. The 3d- series element which has positive E^0 value is _____

19. To preserve biological specimens _____ solution is used.

20. The best chlorinated organic insecticide is _____

PART-B

III. **Answer any *THREE* of the following, each question carries *two* marks** $3 \times 2 = 6$

21. State Henry's law. Write its mathematical expression.

22. Draw the distribution curve showing temperature dependence of rate of the reaction.

23. Define transition elements? Which group of d-block elements are not regarded as transition elements?

24. a) $R-X + NaI \xrightarrow{dry acetone} R-I + NaX$. Name this reaction.

    b) What is the need of precipitating NaX in the above reaction using dry acetone?

25. Explain the Rosenmund reduction of benzoyl chloride.

26. Why sucrose is called invert sugar?

PART-C

IV.   Answer any *THREE* of the following. each question carries *three* marks   3x3=09

27.   Explain the preparation of potassium dichromate from chromate ore.

28.   a) Calculate spin only magnetic moment of Manganese [Z=25] in its lowest oxidation state.

b) What are interstitial compounds?

29.   What is actinoid contraction? How is it different from lanthanoid contraction? Give reason for the difference.

30.   a) What is ambidentate ligand? Give an example.

b) What type of isomerism is shown by coordinate compounds containing ambidentate ligand?

31.   Using valence bond theory explain hybridization, geometry and magnetic property of $[CoF_6]^{3-}$ ion. [Atomic number of cobalt is 27]

32.   Write the IUPAC name of $[Co(NH_3)_3(NO_2)_3]$. Draw the facial and meridional isomers of this complex.

V.   Answer any *TWO* of the following. Each question carries *three* marks   2x3=06

33.   Write any three differences between ideal and non-ideal solutions.

34.   Draw neat labelled diagram of standard hydrogen electrode. Write reduction half reaction of SHE.

35.   Explain the variation of molar conductivity (Λ_m) with concentration of the solution.

36.   Derive an integrated rate equation for rate constant of first order reaction.

PART-D

VI.   Answer any *FOUR* of the following. Each question carries *five* marks   4x5=20

37.   a) i) Explain the S_N2 mechanism involved in the conversion of methyl chloride to methyl alcohol.

ii) Why does the above mechanism is said to follow 2nd order kinetics.

b) Write the major product in the following reaction and name the rule to support the major product.

$CH_3-CH_2-CH_2-CH(Br)-CH_3 \xrightarrow{Alco\ KOH}$ (3+2)

38.   a) Write the steps involved in the mechanism of acid catalysed dehydration of ethanol to ethene

b) Identify the products, A and B in the following reaction

$C_6H_5-O-R + H-X \longrightarrow A + B$ (3+2)

39.   a) i) What is acetylation? ii) Explain acetylation of salicylic acid with equation

b) Explain Kolbe's reaction with equation.   (3+2)

40.   a) Complete the following reaction.

$R-Mg-X + O=C=O \xrightarrow{dry\ ether} ? \xrightarrow{H_2O} ?$

b) Among CH_3-CH_2-COOH and $CH_2=CH-COOH$ which is more acidic? Give reason.

c) Why can't formic acid be halogenated by Hell-Volhard-Zelinsky reaction   (2+2+1)

41.   a) $R-CO-R \xrightarrow{Zn-Hg\ /\ HCl} A + H_2O$. Identify the product A and name the reaction.

b) Explain the aldol condensation reaction of propanone with equation.   (2+3)

42. a) i) Explain the reaction of ethanamine with Hinsberg's reagent.

   ii) Why is the product obtained in the above reaction soluble in alkali?

   b) Nitration of aniline in acidic medium will yield significant amount of meta-derivative along with ortho and para derivatives. Why? (3+2)

43. a) Write the Haworth structure of maltose.

   b) How is glycylalanine formed? Write the number of peptide bonds present in it.

   c) Why cannot Vitamin-C be stored in our body? (2+2+1)

PART-E

VII.   Answer any _THREE_ of the following. each question carries _three_ marks   3x3=09

44. Vapour pressures of pure chloroform ($CHCl_3$) and pure dichloromethane (CH_2Cl_2) at 298K are 200 mmHg and 415mmHg respectively. Total vapour pressure of the binary solution prepared by mixing $CHCl_3$ and CH_2Cl_2 at 298K is 348 mm Hg. Calculate partial vapour pressure of more volatile component and its mole fraction in vapour phase of the solution.

45. Boiling point of water at 750 mm Hg is $99.63°$ C. How much sucrose [molar mass 342 $gmol^{-1}$] is to be added to 500 grams of water such that the solution boils at $100°$ C. [given $K_b = 0.52$ K kg mol^{-1}].

46. The conductivity of 0.001028 mol L^{-1} acetic acid solution is $4.95 \times 10^{-5} Scm^{-1}$. Calculate degree of dissociation of acetic acid, if limiting molar conductivity of acetic acid is 390.5 $Scm^2 mol^{-1}$.

47. The standard electrode potential of Daniel cell is 1.1 V at 298K. Calculate standard Gibb's energy change for the reaction $Zn (s) + Cu^{+2}(aq) \longrightarrow Zn^{+2} (aq) + Cu(s)$ [given F= 96487 C mol^{-1}]

48. Rate constant [k] of decay of a radioactive species is found to be $5.5 \times 10^{-14} S^{-1}$. Then find half life period and the time for 99.9% decay of the radioactive species.

49. For a first order reaction, the temperature coefficient of the reaction is approximately 2. Calculate energy of activation for the reaction [Ea], when temperature changes from 300K to 310K. Given R= 8.314J$K^{-1}mol^{-1}$

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II PUC Preparatory Examination Jan. 2024

Time : 3.15 hours   SUBJECT : CHEMISTRY (34)   Marks : 70

INSTRUCTIONS :

1. Question Paper has 5 Parts all parts are compulsory
2. a) PART- A Carries 20 Marks Each Question carries 1 mark.
   b) PART- B Carries 6 Marks Each Question carries 2 mark.
   c) PART- C Carries 15 Marks Each Question carries 3 mark.
   d) PART- D Carries 20 Marks Each Question carries 5 mark.
   e) PART- E Carries 09 Marks Each Question carries 3 mark.
3. In PART - A Questions first attempted answer will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labelled diagrams & graphs wherever necessary.
5. Direct answer to the numerical problems without detailed steps and specific unit for final answer will not carry any marks
6. Use log tables and simple calculator if necessary (use of scientific calculator is not allowed)

PART- A

I. Select the correct option from the given choices   15 x 1 = 15

1. Type of the solution obtained when copper dissolved in gold is
   a) Solid in solid solution   b) Gas in gas solution   c) Liquid in Liquid solution   d) None of these
2. Kohlrasch Law is applicable for
   a) Concentrated solution   b) At infinite dilution   c) Concentrated as well as a dilute solution   d) None of these
3. Standard reduction potential of Hydrogen electrode is
   a) +1   b) 0   c) -1   d) Very High
4. For a reaction, A + B --------> Product, the rate law is given by $V = k[A]^1[B]^1$, Order of reaction is
   a) First order   b) Second order   C) Third order   d) Zero order
5. The unit of Magnetic moment is
   a) kg.m   b) $kg.m^{-2}$ c) Bohrmagneton (B.M)   d) $kg.m^{-3}$
6. Which of the following is ambidentate ligand
   a) Cl^- b) Br^- c) SCN^- d) None of these
7. Rate of reaction of SN^2 depends on
   a) Concentration of haloalkane   b) Concentration of nucleophile
   c) Both Concentration of haloalkane & nucleophile   d) None of these
8. Which of the following gas is liberated when alcohol is treated with sodium
   a) O_2 b) Cl_2 c) H_2 d) CO_2
9. Resorcinol is an exmaple of
   a) Monohydric Phenol   b) Dihydric phenol   c) Triydric phenol   d) Tetrahydric phenol
10. Aldehydes and ketones both are identified by
    a) Tollens reagent   b) Fehling's Solution   c) Benedict's Solution   d) 2,4-D,NP
11. The following aldehyde does not have the α-hydrogen atom
    a) CH_3-CHO   b) H-CHO   c) CH_3-CH_2-CHO   d) None of these
12. The IUPAC name of CH_3 - N - CH_2- CH_3 is
                            |
                            H
    a) N- methyl ethanamine   b) Methyl ethanamine   c) N, N- methyl ethanamine   d) N- ethyl ethanamine
13. Aniline on reaction with excess of bromine water gives
    a) p-bromo aniline   b) o-bromo aniline   c) 2,4,6 tri bromo aniline   d) m-bromo aniline
14. Which of the following is water soluble vitamin
    a) Vitamin - A   b) Vitamin - K   c) Vitamin - C   d) Vitamin - D
15. The harmone regulates the blood sugar level is
    a) Insulin   b) Thyroxine   c) Adrenaline   d) Cortisol

II. Fill in the blanks by choosing the appropriate word from those given in the brackets   5 x 1 = 5
   (Hydrogen, Henry, anhydrous $ZnCl_2$, Nitrogen, Zero)

16. .... law behind the dissolution of CO_2 gas in soft drinks under high pressure.
17. The half life period of .... order reaction is directly proportional to the initial concentration of reactant.
18. .... gas libirated when Lanthanoides (Ln) reacts with acids.
19. Lucas reagent is mixture of Conc. Hcl and ....
20. Benzene diazonium chloride on reaction with .... gives Diazo amino benzene and .... gas.

PART-B

III. Answer any three of the following, each question carries two marks

21. How solubility of gas in liquid varies with
    i) Temperature ii) Pressure

22. Draw a graph of potential energy V/S reaction co-ordinate showing the effect of a catalyst on activation energy

23. Write Cis and trans isomeric structure of $[Fe(NH_3)_2(CN)_4]^-$

24. Explain Wurlz - fitting reaction with an example

25. Explain esterification reaction and write the equation

26. Write the Haworth's structure of α - D(+) Glucose

PART-C

IV. Answer any three of the following , Each questions carries three marks $3 \times 3 = 9$

27. Write the balanced chemical equation in the manufacture of $K_2Cr_2O_7$ from chromite ore.

28. What is Lanthanoid Contraction ? Mention two of its consequences.

29. With refferance to the first row transition series
    a) Name the metal which possesses maximum number of oxidation state
    b) Among Zn^{2+} and Cu^{2+} which is colourless ?
    c) No of unpaired electrons in Cr^+

30. With the help of Valence Bond theory (VBT), explain hybridization, geometry and magnetic property of $[Ni(CN)_4]^{2-}$ (Given : Atomic number of Ni = 28)

31. Write any three postulates of Werner's theory of Co-ordination Compounds,

32. a) For the given complex $[Co(NH_3)_5 Br] So_4$, Write the IUPAC name and its ionisation isomer
    b) Which set of d -orbitals of metal / ion experience more repulsion in octohedral field created by the ligand ?

V. Answer any two of the following, each questions carries three marks $2 \times 3 = 6$

33. a) State Raoult's law of binary solution for two volatile liquid components
    b) On mixing equal volumes of acetone and ethanol, what type of deviation from Raoult's law is expected ?

34. Draw a neat labelled daigram of SHE and write its symbolic representation.

35. a) State Faraday's First law of electrolysis. Write its mathematical form using usual notations.
    b) State Kohlrausch law

36. Derive an integrated rate equation for the rate constant of first order reaction.

PART-D

IV. Answer any four of the following , each questions carries Five marks $4 \times 5 = 20$

37. a) Write the steps involved in SN^1 mechanism of the conversion of tertiary butyl bromide in to tertiary butyl alcohol
    b) Explain Finkelstein reaction and write the equation. (3 + 2)

38. a) Explain the mechanism of acid Catalysed dehydration of ethnol to ethene. (3 + 2)
    b) What is the product formed when acetaldehyde is treated with Grignard's reagent.

39. a) Explain the Williamson's ether synthesis with an example (2 + 2 +1)
    b) Complete the following reactions.

    i) [benzene ring with OH] Conc. HNO_3 ----------->   ii) [benzene ring with OH] + Zn --------------->
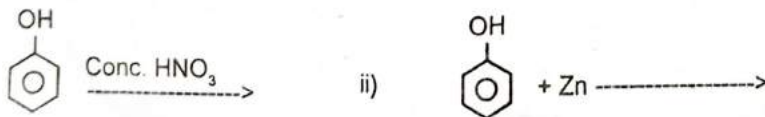
    c) Name the product when phenol is treated with bromine water.

40. a) Explain the mechanism of addition of HCN to aldehyde in presence of NaOH (3 + 2)
    b) Among formic acid and acetic acid, which is more acidic ? Give reason.

41. a) Explain Aldol Condensation reaction for acetaldehyde write the equation. (3 + 2)
    b) Complete the following reacton

    i) $CH_3 - \overset{\overset{O}{\|}}{C} - CH_3$ $\xrightarrow{\underset{Conc.\ Hcl}{Zn - Hg}}$

    NaOH + CaO, Heat
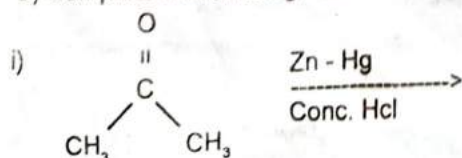
42. a) Explain Hoffmann bromamide degradation for the preparation of aniline.
    b) How would you convent methyl amine into methyl iso cyanide   (2 + 2 +1)
    c) What is Hinsberg reagent ?

43. a) How would you show that glucose Contains the presence of Carbonyl group ?
    b) What are essential amino acids ? Is glycine an essential amino acid ?   (2 + 2 +1)
    c) Name the disease caused by the deficiency of vitamin - A

PART-E

IV. Answer any three of the following , each questions carries threemarks   3 x 3 = 09

44. A Solution containing 18g non -volatile solute dissolved in 200 g of water freezes at 272.0k Calculate the molar mass of solute (Given K_f = 1.86 K.Kg/mol) Freezing point of water = 273k)

45. 200 Cm^3 of on aqueous solution of a protien contains 1.26g of protien. The osmotic pressure of such a solution at 300 k is found to be 2.57 x 10^{-3} bar. Calculate molar mass of protein.

46. Calculate the e.m.f. of the cell for the reaction.

    $Mg_{(s)}$ + Cu^{2+} (0.0001M) ---------> Mg^{2+}(0.001M) + Cu(s)
    (Given : $E^0_{mg^{2+}}$= -2.37V, $E^0_{c4^{2+}}$= -0.34V)

47. Calculate the standard Gibb's free energy ($4G^0$) for the reaction at 298k

    $Zn_{(s)}$ + 2 $Ag^+_{(ag)}$ ------> 2 $Ag_{(s)}$ + $Zn^{2+}_{(aq)}$

    (Given : $E^0_{zn^{2+}/zn}$ = - 0.76 v, $E^0_{Ag^+/Ag}$ = + 0.80v
    F = 96500 C.mol^{-1}]

48. The rate of a particular reaction doubles when the temperature changes from 300 K to 310 k Calculate the energy of activation of the reaction.

49. A first order reaction is 99% completed in 85 minutes. calculate the time required for the completion of 75% of the reaction.

DISTRICT LEVEL II PUC PREPARATORY EXAM, JANUARY – 2024

Time: 3 Hrs. 15 Mins.　　　　**Sub: CHEMISTRY (34)**　　　　**Max. Marks: 70**

General Instructions:
1. The question paper has five parts. All parts are compulsory.
2. Part – A carries 20 marks, each question carries 1 mark.
   Part – B carries 6 marks, each question carries 2 marks.
   Part – C carries 15 marks, each question carries 3 marks.
   Part – D carries 20 marks, each question carries 5 marks.
   Part – E carries 09 marks, each question carries 3 marks.
3. In Part – A questions, first attempted answer will be considered for awarding marks.
4. Write balanced chemical equations and draw diagrams wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log table and simple calculators if necessary. (Use of scientific calculator is not allowed).

PART – A

I. **Select the correct option from the given choices:**　　　　$15 \times 1 = 15$

1. Which of the following modes of expressing concentration is dependent of temperature?
   - (A) Molarity
   - (B) Mole fraction
   - (C) Parts per million
   - (D) Molality

2. The standard electrode potential for fluorine is the highest in the electrochemical series indicating that fluorine gas is
   - (A) Strong reducing agent
   - (B) Weak reducing agent
   - (C) Weak oxidizing agent
   - (D) Strong oxidizing agent

3. The cathode in lead acid battery during discharging is
   - (A) Pb
   - (B) PbO_2
   - (C) PbO
   - (D) $PbSO_4$

4. The order of the reaction for the decomposition of hydrogen peroxide in alkaline medium
   - (A) First order
   - (B) Zero order
   - (C) Second order
   - (D) Pseudofirst order

5. Which of the following statements about the interstitial compounds is incorrect?
   - (A) They retain metallic conductivity
   - (B) They have higher melting points than the pure metal
   - (C) They are much harder than pure metal
   - (D) They are chemically reactive

6. The isomers of $\left[Co(NH_3)_5 (SO_4) \right] Br$ are an example for
   - (A) Linkage isomerism
   - (B) Co-ordination isomerism
   - (C) Ionisation isomerism
   - (D) Solvate isomerism

7. The method of preparation of an alkyl fluoride by treating alkyl chloride with metallic fluoride is
   - (A) Finkelstein reaction
   - (B) Wurtz reaction
   - (C) Swartz reaction
   - (D) Fittig reaction

8. When phenol is treated with conc. HNO_3 forms
   - (A) Anisole
   - (B) Picric acid
   - (C) Aspirin
   - (D) Salicylic acid

9. Denaturated alcohol is
   - (A) Ethanol + methane
   - (B) Rectified spirit + Methanol + Pyridine
   - (C) Undistilled ethanol
   - (D) Rectified spirit

10. The carboxylic acids have higher boiling points than aldehydes, ketones and alcohols due to
    - (A) Intra molecular hydrogen bonding
    - (B) Vanderwaal's force of attraction
    - (C) Dipole moment
    - (D) Intermolecular hydrogen bonding

1

P.T.O.

11. The catalyst used in Rosenmund reaction is
(A) Zn / Hg   (B) Pb / BaSO₄   (C) CO + HCl   (D) Raney Ni

12. Hofmann's Bromamide reaction is to convert
(A) Acid to alcohol
(C) Amide to amine
(B) Alcohol to acid
(D) Amine to amide

13. The bad smelling substance formed by the action of alc.KOH on chloroform and aniline is
(A) Nitrobenzene
(C) Phenyl cyanide
(B) Phenyl isocyanide
(D) Phenyl thiocyanide

14. The Vitamin B₂ is also known as
(A) Thiamine   (B) Pyridoxine   (C) Ascorbic acid   (D) Riboflavin

15. The helical structure of protein is stabilized by
(A) Dipeptide bond   (B) Hydrogen bond   (C) Peptide bond   (D) Ionic bond

II. Fill in the blanks choosing the appropriate word from those given in the brackets: 5 × 1 = 5

(Manganese, Henry's law, Gatterman reaction, Na in ether, Arrhenius equation)

16. The relationship between mole fraction of gas in solution and partial pressure over the solution is given by _____.

17. The temperature dependence of the rate of a chemical reaction is explained by _____.

18. The metal used to make alloy steel for armour plates, safes and helmet is _____.

19. Wurtz reaction involves the reaction of alkyl halide with _____.

20. The conversion of benzene diazonium salt to haloarenes in presence of copper in acidic medium is called _____.

PART – B

III. Answer any **THREE** of the following questions. Each question carries two marks: 3 × 2 = 6

21. Define azeotropic mixtures. Given an example for maximum boiling azeotropes.

22. Show that for the first order reaction, half life period is independent of initial concentration of the reactants.

23. The transition elements forms coloured complexes. Explain.

24. Define freons. Give an example.

25. Explain HVZ reaction with chemical equation.

26. Define denaturation of protein. Give an example.

PART – C

IV. Answer any **THREE** of the following. Each question carries three marks: 3 × 3 = 9
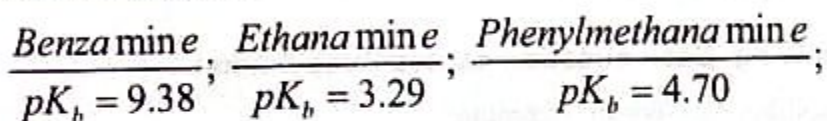
27. (a) The transition elements acts as good catalysts. Give any two reasons. [2M]
(b) Mention the unit for magnetic momentum. [1M]

28. Explain the manufacturing of potassium permanganate from its ore with chemical equation. [3M]

29. What is lanthanoid contraction? Mention any two consequences of lanthanoid contraction. [3M]

30. Based on VBT, explain the geometry, hybridization and magnetic properties of $\left[Ni(CN)_4 \right]^{2-}$. [3M]

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31. Explain the splitting of d – orbitals in tetrahedral co-ordination sphere. [3M]

32. (a) Explain synergetic bonding in metal carbonyls. [2M]

(b) Write the structure of $Co(CO)_8$ complex. [1M]

V. **Answer any TWO of the following. Each question carries three marks:** $2 \times 3 = 6$

33. (a) What are hypertonic solutions? Give an example. [2M]

(b) Define reverse osmosis. [1M]

34. (a) How the molar conductivity varies with concentration? Mention the graphical representation of variation of molar conductivity of acetic acid and potassium chloride in aqueous solution. [2M]

(b) Define limiting molar conductivity. [1M]

35. Explain the construction of SHE with neat labelled diagram. [3M]

36. Derive an integrated rate equation for the rate constant of a zero – order reaction. [3M]

PART – D

VI. **Answer any FOUR of the following. Each question carries FIVE marks:** $4 \times 5 = 20$

37. (a) Explain the mechanism of S_N1 reaction for the conversion of tert – butyl bromide to tert – butyl alcohol. [3M]

(b) Mention the condition to show an optical activity of an organic molecule. [1M]

(c) Give an example for an alkylidene halide. [1M]

38. (a) With chemical equation, explain the preparation of primary alcohol from Grignard reagent. [2M]

(b) Explain the manufacturing of phenol from Cumene process. [3M]

39. (a) Predict the product formed in the following chemical reactions [2M]

(i) $CH_3CH_2OH \xrightarrow{conc.\ H_2SO_4,\ 413K} P$

(ii) $(CH_3)_3 C - OC_2H_5 \xrightarrow{HI} P$

(b) Explain the mechanism of dehydration of ethanol to an ethane in acidic medium. [3M]

40. (a) Explain how an acetaldehyde forms an oxime. [2M]

(b) Mention the condition, that an organic compound to undergo Cannizzaro reaction. [1M]

(c) Write the product formed when benzaldehyde is heated with conc. NaOH. [2M]

41. (a) Explain how diethyl cadmium reacts with acetyl chloride. [2M]

(b) Explain with chemical equation effect of heat on acetic acid with ammonia. [2M]

(c) Write the IUPAC name of $H_5C_2 - \underset{\underset{O}{\|}}{C} - CH_3$ [1M]

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42. (a) Explain the preparation of primary amine by Gabriel phthalimide synthesis. [3M]

    (b) Arrange the following compounds, in the increasing order of their basic nature in [2M]

    aqueous solution.

$$\frac{Benza\, min\, e}{pK_b = 9.38}; \quad \frac{Ethana\, min\, e}{pK_b = 3.29}; \quad \frac{Phenylmethana\, min\, e}{pK_b = 4.70};$$

43. (a) Mention the glycosidic linkage present in lactose. [1M]

    (b) Name any one sulphur containing amino acid. [1M]

    (c) How many peptide bonds are present in tetrapetide. [1M]

    (d) Define nucleotide. [1M]
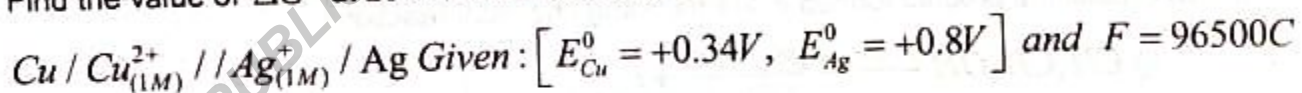
    (e) Give an example for a reducing sugar. [1M]

PART – E

V. **Answer any THREE of the following. Each question carries THREE marks:** $3 \times 3 = 9$
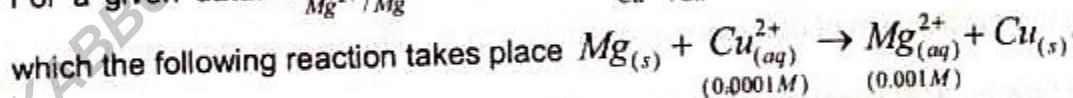
44. Vapour pressure of benzene is 20mm of Hg. When 2 gram of a non-volatile solute dissolved in 78 grams of benzene. Benzene has vapour pressure of 195mm of Hg. Calculate the molar mass of the solute. (molar mass of benzene is $78\ gram\ mol^{-1}$)

45. 450 cm^3 of an aqueous solution of a protein contains 1.0g of the protein. The osmotic pressure of such a solution at 310K is found to be $3.1 \times 10^{-4}\ bar$. Calculate the molar mass of the protein. $\left(R = 0.083\, L\, bar\, mol^{-1} k^{-1} \right)$.

46. Find the value of ΔG^0 at 25^{0}C for the following electrochemical cell.

$$Cu / Cu^{2+}_{(1M)} // Ag^+_{(1M)} / Ag\ Given : \left[E^0_{Cu} = +0.34V,\ E^0_{Ag} = +0.8V \right]\ and\ F = 96500C$$

47. For a given data: $E^0_{Mg^{2+}/Mg} = -2.37V,\ E^0_{Cu^{2+}/Cu} = +0.34V$. Calculate the emf of the cell in which the following reaction takes place $Mg_{(s)} + Cu^{2+}_{(aq)} \underset{(0.0001M)}{} \rightarrow Mg^{2+}_{(aq)} \underset{(0.001M)}{} + Cu_{(s)}$

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

49. Calculate the rate constant of the first order reaction, if 70% of chemical reaction is completed in 23 mins.

DISTRICT LEVEL II PUC PREPARATORY EXAM, JANUARY – 2024

Time: 3 Hrs. 15 Mins. Sub: CHEMISTRY (34) Max. Marks: 70

General Instructions:

1. The question paper has five parts. All parts are compulsory.
   Part – A carries 20 marks, each question carries 1 mark.
   Part – B carries 6 marks, each question carries 2 marks.
   Part – C carries 15 marks, each question carries 3 marks.
   Part – D carries 20 marks, each question carries 5 marks.
   Part – E carries 09 marks, each question carries 3 marks.
2. In Part – A questions, first attempted answer will be considered for avoiding marks.
3. Write balanced chemical equations and draw diagrams wherever necessary.
4. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
5. Use log table and simple calculators if necessary. (Use of scientific calculator is not allowed).

PART – A

Select the correct option from the given choices: $15 \times 1 = 15$

1. Van't Hoff factor (i) for aqueous solutions of electrolytes is
   (A) Zero
   (B) Greater than 1
   (C) Less than 1
   (D) Depends on nature of electrolyte

2. Which of the following is the example for inert electrode?
   (A) Gold electrode   (B) Copper electrode   (C) Zinc electrode   (D) Silver electrode

3. How does molar conductivity vary with dilution?
   (A) Decreases
   (B) Increases
   (C) No change
   (D) Inversely proportional

4. The rate law equation for the reaction: $A + 2B \rightarrow C + D$ is Rate $(r) = k[A]$, the order with respect to 'B' is
   (A) Two   (B) One   (C) Zero   (D) All of these

5. Which of the following element is not regarded as transition element?
   (A) Fe   (B) Mn   (C) Sc   (D) Zn

6. The oxidation state of Ni in $Ni(CO)_4$ is
   (A) +2   (B) 0   (C) +3   (D) +4

7. An example for vicinal dihalide is
   (A) Dichloromethane   (B) 1, 2 - dichloroethane   (C) Vinly chloride   (D) Allyl chloride

8. In the hydroboration – oxidation reaction of propene, with diborane, H_2O_2 and NaOH, the organic compound formed is
   (A) Ethyl alcohol   (B) Propan – 2 – ol   (C) Propan – 1 – ol   (D) Propanal

9. When phenol is treated with bromine water, it forms
   (A) m – bromophenol
   (B) o – and p – bromophenols
   (C) 2, 4 – dibromophenol
   (D) 2, 4, 6 – tribromophenol

10. The IUPAC name of H – CHO is
    (A) Formic acid   (B) Formaldehyde   (C) Methanal   (D) Methanol

11. The correct order of increasing acidic strength of carboxylic acids is

(A) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH > HCOOH$

(B) $HCOOH > BrCH_2COOH > ClCH_2COOH > FCH_2COOH$

(C) $CClCH_2COOH > FCH_2COOH > BrCH_2COOH > HCOOH$

(D) $BrCH_2COOH > CClCH_2COOH > FCH_2COOH > HCOOH$

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12. Hinesburg's reagent is
   (A) Benzene sulphuryl chloride
   (B) Chlorobenzene
   (C) Benzene sulphonyl chloride
   (D) Benzene carbonyl chloride

13. Amongst the following amines, the strogenst base in aqueous medium is
   (A) CH_3NH_2
   (B) $(CH_3)_3N$
   (C) $(CH_3)_2NH$
   (D) $C_6H_5NH_2$

14. The main storage polysaccharide of plants is
   (A) Starch
   (B) Cellulose
   (C) Glycogen
   (D) Glucose

15. Amongst naturally occurring α - amino acids, the one which is not optically active is
   (A) Lysine
   (B) Glycine
   (C) Cysteine
   (D) Alanine

II. **Fill in the blanks choosing the appropriate word from those given in the brackets:** $5 \times 1 = 5$

(Isocyanides, lanthanoid, rate law, isotonic, Grignard)

16. The solutions having same osmotic pressure at a given temperature are called _____ solutions.

17. The representation of rate of reaction in terms of concentration of the reactants is known as ____.

18. Zr and Hf have a almost equal atomic and ionic radii because of _____ contraction.

19. Alkyl magnesium halides are known as _____ reagents.

20. _____ are foul smelling substances.

PART – B

III. **Answer any THREE of the following questions. Each question carries two marks:** $3 \times 2 = 6$

21. State Henry's law. Write its mathematical form.

22. The conversion of molecules X to Y follows second order kinetics. If the concentration of X is increased to three times, how will it affect the rate of formation of Y?

23. Draw the energy level diagram for the crystal field splitting of d–orbitals in Octahedral complexes.

24. Explain Swarts reaction with an example.

25. How is benzamide obtained from benzoic acid? Write equation.

26. What is denaturation of proteins? Which level of structure remains intact during denaturation of globular proteins?

PART – C

V. **Answer any THREE of the following. Each question carries three marks:** $3 \times 3 = 9$

27. Explain the preparation of potassium permanganate from MnO_2 with equations.

28. Calculate the spin only magnetic moment of ferric ion. [Given: atomic number of iron is 26].

29. What is actinoid contraction? Give any two general characteristics of actinoids.

30. Explain hybridization, geometry and magnetic property of $\left[Ni(CN)_4\right]^{2-}$ ion using Valence Bond Theory (VBT). [atomic number of Ni is 28].

31. Give the IUPAC name of $\left[CoCl_2(NH_3)_4\right]Cl$. Draw cis and trans isomers of $\left[CoCl_2(NH_3)_4\right]^+$ ion.

32. Write any three postulates of Werners theory of co-ordination compounds.

V. **Answer any TWO of the following. Each question carries three marks:**   2 × 3 = 6

33. Write any three differences between ideal and non-ideal solutions.

34. Draw a neat, labelled diagram of Standard Hydrogen Electrode (SHE). Write the balanced equation for the reaction taking place at cathode during rusting of iron.

35. State Kohlrausch's law of independent migration of ions. Mention two applications of it.

36. Derive an integrated rate equation for the rate constant of a zero – order reaction.

PART – D

V. **Answer any FOUR of the following. Each question carries FIVE marks:**   4 × 5 = 20

37. (a) Explain S_N1 mechanism of conversion of tert – butyl bromide to tert – butyl alcohol. [3M]

    (b) Give any two reasons for the less reactivity of aryl halides towards nucleophilic substitution reactions. [2M]

38. (a) Write three steps involved in the mechanism of acid catalysed dehydration of ethanol to ethene. [3M]

    (b) Explain Kolbe's reaction with equation. [2M]

39. (a) Explain Williamson's synthesis of ethers. Give equation. [2M]

    (b) How does anisole react with acetyl chloride in the presence of anhydrous aluminium chloride? Write the chemical equation for the reaction. [2M]

    (c) Name the enzyme which catalyses the hydrolysis of sucrose into glucose and fructose. [1M]

40. (a) How an aldehydes prepared from nitriles? Write equation. What is the name of the reaction? [3M]

    (b) Explain Hell – Volhard – Zelinsky reaction with equation. [2M]

41. (a) How is ketone prepared from Grignard reagent and nitrile? Give an example. [2M]

    (b) Explain Cannizzaro reaction with an example. [2M]

    (c) Write the IUPAC name of CH_3COCH_3. [1M]

42: (a) Complete the following reactions by giving major products: [2M]

    (i) $C_6H_5NH_2 \xrightarrow[273K - 278K]{NaNO_2 + HCl}$

    (ii) $R - CO - NH_2 + Br_2 + 4NaOH \rightarrow$

    (b) Why diazonium salt is generally not stored and is used immediately after its preparation? [1M]

    (c) Explain Sadnmeyer reaction with equation. [2M]

43. (a) Write the Haworth's structure of Lactose. [2M]

    (b) What is fibrous protein? Name the protein present in hair. [2M]

    (c) Write the name of the nitrogenous base present only in DNA but not in RNA. [1M]

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P.T.O.

PART – E

I. Answer any <u>THREE</u> of the following. Each question carries THREE marks: $\qquad$ $3 \times 3 = 9$

44. On dissolving 3.46g of non-volatile solute in 100g of water, the boiling point of solution was raised to that of pure water by 0.12K. Calculate the molar mass of non-volatile solute. (Given: K_b of water = $0.15 K kg mol^{-1}$)

45. 100g of liquid 'A' (molar mass $140 g mol^{-1}$) was dissolved in 1000g of liquid 'B' (molar mass $180 g mol^{-1}$). The vapour pressure of liquid 'B' was found to be 500 torr. Calculate the vapour pressure of pure liquid 'A' if the total vapour pressure of the solution is 475 torr.

46. Calculate the e.m.f. of the cell in which the following reaction takes place.

$$Ni_{(s)} + 2 Ag^+_{(0.002 M)} \rightarrow Ni^{2+}_{(0.160 M)} + 2 Ag_{(s)} \quad Given \ E^0_{cell} = 1.05 V \ .$$

47. The resistance of 0.1M solution is found to be $2.5 \times 10^3 \Omega$. Calculate the molar conductance. Given cell constant = $1.15 cm^{-1}$.

48. The rate constants of a reaction is doubled when the temperature increased from 400K to 410K. Calculate the activation energy (E_a). $\left[R = 8.314 J K^{-1} mol^{-1} \right]$.

9. For a first order reaction, the half – life period is 120 min. Calculate the time required to complete 90% of the reaction.

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II PUC PREPARATORY EXAMINATION - 2024

| Time 3 Hours 15 Minutes | CHEMISTRY (34) | Max Marks 70 |

Instructions :

1. Question paper has FIVE parts. All parts are compulsory.
2.
   a. Part - A carries 20 marks. Each question carries 1 mark.
   b. Part - B carries 06 marks. Each question carries 2 marks.
   c. Part - C carries 15 marks. Each question carries 3 marks.
   d. Part - D carries 20 marks. Each question carries 5 marks.
   e. Part - E carries 09 marks. Each question carries 3 marks.
3. In Part - A questions, **first attempted answer** will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labeled diagrams and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.

   Use log tables and simple calculator if necessary (use of scientific calculator is no allowed).

PART - A

I. Select the correct option from the given choices.   1x15=15

1. The dissolution of a gas in a liquid is governed by
   a. Raoult's law
   b. Henry's law
   c. Boyle's law
   d. van't Hoff factor

2. Standard electrode potential refers to the electrode potential of
   a. The metal in combination with 1 mol L^{-1} solution of its ions.
   b. The metal in combination with its ions of any concentration.
   c. The metal in combination with 1kg L^{-1} solution of its ions.
   d. The metal alone.

3. What is correct about H_2-O_2 fuel cell
   a. Pt or Pd is used as catalyst
   b. acidic conditions are maintained
   c. water is electrolyzed
   d. Pt or Pd is used as electrode.

4. Order of a reaction is determined by
   a. Balanced chemical equation
   b. unbalanced chemical reaction
   c. Experimental rate expression
   d. Thermo-chemical equation

5. In aqueous solution cuprous ions undergo ;
   a. Oxidation
   b. Reduction
   c. Sublimation
   d. Disproportionation

6. Which of the following ligand if present in a complex lead to the exhibition of Linkage isomerism
   a. -CN
   b. -ONO
   c. Cl
   d. EDTA

7. 1-chlorobutane on reaction with alc. KOH gives
   a. 1-butanol
   b. 2-butene
   c. 1-butene
   d. 2-butanol

8. The product obtained when tertiary butyl alcohol is passed over heated copper at 300° C?
   a. Aldehyde
   b. Alkene
   c. Ketone
   d. Carboxylic acid

9. The alcohol that produces turbidity immediately when treated with Lucas reagent is
   a. 1-hydroxy butane
   b. 2-hydroxybutane
   c. 2-hydroxy-2-methylpropane
   d. 1-hydroxy-2-methylpropane

10. In an Etard reaction, the oxidizing agent used is
    a. CrO_2Cl_2
    b. $KMnO_4$
    c. CrO_3
    d. Anhy $ZnCl_2$

11. Both Aldehydes and Ketones are identified by
    a. Tollen's Reagent   b. Fehlings Solution
       c. 2,4 DNP   c. Benedicts reagent

12. The IUPAC name of an amine $(H_3C)_2N\ CH_2CH_2CH_3$
    a. N,N-Dimethylethanamine   b. N,N-Dimethylpropanamine
    c. 1,1-Dimethylpropanamine   d. N-Ethyl-N-methylethanamine

13. In case of amines, the melting points are normally highest for
    a. Primary amines   b. Secondary amines
    c. Tertiary amines   d. Quaternary ammonium salts

14. The water-soluble component of starch is
    a. Vitamin C   b. Amylopectin   c. Amylose   d. Galactose

15. Which of the following is a steroid hormone
    a. Insulin   b. Glucagon   c. Androgen   d. Thyroxine
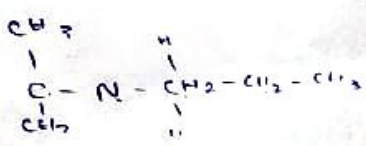
II. Fill in the blanks by choosing the appropriate word from those given in the brackets.   5x1=5
   (Benzene, increases, Phosgene, Promethium, decreases)

16. Solubility of a gas in liquid .... with decrease in temperature.

17. A catalyst .... energy of activation.

18. The only lanthanoid that shows radioactivity is ....

19. The poisonous gas formed when chloroform is exposed to air and light is ....

20. On heating Benzene diazonium chloride with hypophosphorous acid, the product obtained is ....

PART - B

III. Answer any three of the following. Each questions carries two marks.   3x2=6

21. What are Azeotropes? Give an example for minimum boiling azeotropes.

22. According to Collision theory, mention the two factors leading to an effective Collision.

23. Write the energy level diagram for the crystal field splitting in octahedral complexes.

24. Aryl halides are extremely less reactive towards nucleophilic substitution reaction than alkyl halides. Why ?

25. Explain Gattermann-Koch reaction with equation for the preparation of benzaldehyde.

26. i. Name the sugar moiety present in RNA.
    ii. Write the Zwitter ionic structure of glycine.

IV. Answer any two of the following. Each question carries three marks.   2x3=6

27. Explain the manufacture of potassium dichromate from chromite ore.

28. i. Zn, Cd and Hg are not regarded as d block elements, why ?
    ii. Calculate the spin only magnetic moment of V(III), (Z=23)   [1+2]

29. i. $Ce(OH)_3$ is found to be more basic than $Lu(OH)_3$, Give reason
    ii. Name the element with highest melting point in the 3d series of transition metals   [2+1]

30. Using the Valence Bond theory account for the hybridization, geometry and magnetic property of $[Co(NH_3)_6]^{3+}$

31. Give an example for a complex exhibiting facial-meridional isomerism and write the isomeric structure of that complex.

32. i. What is linkage isomerism ?
    ii. Write the IUPAC name of $[Pt(NH_3)_4][PtCl_4]$
    iii. How many moles of AgCl is precipitated when $[Co(NH_3)_4Cl_2]Cl$ reacts with $AgNO_3$ [1+1+1]

V. Answer any two of the following. Each question carries three marks.   2x3=6

33. Give reason,
    i. Blood cell when placed in water swells.
    ii. Depression in freezing point of 0.1 M aqueous NaCl is nearly twice that of 0.1 M glocose solution. [1+2]

34. State Kohlrausch's law of independent migration of ions. Mention two applications of it.

35. i. Write the balanced chemical equations for reactions that occur at anode and cathode during rusting of iron.

ii. How many Faradays of electricity is required to reduce Al^{3+} to Al? [2+1]

36. Derive integrated rate equation for Zero order reaction. [3]

PART - D

VI. Answer any four of the following. Each question carries five marks. 4x5=20

37. i. Explain the SN1 mechanism for the conversion of 2-bromo-2-methylpropane to 2-methyl butan-2-ol.
   ii. Write the reaction for the formation of fluoro methane from bromo methane and name the reaction. [3+2]

38. i. Write the mechanism of acid catalyzed dehydration of ethanol to ethene .
   ii. Explain Kolbe's reaction.

39. i. Name the product obtained when phenol is refluxed with chloroform in presence of aqueous sodium hydroxide at 340K, Name the reaction.
   ii. What is the effect of -NO_2 group on acidity of Phenol.
   iii. Explain Friedel Crafts acylation of Anisole. [2+1+2]

40. i. Write the chemical equation for the reaction when benzaldehyde is slightly heated with acetaldehyde in the presence of dilute alkali. Give the IUPAC name of the product.
   ii. Explain haloform reaction with an example. [3+1]

41. i. Among Acetic acid and chloro acetic acid, which is a stronger acid and why ?
   ii. Ketones are generally less reactive than aldehydes, give reason
   iii. Complete the following reaction.

$$C_6H_5COONa \xrightarrow{\text{NaOH \& CaO, heat}} ? A + Na_2CO_3$$ [2+2+1]

42. i. Give equations for the preparation of methylamine (methanamine) by Gabriel-phthalimide synthesis.
   ii. How is aniline converted to phenyl isocyanide. [3+2]

43. i. Draw the Howarth structure of Lactose.
   ii. How do you account for the absence of free aldehyde group in the pentaacetate of D-glucose?
   iii. Write the basic structural difference between Starch and Cellulose.
   iv. How many peptide bonds are present in hexapeptide.
   [2+1+1+1]

PART-E (PROBLEMS)

VII. Answer any three of the following. Each question carries three marks. 3x3=9

44. At 20^0C, the vapour pressure of pure liquid A is 22 mm of Hg and that of pure liquid B is 75 mm of Hg. What is the mole fractions of these two components in a solution that has a vapour pressure of 48.5 mm of Hg at this temperature (assuming ideal behavior).

45. 32 g of an unknown molecular solid is dissolved in 500 g of water. The resulting solution freezes at 271.15 K. Calculate the molar mass of this molecular solid. [Given, K_f for water is 1.86 K Kg mol^{-1}]

46. Calculate the EMF of the cell for the reaction,

$$Mg(s) + 2Ag^+(aq) \longrightarrow Mg^{2+}(aq) + 2Ag(s).$$

Given : $E^0_{Mg2+/Mg}$ = -2.37 V, $E^0_{Ag+/Ag}$ = 0.80 V, $[Mg^{2+}]$ = 0.001 M; $[Ag^+]$ = 0.0001 M

47. The conductivity of a 0.01 M solution of acetic acid at 298 K is 1.65×10^{-4} S cm^{-1}. Calculate dissociation constant for acetic acid.

(Given Λ^0_m for acetic acid = 390 S cm^{2}mol^{-1})

48. For a first order reaction, the half-life period is 110 min. Calculate the time required to complete 75% of the reaction.

49. The rate of a reaction doubles when the temperature changes from 27^0C to 37^0C. Calculate the value of E_a.

DISTRICT LEVEL PREPARATORY EXAMINATION - JANUARY 2024

II PUC - Chemistry (34)

Time : 3-15 Hrs.   Max. Marks : 70

Instructions:
1. Question paper has FIVE parts. All parts are compulsory.
2. a. Part-A carries 20 marks. Each question carries 1 mark.
   b. Part-B carries 06 marks. Each question carries 2 marks.
   c. Part-C carries 15 marks. Each question carries 3 marks.
   d. Part-D carries 20 marks. Each question carries 5 marks.
   e. Part-E carries 09 marks. Each question carries 3 marks.
3. In Part-A questions, first attempted answer will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labeled diagrams and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculator if necessary (use of scientific calculator is not allowed).

PART-A

I Select the correct option from the given choices. $1 \times 15 = 15$

1. A binary liquid solution is prepared by mixing n - heptane and ethanol. Which one of the following statements is correct regarding the behavior of the solution?
   a) The solution formed is an ideal solution.
   b) The solution formed is non-ideal solution showing negative deviation from Raoult's law.
   c) The solution formed is non-ideal solution showing positive deviation from Raoult's law.
   d) n - heptane shows positive deviation while ethanol shows negative deviation from Raoult's law.

2. S. I. unit of conductivity is
   a) Sm   b) Sm^{-1} c) ohm m^{-1} d) Sm^{-2}

3. The standard electrode potential of the zinc electrode is $- 0.76$ V and that of the silver electrode is $+ 0.8$ V. If the two electrodes are coupled, the emf of the cell will be
   a) 0.04V   b) 0.42V   c) 1.56V   d) 1.18V

4. For the reaction $P + Q \rightarrow$ Products, rate law is $r = k[P]^{1/2} [Q]^{3/2}$. Order of the reaction is
   a) 1   b) ½   c) 0   d) 2

5. Alkaline $KMnO_4$ is treated with potassium iodide, iodide ion is oxidised to
   a) I_2 b) IO^- c) IO_3^- d) IO_4^-

6. Which of the following is paramagnetic?
   a) $[Ni(CO)_4]$ b) $[Co(NH_3)_6]^{3-}$ c) $[Ni(CN)_4]^{2-}$ d) $[NiCl_4]^{2-}$

7. The alkyl halide having highest boiling point is
   a) CH_3I b) CH_3Br c) CH_3Cl d) CH_3F

8. Identify the product in the following reaction $CH_3 - CO - CH_3 + NH_2OH \rightarrow$
   a) oxime   b) hydrazone   c) imine   d) phenyl hydrazone

9. Ammoniacal silver nitrate is called
   a) Fehling's solution.   b) Benedict's reagent.   c) Schiff reagent.   d) Tollen's reagent.

10. Carboxylic acids are obtained by treating Grignard reagent with
    a) Ice   b) dry ice   c) water   d) CO

11. The formula C_3H_9N can represent
    a) Primary amine   b)Secondary amine   c)Tertiary amine   d) All of these

13. The general formula of diazonium salt is
    a) Ar – X   b) Ar – NO_2 c)Ar N_2^+ X^- d)Ar $N_2^+HSO_4^-$

14. The nitrogenous base present in RNA but not in DNA is
    a) Thymine   b) Uracil   c) Adenine   d) Guanine

15. The hormone which is responsible for preparing the uterus for implantation of fertilized egg is
    a) Testosterone   b) estradiol   c) glucocorticoids   d) progesterone

II Fill in the blanks by choosing the appropriate word from those given in the brackets: 5 × 1 = 05
(less, hard spheres, solvent, Grignard, zinc, solute)

16. Colligative properties depend on the number of ------------ particles in the solution.
17. According to the collision theory, the reactant molecules are assumed to be ----------.
18. The non-transitional metal present in brass is ----------
19. Alkyl magnesium halides are commonly called as ---------- reagents.
20. Aniline is -------- basic than ammonia.

PART-B

III Answer any three of the following. Each question carries two marks.   **3 × 2 = 06**

21. i) At a given temperature oxygen gas is more soluble in water than nitrogen gas. Which one of them has higher value of K_H?

    ii) Van't Hoff factor for a solution is more than one. What is the conclusion drawn from it?

22. Explain the effect of catalyst on the rate of the reaction with the graphical representation.

23. Write the cis and trans isomers for $[CoCl_2(en)_2]^+$

24. Complete the equation and name the reaction. $CH_3Br + AgF \rightarrow$

25. Explain Clemmensen reduction with an example.

26. What are essential amino acids? Give an example.

PART-C

IV Answer any three of the following. Each question carries three marks.   **3 × 3 = 09**

27. i) Calculate the spin only magnetic moment of Fe^{3+} ion. (Z = 26)

    ii) Cu^{2+} salts are coloured. Give reason.

28. Explain the preparation of potassium dichromate from chromite ore.

29. What is Lanthanoid contraction? Mention the cause and any one of its consequences.

30. i) Mention any two postulates of Werner's theory of coordination compounds.

    ii) Write the IUPAC name of $[Pt(NH_3)_2Cl(NO_2)]Cl_2$.

31. Using Valence Bond Theory [VBT], explain geometry, hybridisation and magnetic property of $[NiCl_4]^{2-}$ ion. [Atomic number of Nickel is 28].

32. Draw the energy level diagram for the crystal field splitting in octahedral complexes. Write the relation between Δ_0 and Δ_t for the complexes having same metal, the same ligand and metal-ligand distances.

V. Answer any two of the following. Each question carries three marks.   2 × 3 = 06

33. What is solubility? How solubility of a gas in liquid varies with i) temperature and ii) pressure.

34. What are fuel cells? Write the electrode reactions taking place inside a $H_2 - O_2$ fuel cell.

35. Draw a neat labeled diagram of standard hydrogen electrode (SHE). Write its half-cell reaction and the symbolic representation.

36. Define half-life of a reaction. Show that half-life of a first order reaction is independent of initial concentration.

PART-D

VI. Answer any four of the following. Each question carries five marks.   4 × 5 = 20

37. a. Explain the mechanism involved in the conversion of tertiary butyl bromide to tertiary butyl alcohol.

   b. Predict the major product formed when chloro benzene reacts with

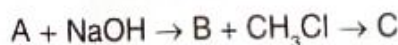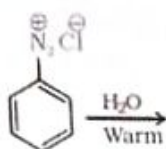   i) sodium metal in the presence of dry ether ii) chloromethane in the presence of anhydrous $AlCl_3$ (3+2)

38. a. Explain the mechanism of acid catalysed hydration of alkenes in the preparation of alcohols.

   b. What is the effect of $- NO_2$ group on the acidic strength of phenol? Give reason.   (3+2)

39. a.

   $A + NaOH \rightarrow B + CH_3Cl \rightarrow C$

   Identify the major product A, B, and C.

   b. How does anisole react with bromine in ethanoic acid? Give equation.   (3+2)

40. a. An acyl chloride A is hydrogenated over catalyst palladium on barium sulphate to form a carbonyl compound B which on heating with concentrated sodium hydroxide forms the compounds C and D. Identify the compounds A, B, C and D.

   b. Write the IUPAC name of $OHC-CH_2-CH-CH_2-CHO$ (4+1)
                                                    $|$
                                                  CHO

41. a. A carboxylic acid is treated with alcohol in the presence of concentrated sulphuric acid. Name the reaction. Identify the major product formed during the reaction and write its general equation.

   b. Between acetic acid and formic acid, which is more acidic? Give reason.   (3+2)

42. a. Name the major product formed during the following conversions

   i) Nitrous acid is treated with methyl amine.

   ii) Benzene diazonium chloride is treated with KI.

   iii) Nitrobenzene treated with iron scrap and hydrochloric acid.

   b. Explain the preparation of methanamine by Hoffman bromamide degradation reaction.   (3+2)

43. a) Write the Haworth structure of lactose.

   b) The deficiency of which vitamin increases the blood clotting time?

   c) Name the protein present in muscles.

   d) Give an example for invert sugar.   (2+1+1+1)

(PROBLEMS)

VII Answer any three of thefollowing. Each question carries three marks. $3 \times 3 = 09$

44. Calculate the mass of a non-volatile solute (molar mass = 40 $gmol^{-1}$) which would be dissolved in 114g of octane to reduce its vapour pressure to 80%.

45. A solution containing 18g of non-volatile solute is dissolved in 200 g of water freezes at 272.07K. Calculate the molecular mass of solute. Given k_f = 1.86 $Kkgmol^{-1}$, freezing point of water = 273K

46. Given: $E°_{Mg2+/Mg}$ = −2.37V and $E°_{Al3+/Al}$ = − 1.66 V respectively. Construct a galvanic cell using these electrodes and calculate the equilibrium constant for the reaction.

47. Chromium plating is carried out according to the equation:

    $CrO_3 + 6H^+ + 6e^- \rightarrow Cr + 3H_2O$. How long will it take to plate 1.5g of chromium if 12.5A current flows? (Atomic mass of Cr = 52, F = 96500C)

48. A first order reaction takes 40 min for 30% completion. Calculate the half-life period of the reaction.

49. The energy of activation of a reaction is 60 $kJmol^{-1}$. If its rate constant at 310 K is 2 x $10^{-4}s^{-1}$. calculate the rate constant at 320 K. (Given: R = 8.314$JK^{-1}mol^{-1}$)

GOVERNMENT OF KARNATAKA
DEPARTMENT OF PRE-UNIVERSITY EDUCATION
II PUC PREPARATORY EXAM   2023-24
Subject : Chemistry - 34

Time : 3:15 Hr   Marks : 70

Instructions
1. Question paper of FIVE parts. All parts are compulsory.
2. a. Part-A carries 20 marks. Each question carries 1 mark.
    b. Part-B carries 06 marks. Each question carries 2 marks
    c. Part-C carries 15 marks. Each question carries 3 marks
    d. Part-D carries 20 marks. Each question carries 5 marks
    e. Part-E carries 09 marks. Each question carries 3 marks
3. In Part-A Questions, first attempted answer will be considered for awarding marks
4. Right balanced chemical equations and draw neat labeled diagrams and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks
6. Use law tables and simple calculator is necessary (use of scientific calculator is not allowed).

PART - A

I.   Select the correct option from the given choices   1x15=15

1. Type of the solution obtained when copper dissolved in Gold is
   a) Gaseous solution   b) Liquid solution
   c) Solid solution   d) Heterogeneous solution

2. During the electrolysis of molten NaCl using platinum electrode, the product liberated at anode and cathode respectively
   a) Cl_2 and Na   b) Na and Cl_2
   c) H_2 and O_2 d) Cl_2 and H_2

3. For the H_2 - O_2 fuel cell, the reaction at cathode is
   a) $O_{2(g)} + 2H_2O_{(l)} + 4e^- \rightarrow 4\,OH^-_{(aq)}$ b) $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$
   c) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$ d) $H^+ + e^- \rightarrow \frac{1}{2}H_{2(g)}$

4. The thermal decomposition of HI on gold surface is an example of
   a) Zero order   b) First order
   c) Half order   d) Second order

5. Electrolytic oxidation of MnO_4^{-2} in alkaline solution gives
   a) MnO_2 b) Mn_2O_3
   c) MnO_4^- d) MnO

6. The common oxidation state exhibited by elements in 3d series is
   a) +7   b) +3
   c) +2   d) +4

7. The gases liberated when primary alcohol react with sulphonyl chloride are
   a) H_2 and HCl   b) SO_2 and HCl
   c) SO_2 and H_2O d) SO_3 and H_2

8. Which among these suitable reagent for the conversion of $R - CH_2 - OH \rightarrow R - CHO$ is
   a) $KMnO_4$ b) $K_2Cr_2O_7$

9. Choose strongest acid among the following

   a) 2-Nitrophenol   b) 4-Bromophenol

   c) 4-Nitrophenol   d) 3-Nitrophenol

10. Ammonical silver nitrate solution is also known as

   a) Benedict's reagent   b) Schiff's reagent

   c) Fehling solution   d) Tollen's reagent

11. Identify the most acidic halogenic carboxylic acid

   a) FCH_2COOH b) ICH_2COOH

   c) $ClCH_2COOH$ d) $BrCH_2COOH$

12. The product obtained when propionamide subjected for Hoffmann degradation

   a) methyl amine   b) propyl amine

   c) ethyl amine   d) ethyl bromide

13. Choose the most stable diazonium salt

   a) $C_6H_5CH_2N_2^+X^-$ b) $CH_3N_2^+X^-$

   c) $C_6H_5N_2^+X^-$ d) $CH_3CH_2N_2^+X^-$

14. Among these which one can form Zwitter ion

   a) $CH_3 - COO - CH_3$ b) $NH_2 - CH_2 - COOH$

   c) $H_2N - CO - C_2H_5$ d) $CH_3 - CH_2 - COOH$

15. The correct base sequence of hydrogen bonding in DNA double helix structure

   a) $A - C, T - G$ b) $A - T, G - C$

   c) $G - C, A - C$ d) $A - A, T - T$

II.   Fill in the blanks by choosing the appropriate word from those given in the brackets.   15X1=5

(Freon-12, Radioactive, low atmospheric pressure, low temperature, theoretically, basic strength)

16. Low concentration of oxygen in the blood and tissues of people living at high altitude is due to ....

17. Molecularity of elementary reaction can be predicted only by ....

18. Most of the Actinoids are .... in nature.

19. CCl_2F_2 is an example for ....

20. Larger the PK_b values of amine, weaker is the ....

PART-B

III.   Answer any THREE of the following. Each questions carries 2 marks.   2X3=6

21. Mixture of acetone and ethanol shows positive deviation from Roulte's law. Give reason.

22. What is pseudo first order reaction? Give an example.

23. Define linkage isomerism? Give an example

24. How can you obtain fluoro alkane from other haloalkane? Name the reaction.
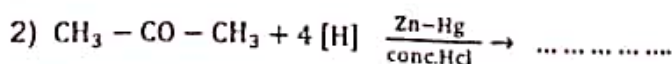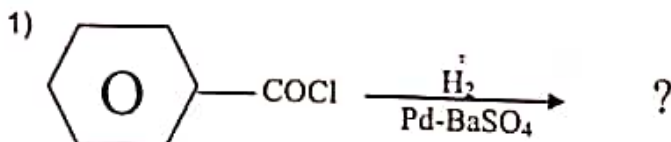
25. Explain Gatterman-Koch reaction.

26. Mention the two hormones which are group of steroid

PART-C

IV. Answer any THREE of the following. Each question carries 3 marks. 3 X 3= 9

27. Calculate the Spin only magnetic moment of M^{+3} ion (Z=26).

28. With the balanced chemical equation, explain the manufacture of $K_2Cr_2O_7$ from chromite ore.

29. What is Lanthanoid contraction? Mention any two consequences.

30. (a) Write the IUPAC name $[Cr(NH_3)_3(H_2O)_3]Cl_3$ for. (1)

(b) Draw the facial and meridional isomerism of $[Co(NH_3)_3(NO_2)_3]$. (2)

31. Using VBT, explain the geometry, hydbridisation and magnetic property of $[Co(NH_3)_6]^{+3}$ ion complex (given atomic number of Co is 27).

32. Draw and explain energy level diagram for the crystal field splitting in octahedral complexes.

V. Answer any TWO of the following. Each questions carries 3 marks. 3 X 2= 6

33. Give any three difference between ideal and non-ideal solutions.

34. Describe the construction and working of standard hydrogen electrode and write electrode reactions.

35. State Kohlrausch's law of independent migration of ions, mention it's any two application.

36. Derive an integrated rate equation for zero order reaction.

PART-D

VI. Answer any FOUR of the following. Each questions carries 5 marks. 4 X 5= 20

37. (a) Explain the steps involve in the S_N1 mechanism of hydrolysis of 2-bromo-2-methyl propane. (3)

(b) Along with chemical equation explain Friedel Craft's acylation reaction by taking chloro benzene as an example. (2)

38. (a) Describe the mechanism for acid catalyzed dehydration of ethenol to ethane. (3)

(b) Write the reaction for manufacture of Phenol from cumene. (2)

39. (a) An organic compound A reacts with chloroform in the presence of excess of base to give B. Identify A and B and name the reaction. (3)

(b) Identify the product A and B in the following equation. (2)

$$(CH_3)_3C - O - C_2H_5 \xrightarrow{HI, \Delta} A + B$$

40. (a) Explain Cannizzaro's reaction taking benzaldehyde as an example. (2)

(b) Complete the following equation (2)

1)

$$\langle O \rangle - COCl \xrightarrow[Pd-BaSO_4]{H_2} \quad ?$$

2) $CH_3 - CO - CH_3 + 4 [H] \xrightarrow[conc.Hcl]{Zn-Hg} \cdots\cdots\cdots\cdots$

(c) Name the oxidizing agent used in Etard reaction.

41. (a) 'A' carboxylic acid reacts with chlorine in the presence of red phosphorus. Write the equation and name the compound A. (3)

    (b) Between formic acid and acetic acid which is more acidic. Give reason. (2)

42. (a) Write the equation for the preparation of methyl amine by Hoffmann's bromamide reaction. (2)

    (b) Explain carbylamine reaction with an equation by taking methyl amine. (2)

    (c) IUPAC name of the organic compound
    $$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{N}} - CH_3$$
    (1)

43. (a) Give any two difference between amylose and amylopectin. (2)

    (b) What is nucleoside? Write any one function of RNA. (2)

    (c) Which hormone is responsible for hypothyroidism. (1)

PART-E

VII.   Answer any THREE of the following. Each questions carries 3 marks.   3 X 3= 9

44. 12.6 g of non-electrolyte is dissolved in 75 g of water. The freezing point of this solution is 271.9 K. Calculate the molar mass of the solute. (Freezing point of water is 273.15 K and molal depression constant of water is 1.86 K kg mol^{-1})

45. Solubility of a gas in water 0.001 m STP. Determine its Henry's law constant.

46. The standard electrode potential for Daniel cell is 1.1 V. Calculate the standard Gibb's energy for the reaction: $Zn(s) + Cu^{+2}(aq) \rightarrow Zn^{+2}(aq) + Cu(s)$

    (Given F = 96487 C/mol)

47. Calculate the emf of the following cell using Nernst equation at 298 K.

    $$Fe(s)|Fe^{2+}(0.001\ M)||H^+(1\ M)|\ H_2(g)(1\ bar)|Pt(s)$$

    $$[E^0\ Fe^{2+} = -0.44\ V \text{ and } E^0\ H^+ = 0.0\ V]$$

48. Show that for a first order reaction, the time taken for the completion of 99% of the reaction is twice for the completion of 90% of reaction.

49. The rate constant for a reaction at 500 K and 700 K ate 0.02 s^{-1} and 0.07 s^{-1} respectively. Calculate activation energy (R=8.314 J K^{-1} mol^{-1}).

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 : 1. The question paper has five parts. A, B, C, D & E. All the parts are compulsory.
2. a) **PART-A** Carries 20 marks, Each question carries 1 mark.   b) **PART-B** Carries 6 marks, Each question carries 2 marks
   c) **PART-C** Carries 15 marks, Each question carries 3 marks.   d) **PART-D** Carries 20 marks, Each question carries 5 marks.
   e) **PART-E** carries 9 marks, Each question carries 3 marks.
3. In Part-A questions, **first attempted answers** will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labelled diagrams & graphs wherever required.
5. Direct answers to numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and the simple calculators if necessary. (Use of scientific calculator is not allowed)

PART - A

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

1) The Van't Hoff factor i for a dilute aqueous solution of sucrose is
   a) zero   b) one   **c) two**   d) three

2) Molten NaCl conducts electricity due to the presence of
   a) free electrons   b) free molecules   **c) free ions**   d) atoms of Na and Cl

3) Three faradays of electricity passed through molten Al_2O_3, aqueous solution of $CuSO_4$ and molten NaCl. The amount of aluminium, copper and sodium deposited at the cathodes will be in the ratio
   a) 1 mol : 2 mol : 3 mol   b) 1.5 mol : 2 mol : 3 mol
   c) 1 mol : 1.5 mol : 3 mol   d) 1 mol : 3 mol : 2 mol

4) Radioactive disintegration is an example of
   a) zero order reaction   **b) first order reaction**
   c) second order reaction   d) third order reaction

5) Colour of transition metals ions are due to absorption of some wavelength. This results in
   a) d-s transition   b) s-s transition   c) s-d transition   **d) d-d transition**

6) The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$ is
   a) diamminedichloridoplatinum (IV)   **b) diamminedichloridoplatinum (II)**
   c) diamminedichloridoplatinum (0)   d) dichloridodiammineplatinum (IV)

7) The ether that undergoes electrophilic substitution reaction is
   a) $CH_3OC_2H_5$ **b) $C_6H_5OCH_3$**   c) CH_3OCH_3 d) $C_2H_5OC_2H_5$

8) Bromination of methane in presence of sunlight is a
   a) nucleophilic substitution   **b) free radical substitution**
   c) electrophilic substitution   d) nucleophilic addition

9) Propanone on reaction with alkyl magnesium bromide followed by hydrolysis will produce
   a) Primary alcohol   b) secondary alcohol   **c) tertiary alcohol**   d) carboxylic acid

10) Benzoyl chloride on reduction with H_2/Pd-$BaSO_4$ produces
   a) benzoic acid   b) benzyl alcohol   c) benzoyl sulphate   **d) benzaldehyde**

11) Which of the following will not undergo HVZ reaction ?
   a) propanoic acid   **b) ethanoic acid**
   c) 2-methylpropanoic acid   d) 2, 2-dimethylpropanoic acid

12) Nitrogen atom of amino group is _____ hybridised.
   a) sp   b) sp^2 **c) sp^3**   d) sp^3d

13) Which of the following has highest pK_b value ?
   a) $(CH_3)_3CNH_2$ b) NH_3 c) $(CH_3)_2NH$ d) CH_3NH_2

14) Deficiency of vitamin D causes
   a) scurvy   b) beri-beri   **c) rickets**   d) muscular weakness

15) A nucleoside on hydrolysis gives
   a) an aldopentose & a nitrogenous base   b) an aldopentose & phosphoric acid
   c) an aldopentose, a nitrogenous base & phosphoric acid
   d) a nitrogenous base & phosphoric acid

II. **Fill in the blanks by choosing the appropriate word from those given in the brackets :**   5X1=5
   [Ziegler, saturated, phosgene, p-aminoazobenzene, catalyst]
16) A solution in which no more solute can be dissolved at the same temperature & pressure is called .... solution.
17) Gibb's free energy of a reaction is not altered by the addition of ....
18) Mixture of $TiCl_4$ and $Al(CH_3)_3$ is called .... catalyst.
19) The poisonous gas .... is formed when chloroform is exposed to air and light.
20) Reaction of aniline with benzene diazonium chloride in acidic medium gives ....

PART-B

III. **Answer ANY THREE of the following questions. Each carries two marks.**   3X2=6
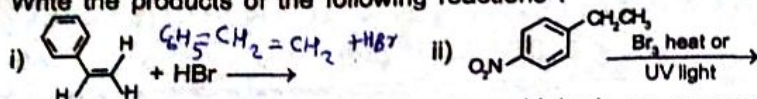21) How does vapour pressure of solvent varies when a non-volatile solute is dissolved in it ? Give reason.
22) What is pseudo first order reaction ? Give an example.

23) What is an ambidentate ligand ? Name the type of structural isomerism arises when such ligand present in the complex.

24) Write the products of the following reactions :

i) [benzene ring with CH=CH₂] $C_6H_5-CH_2=CH_2 + HBr$ + HBr ———→ ii) O_2N—[benzene ring]—CH_2CH_3 $\xrightarrow{Br_2, \text{ heat or UV light}}$

25) Explain Cannizzaro's reaction taking benzaldehyde as an example.
26) What are essential amino acids ? Give an example.

PART-C

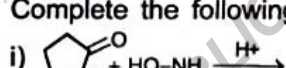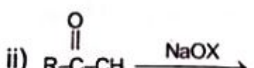**IV. Answer ANY THREE of the following questions. Each question carries three marks. 3X3=9**

27) Write the balanced equations in the manufacture of $K_2Cr_2O_7$ from chromite ore. (3)
28) a) Calculate spin only magnetic moment of Cr^{3+} ion. (Atomic number of Cr=24) (2)
    b) Zr and Hf have identical atomic radii. Give reason. (1)
29) a) Give any two reasons for the formation of large number of complex compounds by transition metals. (2)
    b) Actinoids exhibit a greater range of oxidation states. Give reason. (1)
30) Using valence bond theory (VBT), explain geometry, hybridisation and magnetic property of $[NiCl_4]^{2-}$ ion. (Atomic number of Ni is 28) (3)
31) a) Draw the facial (fac) and meridional (mer) isomeric structures of $[Co(NH_3)_3(NO_2)_3]$. (2)
    b) What is the coordination number of Chromium in $K_3[Cr(C_2O_4)_3]$. (1)
32) Explain the crystal field splitting in octahedral complexes using energy level diagram. (3)

V. Answer ANY TWO of the following questions : Each question carries three marks. 2X3=6

33) Write any three differences between non-ideal solutions showing positive and negative deviation.
34) a) Write half cell reaction and E° value of standard hydrogen electrode (SHE). (2)
    b) State Kohlrausch's law. (1)
35) a) What is molar conductivity ? How does it vary upon dilution ? (2)
    b) Mention any one method for prevention of corrosion. (1)
36) Derive an integrated rate equation for the rate constant of first order reaction. (3)

PART-D

VI. Answer ANY FOUR of the following questions : Each question carries 5 marks. 4X5=20

37) a) Explain S_N2 mechanism by taking chloromethane as an example. (2)
    b) Explain Friedel-Craft's acylation of chlorobenzene with equation. (2)
    c) What are enantiomers ? (1)
38) a) Explain the mechanism of acid catalysed dehydration of ethanol to ethane. (3)
    b) What happens when phenol is heated with zinc dust ? Write equation. (2)
39) a) What is the effect of following groups on acidity of phenol. i) $-NO_2$ ii) $-CH_3$ (2)
    b) Explain Williamson's ether synthesis for the preparation of methoxymethane. (2)
    c) Give the composition of Luca's reagent. (1)
40) a) Aldehydes are generally more reactive than ketones towards nucleophilic addition reactions. Give two reasons. (2)
    b) Explain Etard reaction with equation. (2)
    c) What is Tollen's reagent ? (1)
41) a) Complete the following reactions. (2)

    i) [cyclopentanone structure] $+ HO-NH_2 \xrightarrow{H+}$ ii) $R-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow{NaOX}$

    b) How does carboxylic acids prepared using Grignard reagent ? Give equation. (2)
    c) Which is more acidic among formic acid and acetic acid ? (1)
42) a) Explain Hinsberg's test of differentiation of primary, secondary and tertiary amines. (3)
    b) How is methanamine prepared by Hoffmann's bromamide degradation reaction. (2)
43) a) Write the Haworth structure of Lactose. (2)
    b) Explain with reaction to show that glucose contains.
       i) six carbon atoms in straight chain and ii) a carbonyl functional group (2)
    c) Name the hormone which regulates blood sugar level. (1)

PART-E (Problems)

VII. Answer ANY THREE of the following questions : Each question carries 3 marks. 3X3=9

44) 200 cm³ of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57×10^{-3} bar. Calculate the molar mass of the protein.
45) The vapour pressure of water is 12.3 kPa at 300 K. Calculate vapour pressure of 1 molal solution of a non-volatile solute in it.
46) A solution of $NiNO_3$ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. What mass of Ni is deposited at the cathode ?
47) Calculate limiting molar conductivity of calcium sulphate. Limiting molar conductance of calcium and sulphate ions are 119 and 160 Scm^2mol^{-1} respectively.
48) The rate constant for a first order reaction is 60s⁻¹. How much time will it take to reduce the initial concentration of the reactant to its $1/16^{th}$ value ?
49) The rate of a reaction quadruples when the temperature changes from 293 K to 313 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature.

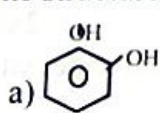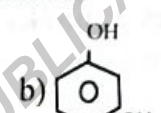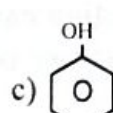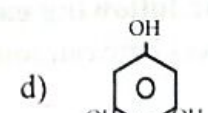| Time : 3 : 15 min	Sub: Chemistry (34)	Max Marks : 70
Class: II PUC		No. Of Questions: 49

Instructions :
1. Question Paper have FIVE Parts. All Parts are compulsory
2. a. Part-A Carries 20 Marks. Each Question carries 1 mark
   b. Part-B Carries 06 Marks Each Question carries 2 marks
   c. Part-C Carries 15 Marks Each Question carries 3 marks
   d. Part-D Carries 20 Marks Each Question carries 5 marks
   e. Part-E Carries 09 Marks Each Question carries 3 marks
3. In Part –A Questions, **First Attempted** answer will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labeled diagram and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculator if necessary. (use of scientific calculator is not allowed)

Part A

I. Select the correct options from the given choice 15x1=15

1) The mixture of 95% ethyl alcohol & 5% water by volume shows which type of azeotrope. ?
   a) Maximum boiling azeotrope.
   b) Minimum boiling azeotrope.
   c) Both Minimum and maximum boiling azeotrope.
   d) None of the above

2) SI Unit for molar conductivity.
   a) $S\ cm^2\ mol^{-1}$
   b) $S\ cm\ mol^{-1}$
   c) $S^{-1}\ cm^2\ mol^{-1}$
   d) $S\ cm^3\ mol^{-2}$

3) How Many coulombs are required for the following reaction : $Al \rightarrow Al^{+} + 3e^{-}$
   a) 96500 x 1
   b) 96500 x 2
   c) 96500 x 3
   d) 96500 x 4

4) Example for fractional order of reaction is
   a) $H_2 + Cl_2 \rightarrow 2 HCl$
   b) $H_2 + I_2 \rightarrow 2 HI$
   c) $H_2 + F_2 \rightarrow 2 HF$
   d) $H_2 + Br_2 \rightarrow 2 HBr$

5) Which of the following 3d series transition metal ion has colourless?
   a) Cu^{+2}
   b) Cu^{+}
   c) Cr^{3+}
   d) Fe^{+2}

6) The Co-ordination number of the following complex is $[Co\ (en)_2\ Cl_2]^{+}$
   a) 2
   b) 4
   c) 6
   d) 5

7) IUPAC name of the following compound
   CH_2 - CH - CH_2
   | | |
   OH   OH   OH
   a) Propane – 1, 2, 3- triol
   b) Ethane – 1, 2, 3- triol
   c) Propane – 1, 2- diol
   d) Propane – 1, 3, 4- triol

8) The structure of resorcinol is

9) Identify the named reaction $CH_3ONa + I-CH_3 \xrightarrow{\Delta} CH_3-O-CH_3 + NaI$
   a) Wurtz reaction
   b) Wurtz fittig reaction
   c) Williamson's ether synthesis
   d) Fittig reaction

10) Condition for aldol condensation
   a) Aldehyde & Ketone does not contain α H atom
   b) Aldehyde & Ketone does not contain β H atom
   c) Aldehyde & Ketone contain α H atom
   d) Aldehyde & Ketone contain β H atom

11) Among the following acids which is more acidic
   a) Acetic Acid
   b) Dichloro acetic acid
   c) Trichloro acetic acid
   d) Monochloro acetic acid

12) Which of the following amines is more basic in aqueous medium?
   a) Dimethyl amine
   b) Methyl amine
   c) Trimethyl amine
   d) Ammonia

13) Which of the following amine does not react with Hinsberg's reagent?
   a) Primary amine
   b) Tertiary amine
   c) Secondary amine
   d) Both Primary and Secondary

a) Methionine   b) Cytosine   c) Both a & b   d) Alanine

15) Which of the following vitamin deficiency causes scurvy disease
    a) Vitamin A   b) Vitamin D   c) Vitamin E   d) None of the above

II. Fill in the blanks by choosing the appropriate word from those given in the brackets   5x1=05
           (Decreases,   Racemic,   +2,   1,   Primary,   Increases)

16) If Henry's constant (K_H) value increases the solubility of gas in liquid is _____

17) For the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ The order of reaction is _____

18) The most stable oxidation state of copper is _____

19) Equimolar mixture of dextro & leavo rotatory isomers is called _____ mixture

20) Gabriel phthalimide synthesis is used to prepare _____ amines only

Part B

III. Answer any three of the following each question carries 2 marks.   3x2=06

21) State the Raoult's Law of liquid solutions and write its mathematical form.

22) Write any 2 differences between order and molecularity of the reaction.

23) Write structures of cis and trans isomers of $[Co(en)_2Cl_2]^+$ complex.

24) Explain Swart's reaction with balanced chemical equation by taking ethyl bromide an example.

25) Complete the reaction and write its name of product.

$$CH_3 - \underset{\underset{H}{|}}{C} = O + H_2N - OH \xrightarrow{-H_2O} \quad ?$$
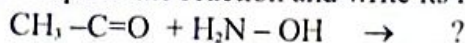
       Acetaldehyde   Hydroxylamine

26) What is Zwitter ion of α aminoacid. Write general structure of it.

Part C

IV. Answer any three of the following each question carries 3 marks.   3x3=09

27) Calculate spin only magnetic moment of Co^{II} ion $(Z = 27)$

28) How does $K_2Cr_2O_7$ react with (i) I^- (ii) Fe^{+2} (iii) H_2S to give I_2, Fe^{+3}, S respectively. Write balanced chemical equations

29) Write any three differences between Lanthanides and actinides.

30) Write any three postulates of Werner's co-ordination theory.

31) Using V.B.T (Valence Bond Theory) explain hybridization geometry and magnetic property of $[NiCl_4]^{-2}$

32) a) Draw energy level diagram for crystal field splitting in octahedral complex.
     b) Write the IUPAC Name of $[Co(NH_3)_6]$ $[Cr(CN)_6]$

IV. Answer any Two of the following each question carries 3 marks.   2x3=06

33) Write any three differences between solutions showing positive deviation and negative deviation from Raoults Law.

34) Write the balanced chemical equations of anode, Cathode and overall reactions of Lead storage battery while discharging (When battery is used)

35) a) Explain the effect of dilution on molar conductivity and conductivity.
     b) Define limiting molar conductivity.

36) Derive integrated rate equation for zero order reaction.

Part D

IV. Answer any four of the following each question carries 5 marks.   4x5=20

37) a) Explain SN^1 mechanism by taking 2 bromobutane an example show that the forming of D and L isomers as a product. ($CH_3-CH-CH_2-CH_3$)   3M

            |
           Br

     b) Explain Fittig reaction by taking bromobenzene an example.   2M

38) a) Explain the mechanism of acid catalyzed hydration of alkene into alcohol.   3M
     b) Between water and alcohol which one is weaker acid? Give Reason.   2M

39) a) Explain the mechanism of hydration of excess of ethanol into diethyl ether in the presence of acid catalyst at 413K.   3M
     b) Between O- nitro phenol and P- nitro phenol which one has less volatile? Give reason   2M

40)

b) How benzyl alcohol and sodium benzoate are prepared from benzaldehyde in the presence of base (OH⁻) 2M

    c) What is the condition of reactant undergoes haloform reaction.   1M

41) a) How benzene is prepared from sodium benzoate by decarboxylation reaction   2M

    b) Write Balanced Chemical equations of the reaction of acetic acid react with ammonia to give ammonium acetate and acetamide.   2M

c) Which acid is more acidic in the following   1M

    $H - COOH$ C_6H_5-COOH CH_3-COOH

    $(Pk_a = 3.75)(Pk_a = 4.19)$ $(Pk_a = 4.75)$

42) a) An aromatic compound A react with nitrous acid (HNO_2)+HCl at 273-278K to give a product B. It reacts with water to give phenol. Name the product A and B Write the balanced chemical equations.   3M

    b) Write IUPAC Name of the following :   1M

        $CH_3- CH_2 – N- CH_3$

                CH_3

    c) Why Hoffmann's bromoamide reaction is called degradation reaction?   1M

43) a) Write Haworth structure of sucrose.   2M

    b) Write any two differences between DNA and RNA   2M

    c) Which Harmone increase glucose level in blood.   1M

Part E

V. Answer any three of the following each question carries 3 marks.   **3x3=09**

44) Calculate the mass of urea ($NH_2-CO-NH_2$) required in making 2.5 kg of 0.25 molal aqueous solution.

45) 200 cm³ of an aqueous solution of protein containing 1.26g of the protein. The osmotic pressure of such a solution at 300K is found to be 2.57x 10⁻³ bar. Calculate the molar mass of protein. (R= 0.0831 bar .mol⁻¹.K⁻¹)

46) Using the Nernst equation for the following cell at 298K and calculate the EMF

    $Al_{(s)} / Al^{+3}_{(0.001M)} //Cu^{+2}_{(0.0001M)}/ Cu_{(s)}$

    Given E° Al^{+3}/Al = -1.66v and E° Cu^{+2}/Cu = +0.34v

47) How long has a current of 3 ampere to be applied through a solution of silver nitrate to coat a metal surface of 0.42g (Atomic mass of Ag = 108)

48) 60% of first order reaction was completed in 60 minutes calculate the time taken for 50% completed

49) The rate constant of first order reaction becomes 5 times when the temperature is raised from 350K to 400K Calculate the activation energy (Ea) for the reaction.

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MD   **II PUC PREPARATORY EXAMINATION, JANUARY - 2024**   **II**

Time : 3:15 Hours   **CHEMISTRY - 34**   Max. Marks : 70

Instructions : 1) Question paper have FIVE parts. All parts are compulsory.
2) a) Part-A carries 20 marks. Each question carries 1 mark. b) Part-B carries 06 marks. Each question carries 3 marks.
c) Part-C carries 15 marks. Each question carries 3 marks. d) Part-D carries 20 marks. Each question carries 5 marks.
e) Part-E carries 09 marks. Each question carries 3 marks.
3) In part-A questions first attempted answer will be considered for awarding marks.
4) Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
5) Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6) Use log tables and simple calculator if necessary. [use of scientific calculator is not allowed]

PART - A

I Select the correct option from the given choices. $1 \times 15 = 15$

1) Negative deviation from Raoult's law is observed in which of the following binary liquid mixture.
   a) Ethanol and acetone
   b) Benzene and toluene
   c) Acetone and chloroform
   d) Acetone and carbon disulphide

2) How much electricity interms of Faraday is required to reduce one mole of $Cr_2O_7^{2-}$ to Cr^{3+}
   a) 3F   b) 6F   c) 4F   d) 2F

3) If $E_{ext} > 1.1V$ is applied in the galvanic cell
   a) Electrons flow from Cu to Zn rod
   b) Electrons flow from Zn to Cu rod
   c) Current flows from Cu to Zn rod
   d) No flow of electrons or current

4) In a reaction when the concentration of reactant is increased by nine times, the rate increases by 3 times. The order of the reaction is
   a) 3   b) 2   c) 1   d) $\frac{1}{2}$

5) The magnetic moment of divalent ion in aqueous solution if its atomic number is 25 is
   a) 5.92 BM   b) 4.89 BM   c) 3.87 BM   d) 2.82 BM

6) The co-ordination number of cobalt in the complex $\left[Co(en)_2(H_2O)_2\right]Cl$ is
   a) 4   b) 5   c) 6   d) 2

7) Ethylidiene chloride is an
   a) Vicinal dihalide   b) geminal dihalide   c) Allylic halide   d) Vinylic halide

8) Anisole reacts with HI at 373 K gives a mixture of
   a) $C_6H_5I + CH_3OH$ b) $C_6H_5OH + CH_3I$ c) $C_6H_5CH_2OH + CH_3I$ d) $C_6H_5OH + CH_3CH_2I$

9) ![phenol] $\xrightarrow{\text{Con.}^{t} HNO_3}$ X . In this reaction the product 'x' is
   a) O-nitrophenol
   b) P-nitrophenol
   c) The mixture of O-nitro and P-nitrophenol
   d) 2, 4, 6-trinitrophenol

10) Which of the following cannot reduce Tollen's reagent
    a) CH_3COCH_3 b) HCHO   c) CH_3CHO d) C_6H_5CHO

11) $R - CN \xrightarrow[2) H_3O^+]{1) SnCl_2 + HCl} R - CHO$. The name of the reaction is
    a) Rosenmund   b) Stephen   c) Etard   d) gatterman-koch

12) Amongst the following the strongest base in aqueous medium is
    a) CH_3NH_2 b) $(CH_3)_3N$ c) $(CH_3)_2NH$ d) NH_3

13) Benzene diazonium chloride when warmed with water gives
    a) Phenol   b) chlorobenzene   c) Benzene   d) aniline

(P.T.O.)

— 2 —

14) The non-reducing sugar is
   a) maltose   b) sucrose   c) Lactose   d) Glucose

15) Which of the following 'B' group vitamin can be stored in the body
   a) B_1 b) B_2 c) B_6 d) B_{12}

II Fill in the blanks by choosing the appropriate word from those given in the bracket.   1×5=5
[Primary alcohol, slowest step, Hydrogen, Nitrogen, Oxygen, less than one]

16) The Van't Hoff factor for acetic acid in benzene is _____.

17) In a complex reaction, the rate of reaction depends on _____.

18) The gas liberated when $KMnO_4$ is heated at 513K is _____.

19) Grignard reagent reacts with Formaldehyde followed by hydrolysis gives _____.

20) The gas liberated when ethyl amine reacts with HNO_2 is _____.

PART - B

III Answer any three of the following. Each question carries two marks.   3×2=6

21) What happens to the solubility of a gas in a liquid with increase in temperature? Give reason.

22) Define rate of a reaction. What is the unit of rate of reaction?

23) What are Homoleptic complexes? Give an example.

24) Name the reagents in the following conversions.
   i) Alkyl halide into alkene   ii) Chlorobenzene into diphenyl

25) Complete the following reactions

   i) $CH_3 - CHO \xrightarrow[\text{Con.HCl}]{Zn-Hg}$ —   ii) ⬡ $\xrightarrow[\text{Anhydrous AlCl}_3]{CO, HCl}$ →

26) a) Name the monomer of nucleic acids.
   b) Give an example for amino acid derivative Hormone.

PART - C

IV Answer any THREE of the following. Each question carries three marks.   3×3=9

27a) Why do transition elements form complex compounds?
   b) Name the transition element which does not exhibit +2, oxidation state.

28) Write the balanced chemical equation for the manufacture of $K_2Cr_2O_7$ from chromite ore.

29) Give reasons for the followings
   a) Actinoids show variable oxidation states.
   b) Cerium (Ce) exhibits +4 oxidation state.
   c) The study of actinoid element is difficult

30) What is spectrochemical series? Explain the differences between a weakfield ligand and a strong field ligand.

31) Explain the hybridisation, Geometry and magnetic property of $[CoF_6]^{3-}$ ion using V.B.T.

32) a) How many ions are produced from the complex $[Cr(NH_3)_6]Cl_3$ in solution
   b) Give the IUPAC name of the complex $[Co(NH_3)_4 Cl(NO_2)]Cl$
   c) Draw the structure of cis isomer of $[CoCl_2(en)_2]^+$

V Answer any TWO of the following. Each question carries three marks.   2×3=6

33) Define azeotropes. What type of azeotrope is formed by negative deviation from Raoult's law? Give an example.

34) What is a secondary battery? Write the reactions occuring at anode and cathode in lead storage battery.

35) Describe the construction and working of standard hydrogen electrode.

36) Derive an integrated equation for the rate constant of a first order reaction.

PART - D

VI Answer any FOUR of the following. Each question carries five marks.   4×5=20

37) a) Explain the mechanism involved in the conversion of t-butyl bromide into t-butyl alcohol.
   b) What is Grignard reagent? Why it is necessary to avoid even traces of moisture from a grignard reagent?

— 3 —

38) a) Write the steps involved in the mechanism of acid catalysed hydration of alkene to alcohol.
   b) What is lucas reagent? Which class of alcohols produce immidiate turbidity with it at room temperature.

39) a) Explain Kolbe's reaction with equation.
   b) How does anisole reacts with methyl chloride? Write the equation.
   c) Write the general equation of williamson ether synthesis.

40) a) Complete the following reactions

   i) $\overset{\diagdown}{\diagup}C = O + NaHSO_3 \rightleftharpoons$ _____

   ii) $2CH_3 - CHO \xrightleftharpoons{\text{dil NaOH}}$ _____

   iii) $R - \overset{\overset{O}{\|}}{C} - CH_3 \xrightarrow{\text{NaOX}} R - \overset{\overset{O}{\|}}{C} - ONa +$ _____

   b) How does formaldehyde reacts with concentrated alkalin on heating? Name the reaction.

41 a) Explain the preparation of carboxylic acids from Grignard reagent.
   b) What is the effect of $-CH_3$ and $-NO_2$ Substituents on acidity of carboxylic acids?
   c) What type of carboxylic acids undergo HVZ reaction.

42 a) How do you prepare methanamine from Hoffmann bromamide degradation reaction.
   b) What is diazotisation? Write the equation.
   c) Give the IUPAC name of trimethyl amine.

43 a) How do you confirm the presence of aldehydic and 5 -OH groups in the glucose molecule.
   b) What is peptide bond? How many peptide linkages are present in a pentapeptide.
   c) Name the disease caused by the deficiency of vitamin B_6.

PART - E

VII Answer any THREE of the following. Each question carries three marks. $3 \times 3 = 9$

44) A solution containing 8g of a non-electrolyte substance in 100g of diethyl ether boils at 36.86°c.
   Where as pure ether boils at 35.60°c. Determine the molecular mass of solute
   [For diethyl ether K_b = 2.02 K Kg.mol^{-1}]

45) Calculate the mass of a solute [molar.mass 256 g/mol) to be dissolved in 75g of benzene to
   lower its freezing point by 0.48 K [Kf = 5.12 K Kgmol^{-1}]

46) Calculate the equilibrium constant for the reaction
   $$Cu_{(s)} + 2Ag^+_{(aq)} \rightleftharpoons Cu^{2+}_{(aq)} + 2Ag_{(s)} \left[\text{Given} E^{\ominus}_{cell} = 0.46V \right]$$

47) The resistance of 0.1M KCl solution is found to be 520Ω and shows a conductivity value of 0.248S cm^{-1}.
   Find the value of cell constant.

48) A first order reaction has a rate constant 1.15×10^{-3} S^{-1}. How long will 5 gm of this reactant take to reduce to 3g?

49) The rate constant of a first order reaction at 600k is 1.60×10^{-5} S^{-1}. Its energy of activation is
   209 KJ/mol. calculate the rate constant of the reaction at 700K [R=8.314 J K^{-1}mol^{-1}]

SECOND PUC PREPARATORY EXAMINATION, JANUARY 2024
SUB: CHEMISTRY (34)

Time: 3.15 Hrs]   [Max. Marks: 70

Instructions:

1. Question paper has FIVE parts. All parts are compulsory.
2. a) Part – A carries 20 marks, each question carries 1 mark
   b) Part – B carries 10 marks, each question carries 2 marks
   c) Part – C carries 18 marks, each question carries 3 marks
   d) Part – D carries 10 marks, each question carries 5 marks
   e) Part – E carries 12 marks, each question carries 3 marks
3. In Part – A questions, first attempted answer will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculator if necessary [use of scientific calculator is not allowed]

PART – A

I.   Select the correct option from the given choices: 15 x 1 = 15

1) Which of the following conditions is not satisfied by an ideal Solution?
   a) $\Delta H_{mixing} = 0$ b) $\Delta V_{mixing} = 0$ c) Raoult's law is obeyed d) Formation of an azeotropic mixture

2) A Smuggler could not carry gold by depositing iron on the gold Surface since
   a) Gold·is denser   b) Iron rusts
   c) Gold has higher reduction potential than iron
   d) Gold has lesser reduction potential than iron

3) Electrolysis of brine gives a mixture of
   a) H_2, Na, Cl_2 b) $Cl_2, H_2, NaOH$ c) $H_2, O_2, NaOH$ d) $O_2, Cl_2, NaOH$

4) For a chemical reaction $A \rightarrow B$, it is found that the rate of reaction doubles when the Concentration of A is increased four times The order of the reaction is
   a) two   b) one   c) half d) zero

5) Which of the following are d – block elements but not regarded as transition elements?
   a) Cu, Ag, Au b) Zn, Cd, Hg c) Fe, Co, Ni d) Ru, Ph, Pd

6) A fraction of chlorine precipitated by solution from $\left[Cr(NH_3)_5 Cl\right]Cl_2$ is
   a) ½ b) ⅔ c) ⅓ d) ¼

7) Reaction of chloroethane with chlorobenzene and sodium in the presence of dry ether is known as
   a) Wurtz reaction   b) Wurtz - Fittig reaction   c) Fittig reaction   d) Friedel Craft reaction

8) 2 – chloro –2- methylbutane on reaction with alcoholic KOH gives X as the major product.
   a) 2 – methylbutan – 1 – ol   b) 2 – methyl but – 1 – ene
   c) 2 – methylbut – 2 – ene   d) 2 – methylbutan – 2 – ol

9) Which of the following will react fastest with Lucas reagent?
   a) Ethanol   b) Isopropylalcohol
   c) 2 – methyl propan – 2 – 01   d) All react at equal rate

10) $2 HCHO \xrightarrow{50\% NaOH} CH_3OH + HCOONa$. The above chemical reaction represents:

    a) Rosenmund's reaction   b) Cannizzaro reaction

    c) Kolbe's reaction   d) Etard's reaction

11) In the decarboxylation of carboxylic acid, the reagent used is

    a) Sodamide   b) Caustic Soda   c) Soda lime   d) Quick lime

12) Propionamide on Hoffmann bromamide degradation gives

    a) methyl amine   b) ethyl amine   c) propyl amine   d) ethyl cyanide

13) Hinsberg's reagent is

    a) $\begin{array}{c} COOC_2H_5 \\ | \\ COOC_2H_5 \end{array}$ b) $C_6H_5SO_2Cl$ c) $C_6H_5SO_2NH_2$ d) $CH_3COH_2COOC_2H_5$

14) Lysine is a/an

    a) Neutral amino acid   b) acidic amino acid   c) basic amino acid   d) heterocyclic amino acid

15) The linkages which remain unaffected during denaturation are

    a) hydrogen bonds   b) disulphide linkages   c) Peptide bonds   d) All these

II. *Fill in the blanks by choosing appropriate word from those given in the bracket:*   5 x 1 = 05

(Tin, five, secondary, primary, zero, increasing temperature)

16) Osmotic pressure can be increased by _____

17) A reaction proceeds with a uniform rate throughout. The order is _____

18) The non transition metal present in bronze is _____

19) Number of chlorine atoms in DDT are _____

20) The amine with more basicity in gaseous phase is _____

PART – B

III. *Answer any THREE of the following. Each question carries 2 marks:*   3 x 2 = 06

21) Define reverse osmosis? Mention its one application.

22) Write any two differences between order and molecularity

23) In $K_4\left[Fe(CN)_6\right]$, write the primary and secondary valency of central metal.

24) What are racemic mixture? Mention its optical activity.

25) Complete the equation and name the reaction $R-\overset{\displaystyle O}{\overset{\displaystyle \|}{C}}-CH_3 \;\underline{NaOX}$

26) What is peptide bond? How many peptide bonds are present in hexa peptide?

PART – C

IV. *Answer any THREE of the following. Each question carries 3 marks:*   3 x 3 = 09

27) a) Calculate the spin only magnetic of Fe^{2+} ion [Fe atomic no. 26]

    b) Write the structure of chromate ion $\left(CrO_4^{2-}\right)$ (2 + 1)

28) How is potassium dichromate manufactured from chromite ?

29) Write any three differences between lanthanoids and actinoids.

30) Using valence bond theory, explain geometry, hybridisation and magnetic property of $\left[Co(NH_3)_6\right]^{3+}$ [Atomic number of cobalt is 27]

31) Write the IUPAC name of the complex $\left[Co(NH_3)_4Cl_2\right]^+$ and write its geometrical isomers.

32) Draw energy level diagram for the crystal field splitting in octahedral complexes and write the electronic configuration for d^4 ions when $\Delta_0 > P$.

V. **Answer any TWO of the following. Each question carries 3 marks:** 2 x 3 = 06

33) State Henry's law. Mention any two applications of Henry's law.

34) Name the anode, cathode and electrolyte used in Dry cell.

35) a) State Faraday's second law of electrolysis.

   b) Write the SI unit of specific conductance.

36) Derive integrated rate equation for first order reaction.

PART – D

VI. **Answer any FOUR of the following. Each question carries 5 marks:** 4 x 5 = 20

37) a) Write any three differences between S_N1 and S_N2 mechanism.

   b) Explain Swarts reaction. (3 + 2)

38) a) Write the mechanism for the acidic dehydration of ethanol to ethene.

   b) How is methanol manufactured from carbon monoxide and dihydrogen? (3 + 2)

39) a) What happens when phenol is treated with dilute nitric acid? Give reaction and name the method used for the separation of products.

   b) Explain Williamson ether synthesis with example. (3 + 2)

40) a) Write the mechanism for the addition of HCN to carbonyl compound.

   b) Explain aldol condensation using acetaldehyde.

   c) Formaldehyde does not undergo aldol condensation. Give reason. (2 + 2 + 1)

41) a) A Grignard reagent Y reacts with CO_2 (dry ice) followed by acid hydrolysis gives acetic acid. Then name the compound Y and write the reaction.

   b) Explain the effect of electron donating group on the acidity of carboxylic acids. (3 + 2)

42) a) Write the IUPAC name of $(CH_3)_3N$

   b) Explain Gabriel phthalimide synthesis.

   c) How does benzene diazonium chloride reacts with phenol? Write chemical equation. (1 + 2 + 2)

43) a) Write the Haworth's structure of maltose.

   b) Name the optically inactive α –amino acid

   c) Which vitamin increases the blood clotting time?

   d) Name the nucleic acid which carries genetic information. (2 + 1 + 1 + 1)

PART – E

VII. **Answer any THREE of the following. Each question carries 3 marks:** 3 x 3 = 09

44) 1.0g of a non electrolyte solute dissolved in 50g of benzene lowered the freezing point of benzene by 0.40K. Calculate the molar mass of the solute [Given K_f of benzene is $5.12\ KKg\ mol^{-1}$]

45) The vapour pressure of pure liquids A and B are 450 and 700 mm Hg respectively, at 350K. Find out the composition of the liquid mixture if total vapour pressure is 600 mm Hg.

46) At 298K, the E_{cell}° of the cell $2Fe^{3+} + 2I^- \rightarrow 2Fe^{2+} + I_2$ is 0.237V. Find the equilibrium constant of the cell if free energy change is $-45.5 kJ$.

47) Calculate the emf of the cell $Mg \mid Mg^{2+}_{(0.130M)} \parallel Ag^+_{(0.001M)} \mid Ag$ if $E_{cell}^{\circ} = 3.17V$.

48) A first order reaction has a rate constant $1.5 \times 10^{-3} s^{-1}$. How long will 5g of this reactant take to reduce to 3g?

49) The decomposition of Cl_2O_7 at 500K in the gas phase to Cl_2 and O_2 is a first order reaction. After 1 minute at 500K, the pressure of Cl_2O_7 falls from 0.08 to 0.04 atm. Calculate the rate constant in s^{-1}.

****

EXAMINATION JANUARY 2024
CHEMISTRY [34]

Time: 3hours 15 minutes

Instructions: Max. Marks: 70

i. The question paper has five parts. All the five parts are compulsory
   Part – A carries 20 marks, each question carries one mark
   Part – B carries 06 marks, each question carries two marks
   Part – C carries 15 marks, each question carries three marks
   Part – D carries 20 marks, each question carries five marks
   Part – E carries 09 marks, each question carries three marks
ii. In Part – A questions, first attempted answer will be considered for awarding marks.
iii. Write balanced chemical equations and draw diagrams wherever necessary.
iv. Direct answers to the numerical problems without detailed step and specific unit for final answer will not carry any marks.
v. Use log table and simple calculators if necessary (use of scientific calculator is not allowed).

Part – A

I. **Select the correct option from the given choices.** 1 x 15 = 15

1. Aquatic species are more comfortable in cold water rather than in warm water. This is due to
   a) Solubility of oxygen is more in warm water
   b) Solubility of oxygen is more in cold water
   c) Solubility of gases increases with decrease of temperature
   d) Both (b) and (c)

2. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called
   a) Cell potential   b) cell emf   c) potential difference   d) cell voltage

3. The quantity of electricity required for the reductionof one mole of Al^{3+} ions is
   a) 1F   b) 2F   c) 3F   d) 4F

4. For the first order reaction, the plot of ln R v/s t gives a straight line with slope equal to
   a) $k/2.303$ b) $-k/2.303$ c) $\ln k/2.303$ d) $-k$

5. The IUPAC name of tertiary butyl chloride is
   a) 2-chloro-2-methyl propane   b) 3-chloro butane
   c) 4-chloro butane   d) 2-chloro-3-methyl propane

6. The crystal field theory considers the metal-ligand bond to be a
   a) Covalent bond   b) ionic bond   c) polar bond   d) hydrogen bond

7. Which of the following transition metal ions is colourless
   a) V^{+2} b) Cr^{+3} c) Zn^{+2} d) Ti^{+3}

8. Acidic nature of alcohols decreases in the order
   a) $1^0 > 2^0 > 3^0$ b) $3^0 > 2^0 > 1^0$ c) $3^0 > 1^0 > 2^0$ d) $2^0 > 1^0 > 3^0$

a) Benzene   b) Benzoic acid   c) Benzaldehyde   d) Cumene

10. Hybridization of carbon of carbonyl group is

a) sp   b) sp^3d c) sp^3 d) sp^2

11. Which of the following is more acidic?

a) CH_3COOH b) $ClCH_2COOH$ c) $BrCH_2COOH$ d) FCH_2COOH

12. Primary, Secondary and Tertiary amines can be distinguished by

a) Schiff's reagent   b) Tollen's reagent

c) Fehling's reagent   d) Hinsberg's reagent

13. Amides on reduction with lithium aluminium hydride yield

a) Nitriles   b) Amines   c) Alcohols   d) Aldehydes

14. Deficiency of Vitamin C cause the disease called

a) Anaemia   b) Scurvy   c) Rickets   d) Beri Beri

15. Which of the following nitrogeneous bases is not present in DNA

a) Uracil   b) Adenine   c) Cytosine   d) Thymine

II.   **Fill in the blanks by choosing the appropriate word from those given in the brackets:**   **5 x 1 = 05**

(Lanthanoids, chromyl chloride , pseudo first order, hydrogen, cellulose acetate)

16. The semipermeable memebrane used in the reverse osmosis is ....

17. Inversion of cane sugar is an example of ....reaction

18. The elements in which electrons are progressively filled in 4f orbital are called

....

19. The oxidizing agent used in Etard's reaction is ....

20. Solubility of ethylamine in water is due to formation of .... bonding with water

PART – B

III.   **Answer any three of the following. Each question carries two marks.**   **3 x 2 = 06**

21. State Henry's law and give its mathematical expression

22. Show that tha half life period of a first order reaction is independent of initial concentration of reacting species

23. Identify the counter ion and chelating ligand in the comples $[Cr(en)_2(NH_3)_2]Cl_3$.

24. Complete the equation and name the reaction

40. a) Complete the following

conc. KOH
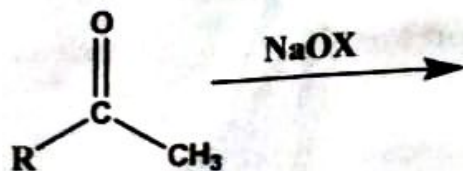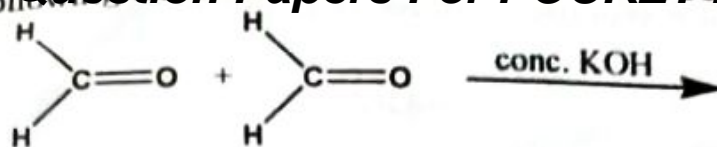
b) Explain Wolff-Kishner reduction reaction with an example. (3+2)

41. a) Explain the preparation of carboxylic acid using Grignard reagent.
    b) Explain conversion of benzoic acid to benzamide with equation
    c) What is Jones reagent?

(2+2+1)

42. a) Give chemical equation to prepare methanamine by Gabriel Phthalimide synthesis.
    b) How do you convert an amide into primary amine having one carbon atom less than the starting compound? Name the reaction.

(3+2)

43. a) What is denaturation of proteins? Which level of structure remains intact during denaturation .
    b) Write the Haworth structure of Sucrose.
    c) Name the hormone responsible for preparing uterus for implantation of fertilized egg.

(2+2+1)

PART – E (PROBLEMS)

VII. **Answer any three of the following. Each question carries three marks**

3 x 3 = 09

44. The vapour pressure of benzene is 200mm of Hg. When 2g of non volatile solute is dissolved in 78g of benzene, benzene has a vapour pressure of 195mm of Hg. Calculate the molar mass of solute (molar mass of benzene = 78g/mol)

45. Calculate the mass of silver metal to be deposited when 50A current passed through the solution of silver sulphate for an hour (atomic mass of silver is 108g/mol)

46. Calculate the EMF of the cell for the reaction

$$Mg + 2Ag^+ \longrightarrow Mg^{2+} + 2Ag$$

[Given: $E^0{}_{Mg^{2+}/Mg}$ = - 2.37 V, $E^0{}_{Ag^+/Ag}$ = 0.80 V

$[Mg^{2+}]$ = 0.001M , $[Ag^+]$ = 0.0001M and log 10^5 = 5]

47. The boiling point of benzene is 353.23K. when 1.8g of non-volatile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11K. Calculate the molar mass of solute. (K_b = 2.52 Kkgmol^{-1})

48. The rate constants of a reaction at 300K and 400K are 0.034s^{-1} and 0.136 s^{-1} respectively. Calculate the value of E_a (R = 8.314JK^{-1}mol^{-1})

49. In first order reaction, the concentration of a reactant decreases from 400molL^{-1} to 25molL^{-1} in 200seconds. Calculate the rate constant for the reaction.

****

25. Give an example of (a) Fibrous Protein (b) Globular protein

26. Explain Finkelstein reaction with an example.

PART – C

IV. **Answer any three of the following. Each question carries three marks.**

$$3 \times 3 = 09$$

27. How is potassium dichromate manufactured from chromite ore?

28. Write any three postulates of Werner's theory of coordination compounds

29. Explain the hybridization, geometry and magnetic properties of $[CoF_6]^{-3}$ ion using VBT.

30. What is optical isomerism? Write the optical isomers of $[PtCl_2(en)_2]^{2+}$

31. What is lanthanoid contraction? Mention two of its consequences.

32. Transition metal forms complex compounds. Give any three reasons.

V. **Answer any two of the following. Each question carries three marks.**

$$2 \times 3 = 06$$

33. Give any three differences between non-ideal solutions showing positive and negative deviations from Raoult's law.

34. State Kohlrausch's law of independent migration of ions. Mention two applications of it.

35. Derive an integrated rate equation for first order reaction.

36. Draw a neat labelled diagram of hydrogen-oxygen fuel cell and write its cathode and anode reaction.

PART – D

VI. **Answer any four of the following . Each question carries five marks.**

$$4 \times 5 = 20$$

37. a) Explain SN_1 reaction mechanism by taking 2-chloro-2-methyl propane as example.
    b) What are optically active compounds? Give the conditions for the molecule to be optically active. (3+2)

38. a) Explain the mechanism of dehydration of ethanol to ethene
    b) Predict the products of the following reaction
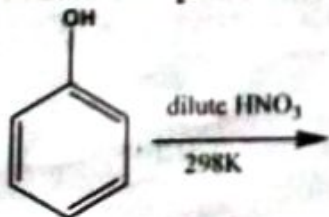
(3+2)

39. a) What is Lucas reagent? How would you distinguish between primary, secondary and tertiary alcholos using lucas reagent. (3+2)
    b) Expalin williamson's ether synthesis with an example

RN   **II PUC PREPARATORY EXAMINATION, JANUARY - 2024**   **II**

Time : 3 Hours 15 min.   **CHEMISTRY - 34**   Max. Marks : 70

INSTRUCTION :

1. Question paper has five parts. All parts are compulsory.
2. a) Part-A carries 20 marks. Each question carries 1 mark.   (b) Part-B carries 06 marks. Each question carries 2 marks.
   (c) Part-C carries 15 marks. Each question carries 3 marks.   (d) Part-D carries 20 marks. Each question carries 5 marks.
   (e) Part-E carries 09 marks. Each question carries 3 marks.
3. In Part-A questions, first attempted answer will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculator if necessary (use of scientific calculator is not allowed)

PART A

I Select the correct option from the given choices: 15×1=15

1) A non-ideal solution with negative deviation was prepared by mixing 30 ml chloroform with 50 ml acetone. The volume of mixture will be
   a) >80 ml   b) < 80 ml   c) = 80 ml   d) ≥ 80 ml

2) Standard electrode potential of SHE at 298 K is _____
   a) -0.76v   b) 0.10v   c) 0.34v   d) 0.0v

3) Fused NaCl on electrolysis, at cathode gives _____
   a) Chlorine   b) Sodium   c) Sodium amalgam   d) Hydrogen

4) Radioactive disintegration is an example of _____
   a) first order reaction   b) zero order reaction   c) second order reaction   d) third order reaction

5) General electronic configuration of Lanthanoids is _____
   a) $[Rn]5f^{1-14}6d^{0-1}7s^2$ b) $[Xe]4f^{1-14}5d^{0-1}6s^{1-2}$ c) $[Kr]4f^{1-14}5d^{0-1}6s^2$ d) $[Xe]4f^{1-14}5d^{0-1}6s^2$

6) The denticity of the EDTA ligand is
   a) 2   b) 6   c) 3   d) 1

7) Which one of the following has the lowest boiling point?
   a) CH_3Cl b) C_2H_5Cl c) C_2H_5Br d) C_2H_5I

8) P-nitrophenol is less volatile than O-nitrophenol due to
   a) intramolecular H-bond   b) intermolecular H-bond   c) Co-valent bond   d) ionic bond

9) Phenol reacts with Zinc dust to give
   a) Benzene   b) Benzoic acid   c) Benzaldehyde   d) Cumene

10) Aldehyde which does not undergo cannizzaro reaction is
    a) HCHO   b) CH_3CHO c) C_6H_5CHO d) All the three a, b & c

11) The P^{Ka} value of trifluoroacetic acid, benzoic acid, formic acid and acetic acid are 0.23, 4.19, 3.75 and 4.76 respectively. The strongest acid amongst them is
    a) Trifluoroacetic acid   b) benzoic acid   c) Acetic acid   d) formic acid

12) Which of the following amines cannot be prepared by Gabriel Synthesis
    a) Methanamine   b) Ethanamine   c) Propanamine   d) Aniline

13) Primary, Secondary and tertiary amines can be distinguished by
    a) Schiff's reagent   b) Fehling's reagent   c) Tollen's reagent   d) Hinsberg's reagent

14) Which one of the following acids is a vitamin?
    a) Aspartic acid   b) Ascorbic acid   c) Adipic acid   d) Saccharic acid

15) The number of peptide bonds present in a tetrapeptide is
    a) One   b) Two   c) Three   d) Four

   5×1=5

II Fill in the blanks by choosing the appropriate word from those given in the brackets:
[Rate constant, association, 2-chloro-2-methyl propan oxidation, tetrahedral, dissociation]

16) Van't Hoff factor for a solute is more than one indicates that the solute undergoes _____ in solution.

17) The half life period for a zero-order reaction is inversely proportional to the _____

(P.T.O.)

18) The structure of chromate ion is _____
19) IUPAC name of tertiary butyl chloride is _____
20) Arylamines get coloured on storage due to atmospheric _____.

PART - B

III Answer any three of the following. Each question carries two marks.   3×2=6

21) What are isotonic solutions? What happens when such solutions are separated by semipermeable membranes?
22) Define the term "Collision frequency".
23) What are heteroleptic complexes? Give an example.
24) Explain the Swart's reaction with an example.

25) Complete the following equation and name the reaction.
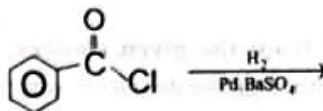
26) Give an example of   a) Fibrous protein   (b) Globular protein

PART - C

IV Answer any THREE of the following. Each question carries three marks.   3×3=9

27a) Calculate the magnetic moment of Ti^{3+} ion [Atomic number of Ti=22]
  b) Give reason : 3d - series elements exhibit variable oxidation states.
28) Explain the preparation of potassium permanganate from pyrolusite ore [MnO_2] with balanced equations.
29) What is lanthanoid contraction? Mention any two consequences of lanthanoid contraction.
30a) Write the IUPAC name of [Cr (NH_3), (H_2O),] Cl_3?
  b) Give the facial and meridional isomeric structures of [CO (NH_3), (NO_2),].
31) Explain the hybridization, geometry and magnetic properties of [CoF_6]³⁻ ion using VBT.
32a) What is spectrochemical series?
  b) Differentiate between strong field ligands and weak field ligands.

                                                                                            2×3=6

**V Answer any TWO of the following. Each question carries three marks.**

33) Give the main points of distinction between non-ideal solutions showing positive and negative deviations.
34) What are fuel cells? Write the reactions occuring at anode and cathode in H_2 - O_2 fuel cell.
35) Define molar conductivity. How is it related to concentration and conductivity? Write the SI unit of conductivity.
36) Derive an integrated rate equation for the rate constant of a first order reaction.

PART - D

                                                                                           4×5=20

VI Answer any FOUR of the following. Each question carries five marks.

37a) Write the mechanism involved in the following reaction: $CH_3Cl + KOH \rightarrow CH_3OH + KCl$
    Mention the order and configuration of the product.
  b) What are optically active compounds? Give the condition for the molecule to be optically active.
38a) Explain the preparation of propan-1-ol from propene and name the rule involved.
  b) Write the equation for the preparation of t-butyl methyl ether by Williamson's synthesis.
39a) Explain Reimer Tiemann reaction.
  b) Give reason : phenols are more acidic than alcohols.
40a) Write balanced chemical equation and name the reaction.
    Benzene is treated with CO & HCl in presence of anhydrons $AlCl_3$,
  b) Describe Wolff Kishner reduction.
  c) Name the oxidizing agent used in Etard's reaction.
41a) Explain decarboxylation reaction with an example.
  b) Among formic and acetic acid which is more acidic and why?

  Complete the reaction

— 3 —
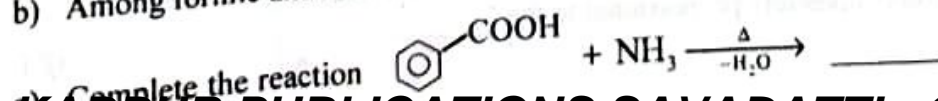
42a) Explain Hoffmann bromamide reaction with example.
 b) How do you prepare benzene diazonium chloride by diazotization? Give equation.
 c) Give reason ; aromatic amines are weaker bases than ammonia.
43a) What is denaturation of proteins? Which level of structure remains intact during denaturation?
 b) How do you show that,
   i) Glucose contains six carbon atoms in straight chain.
   ii) Glucose contains carbonyl group?
 c) Name the sugar unit present in DNA.

PART - E

VII Answer any THREE of the following. Each question carries three marks. $3 \times 3 = 9$

44) 12.6g of non-electrolyte is dissolved in 75g of water. The freezing point of this solution is 271.9k. Calculate molar mass of the solute [freezing point of pure water & molar depression constant of water are 273.15K & 1.86K kgmol^{-1} respectively].

45) Vapour pressure of dichloromethane (Molar mass = 119.5 g/mol) and chloroform (molar mass = 85 g/mol) at 298k are 200 & 415 mm Hg respectively. Calculate the vapour pressure of the solution prepared by mixing 25.5g of dichloromethane and 40g of chloroform at 298k.

46) Calculate the equilibrium constant for the reaction. $Cu_{(s)} + 2Ag^+_{aq} \rightleftharpoons Cu^{2+}_{(aq)} + 2Ag_{(s)}$

[Given $E^0_{cell} = 0.46v$]

47) The resistance of 0.1m KCl solution is found to be 520Ω and shows a conductivity volue of 0.248 s/cm. Find the value of cell constant.

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

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

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 : 1. The question paper has 5 parts All parts are compulsory.
2. a) PART-A Carries 20 marks, Each question carries 1 mark. b) PART-B Carries 6 marks, Each question carries 2 marks
   c) PART-C Carries 15 marks, Each question carries 3 marks. d) PART-D Carries 20 marks, Each question carries 5 marks.
   e) Part-E carries 9 marks, Each question carries 3 marks.
3. In part-A questions, **first attempted answer** will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labelled diagrams wherever necessary.
5. Use log tables and simple calculator if necessary. (Use of scientific calculator is not allowed)

PART - A

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

1) All form ideal solution except
   a) n-hexane + n-heptane
   b) Chloro ethane + bromo ethane
   c) benzene + toluene
   d) acetone + chloro form

2) On which of the following the magnitude of conductivity of a electrolytic solution does not depends ?
   a) Pressure
   b) concentration of electrolyte
   c) Temperature
   d) Nature of electrolyte

3) The electrolyte used in lead storage battery is
   a) $NH_4Cl + ZnCl_2$
   b) 38% H_2SO_4
   c) KOH + ZnO
   d) 38% HCl

4) The unit of rate constant for a first order reaction is
   a) S^{-1}
   b) $mol. L^{-1} S^{-1}$
   c) $mol^{-1} L. S^{-1}$
   d) $mol. L^{-1}$

5) The common oxidation state of lanthanoids is
   a) +2
   b) +4
   c) +3
   d) +5

6) In $[NiCl_4]^{-2}$ complex the hybridisation of nickel is
   a) d^2sp^3
   b) sp^3
   c) sp^3d^2
   d) dsp^2

7) When chloroethane is reacted with alcoholic potash the hydrocarbon liberated is
   a) ethane
   b) propene
   c) butene
   d) ethene

8) The enzyme that convert glucose and fructose into ethanol is
   a) Zymase
   b) diastase
   c) invertase
   d) maltase

9) When phenol is distilled with zinc dust, the chief product formed is
   a) Toluene
   b) benzoquinone
   c) benzene
   d) aniline

10) The catalyst used in Rosenmund reduction is
    a) Cu_2Cl_2 in conc. HCl
    b) Anhydrous $AlCl_3$
    c) Zn-Hg in conc. HCl
    d) $Pd-BaSO_4$

11) Soda lime is a mixture of
    a) NaOH + MgO
    b) NaOH + CaO
    c) KOH + ZnO
    d) KOH + CaO

12) Hinsberg's reagent is
    a) $C_6H_5 SO_2$
    b) $C_6H_5SO_2Cl_2$
    c) $C_6H_5SO_2 Cl$
    d) C_6H_5Cl

13) Amide reacts with bromine and alkali to form primary amine. The reaction is known as
    a) Hoffmann reaction
    b) Kolbe's reaction
    c) Etard reaction
    d) Cannizzaro reaction

14) Cellulose is a polymer of
    a) Fructose
    b) ribose
    c) sucrose
    d) glucose

15) Among the following vitamins the one whose deficiency causes rickets is
    a) Vitamin A
    b) Vitamin D
    c) Vitamin B
    d) Vitamin C

II. **Fill in the blanks by choosing correct appropriate word from those given in bracket :**   5X1=5
   (amylose, R-Mg-X, Manganese, Osmotic pressure, Collision frequency)

16) An example for colligative property is ....

17) The number of collisions per second per unit volume of reaction mixture is called as ....

18) In 3-d series the highest oxidation state is shown by the element ....

19) The general formula of Grignard reagent is ....

20) The water soluble component of starch is ....

PART-B

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

21) Give any two differences between ideal and non ideal solutions.
22) What is pseudo first order reaction? Give example.

24) Explain Wurtz reaction.

25) Explain Cannizzaro reaction of benzaldehyde.

26) Write the Haworth structure of sucrose.

PART-C

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

27) Write the balanced chemical equations used in the preparation of potassium dichromate from chromite ore.

28) Calculate the spin only magnetic moment of Cu^{+2} ion. (At. No. of copper is 29)

29) Give any three differences between lanthanoids and actinoids.

30) Write any three postulates of Werner's theory of co-ordination compounds.

31) Using Valence bond theory, explain geometry hybridisation and magnetic property of $[Ni(CN)_4]^{-2}$ ion (At. No. of nickel is 28)

32) a) What is ligand ? Give an example for polydentate ligand.

 b) Write the IUPAC name of $K_3[Fe(CN)_6]$

V. Answer ANY TWO of the following. Each question carries three marks. 2X3=6

33) a) State Henry's law and write its mathematical form.

 b) What are isotonic solutions ?

34) Explain the construction and working of standard hydrogen electrode. Draw neat labelled diagram.

35) Write the balanced chemical reactions taking place at anode, Cathode and overall cell reaction in lead storage battery.

36) Derive an integrated rate equation for the rate constant of a zero order reaction.

PART-D

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

37) a) Explain SN_1 mechanism of hydrolysis of tertiary butyl bromide.

 b) Explain Wurtz-Fittig reaction. (3+2)

38) a) Explain the mechanism of dehydration of ethanol to ethene.

 b) Explain Williamson ether synthesis. (3+2)

39) a) Explain the preparation of phenol from cumene.

 b) How do you convert phenol to picric acid ? Write equation. (3+2)

40) a) Explain Etard reaction.

 b) Explain Clemmensen reduction.

 c) What is formalin ? (2+2+1)

41) a) What is esterification ? Write its general equation.

 b) Explain nitration of benzoic acid.

 c) Give the IUPAC name of formic acid. (2+2+1)

42) a) Explain carbylamine reaction of methylamine.

 b) Explain diazotisation.

 c) Write the general formula of diazonium salt. (2+2+1)

43) a) Give one chemical test each for the following in glucose.

 i) Presence of straight chain of 6 carbon atoms. ii) Presence of hydroxyl groups.

 b) Give any two differences between DNA and RNA.

 c) What is denaturation of protein ? (2+2+1)

PART-E

VII. Answer ANY THREE of the following. Each question carries three marks. 3X3=9

44) 1 g of a non electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.4 K. Calculate the molar mass of the solute. (Given : K_f for benzene=5.12 K. Kg. mol^{-1})

45) When 2 g of non volatile solute is dissolved in 78 g of benzene, benzene has a vapour pressure of 195 mm of Hg. The vapour pressure of pure benzene is 200 mm of Hg. Calculate the molar mass of the solute (molecular mass of benzene = 78)

46) Calculate $\triangle G°$ for the following cell reaction at 298 K $Mg + 2Ag^+ \longrightarrow Mg^{+2} + 2Ag$ (Given : $E°_{Mg}$ =-2.37V $E°_{Ag}$ = +0.80 V F=96500 C)

47) Calculate the emf of the cell represented below. $Zn/Zn^{+2}(0.1M) \parallel Cu^{+2}(1M)/Cu$ at 298 K (Given : $E°_{cu}$=0.34V $E°_{zn}$=-0.76V)

48) Half life period of a first order reaction is 30 minutes. Calculate the time required for 90% completion of the reaction.

49) The rate constant of a particular reaction doubles when the temperature is increased from 300 K to 310 K. Calculate the energy of activation of the reaction. (Given : R=8.314 JK^{-1} mol^{-1})

ՀՏ-2431

Department of School Education(Pre-University)

II PUC Preparatory Examination – January 2024 Vishoughruna

Time : 3Hours 15Minutes   Subject : Chemistry (34)   Max. Marks : 70

Instructions :

1. Question paper has FIVE parts. All parts are compulsory.
2. a. Part-A carries 20 marks. Each question carries 1 mark.
   b. Part-B carries 06 marks. Each question carries 2 marks.
   c. Part-C carries 15 marks. Each question carries 3 marks.
   d. Part-D carries 20 marks. Each question carries 5 marks.
   e. Part-E carries 09 marks. Each question carries 3 marks.
3. In Part- A questions, first attempted answer will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labeled diagrams and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculator if necessary (use of scientific calculator is not allowed).

PART – A

I. **Select the correct option from the given choices.** $15 \times 1 = 15$

1. Henry's law constant(K_H) values of H_2, He, N_2 and O_2 gases in water at 293K are 69.16kbar, 144.97kbar, 76.48kbar and 34.86kbar respectively. The gas which is least soluble in the water at the temperature is
   a) He   b) N_2 c) H_2 d) O_2

2. Electrolysis of aqueous sodium chloride (NaCl) produces
   a) Sodium at cathode and H_2 at anode   b) Cl_2 at anode and H_2 at cathode
   c) O_2 at anode and H_2 at cathode   d) Sodium at cathode and Cl_2 at anode

3. Variation of molar conductivity(Λ_m) of acetic acid with concentration(C) is correctly represented by

   a) Λ_m b) Λ_m c) Λ_m d) Λ_m
      $\sqrt{C}$ $\sqrt{C}$ $\sqrt{C}$ $\sqrt{C}$
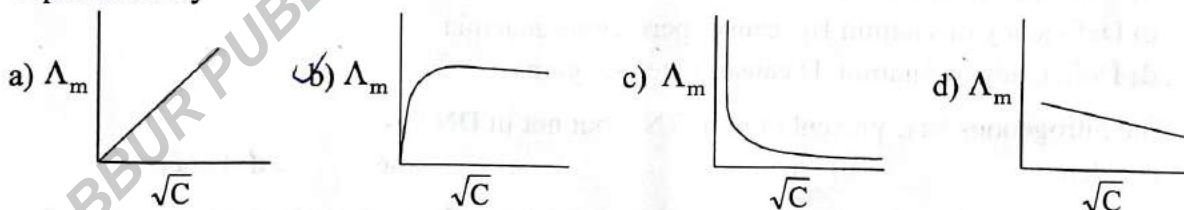
4. For the reaction $2HI(g) \longrightarrow H_2(g) + I_2(g)$, which of the following relation is correct?
   a) $-\dfrac{d[H_2]}{dt} = \dfrac{d[I_2]}{dt}$ b) $\dfrac{1}{2}\dfrac{d[HI]}{dt} = \dfrac{d[H_2]}{dt}$ c) $-\dfrac{2d[HI]}{dt} = \dfrac{d[I_2]}{dt}$ d) $\dfrac{d[I_2]}{dt} = -\dfrac{1}{2}\dfrac{d[HI]}{dt}$

5. Element of 3d series that has maximum number of unpaired electrons in its ground state is
   a) Chromium   b) Manganese   c) Iron   d) Titanium

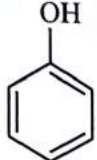6. The IUPAC name of $K_4[Fe(CN)_6]$ is
   a) tetrapotassium hexacyanidoferrate(II)   b) potassium hexacyanidoferrate(III)
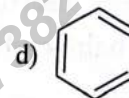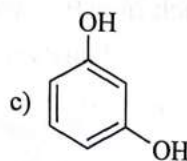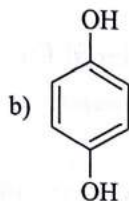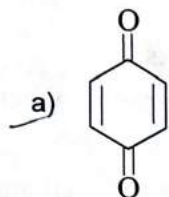   c) potassium hexacyanoferrate(II)   d) potassium hexacyanidoferrate(II)

7. $CH_3Br + NaI \xrightarrow[\Delta]{\text{dry acetone}} CH_3I + NaBr$. This reaction is

   a) Finkelstein reaction   b) Swartz reaction   c) Wurtz reaction   d) Fittig reaction

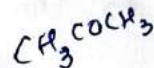8. Which of the following is an unsymmetrical ether ?

   a) $C_2H_5OC_2H_5$ b) CH_3OCH_3 c) $C_2H_5OCH_3$ d) $CH_3CH_2CH_2OC_3H_7$

9. In the reaction $\xrightarrow[H_2SO_4]{Na_2Cr_2O_7}$ P, the P is

   a)   b)   c)   d)

10. The IUPAC name of acetone is CH_3COCH_3

    a) 1-Propanal   b) 2-Propanone   c) 2-Butanone   d) Butan-2,3-dione

11. Ketones react with hydroxyl amine to form

    a) Imine   b) Semicarbazone   c) Oxime   d) Hydrazone

12. Which of the following order of basic strength of amines in aqueous solutions is correct?

    a) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$ b) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$

    c) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$ d) $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2$

13. If the product obtained by an amine with Hinsberg's reagent is insoluble in NaOH solution, then the amine is

    a) Primary amine   b) Secondary amine   c) Tertiary amine   d) Either a) or c)

14. Which of the following statement is wrong with respect to vitamins?

    a) Vitamins A, D, K and E are fat soluble

    b) Vitamins B and C are water soluble

    c) Deficiency of vitamin B_{12} causes pernicious anaemia

    d) Deficiency of vitamin D causes bleeding gums

15. The nitrogenous base present only in RNA but not in DNA is

    a) Adenine   b) Guanine   c) Cytosine   d) Uracil

II. Fill in the blanks by choosing appropriate word from those given in the brackets $5 \times 1 = 5$

[swell, stable, Chloroform, natural number, dye, shrink]

16. Blood cells _____ when put into hypertonic solution.

17. Molecularity of a chemical reaction is always a _____

18. Cu^+ ion is not _____ in aqueous solution.

19. _____ is used in the production of freon refrigerant R-22.

20. P - Hydroxyazobenzene is a _____

PART – B

III. Answer any THREE of the following questions. Each carries 2 Marks   3 × 2 = 06

21. What is an azeotrope? Give an example for minimum boiling azeotrope.

22. According to collision theory, what are the two factors that lead to effective collisions?

23. Violet coloured $[Ti(H_2O)_6]Cl_3$ becomes colourless upon heating. Why?

24. What is meant by racemic mixture? Why is it optically inactive?

25. Explain Hell-Volhard-Zelinsky reaction with general equation.

26. What is zwitter ion? Write the zwitter ion structure of alanine.

PART – C

IV. Answer any THREE of the following questions. Each carries 3 Marks   3 × 3 = 09

27. Give reasons:
    i) Transition metals are paramagnetic in nature.
    ii) Transition metals form coloured compounds.
    iii) Transition metals act as good catalysts.

28. Explain the process of preparation of potassium dichromate from chromite ore.

29. What is meant by lanthanoid contraction? What is the cause for lanthanoid contraction? State any one consequence of lanthanoid contraction.

30. Draw the structures of cis and trans isomers of $[CrCl_2(ox)_2]^{3-}$. Between these, which is optically active?

31. Explain hybridization, geometry and magnetic property of $[Co(NH_3)_6]^{3+}$ on the basis of valence bond theory. (Atomic number of Co is 27).

32. What is the necessary condition required for the splitting up of 'd' orbitals in an octahedral complexes? Draw the energy level diagram for this splitting.

V. Answer any TWO of the following questions. Each carries 3 Marks   2 × 3 = 06

33. What are non-ideal solutions? What type of deviation can be expected from the non-ideal solution of chloroform and acetone from Raoult's law of liquid mixtures? What is the cause for such a deviation?

34. A galvanic cell after use is recharged by passing electric current through it. What type of cell is it? Give an example with the anodic reaction took place in it.

35. Draw a neat labelled diagram of standard hydrogen electrode (SHE). Write its half-cell reaction.

36. Derive an integrated expression for rate constant for zero order reactions.

PART – D

VI. Answer any FOUR of the following questions. Each carries five marks   4 × 5 = 20

37. a) Explain S_N^1 mechanism of conversion of t-butyl bromide into t-butyl alcohol.

    b) Haloarenes are less reactive towards nucleophilic substitution reactions than haloalkanes. Why?

    (3+2)

38. a) Explain the mechanism of acid catalyzed dehydration of ethanol to yield ethene.

    b) How do you distinguish primary and tertiary alcohols using Lucas reagent ?   (3+2)

39. a) How is phenol manufactured from cumene process?

    b) Cresols are less acidic than phenol. Why?

    c) How do you prepare methoxyethane by Williamson's synthesis ?   (2+1+2)

40. a) Explain Etard reaction with an example.   (2+3)

    b) In the reaction identify 'A' and 'B' and also name the reaction.

$$2CH_3CHO \xrightarrow{\text{dil KOH}} A \xrightarrow[-H_2O]{\text{heat}} B$$
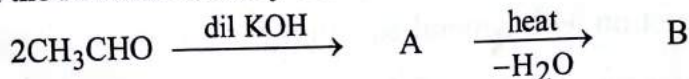
41. a) Ketones are less reactive than aldehydes in nucleophilic addition reactions. Why?

    b) Identify 'A' and 'B' in the following reaction:

$$A + CO_2 \text{ (Solid)} \xrightarrow[\text{Reflux}]{\text{dry ether}} CH_3COOMgBr \xrightarrow{H_3O^{\oplus}} B \text{ (organic compound)}$$

    c) Carboxylic acids exist as dimer in the vapour state or in the aprotic solvents. Why? (2+2+1)

42. a) Write the IUPAC name of $(CH_3)_3N$.

    b) How do you prepare methanamine from Hoffmann bromamide degradation reaction?

    c) Explain carbylamine reaction for aniline.   (1+2+2)

43. a) Write the Haworth structure of sucrose.

    b) What are fibrous proteins? Name the fibrous protein present in hair, wool and silk.

    c) When does a protein lose its biological activity?   (2+2+1)

PART – E

VII. Answer any THREE of the following. Each question carries 3 Marks. $3 \times 3 = 09$

44. How many grams of non volatile, non electrolyte solid of molar mass 180g/mol should be dissolved in 500 g of water (molar mass 18g/mol) to raise its boiling point by 0.5 K? (Given: K_b for water is 0.5 K kg/mol).

45. Calculate the osmotic pressure of a solution of cane sugar at 298 K in which 0.146 mole of cane sugar is dissolved in 0.125 L of solution. Given $R = 0.0821$ L atm mol^{-1}K^{-1}

46. Calculate the emf of the cell for the reaction, $Mg(s) + Cu^{2+}(0.0001M) \longrightarrow Mg^{2+}(0.001M) + Cu(s)$

    Given that $E^0_{\frac{Mg^{2+}}{Mg}} = -2.73V$, $E^0_{\frac{Cu^{2+}}{Cu}} = +0.34$ V.

47. A solution of $CuSO_4$ is electrolysed for 10 minutes with a current of one ampere. What is the mass of copper deposited at the cathode?

    (Atomic mass of Cu = 63 g mol^{-1}. One Faraday = 96500 C mol^{-1})

48. For the first order reaction, show that the time taken for 75% completion of the reaction is twice the time taken for 50% completion of the reaction.

49. The rate constant of a first ordered reaction is exactly doubled when the temperature was raised from 300K to 310K. Calculate the energy of activation for the reaction.

    (Given R = 8.314 J/K/mol)

TUMAKURU DISTRICT P.U. COLLEGES PRINCIPALS' ASSOCIATION (R.)
II PUC PREPARATORY EXAMINATION JANUARY- 2024

Subject Code : 34   **CHEMISTRY**   Total No.of Ques.49
Time : 3-15 hours   Max Marks : 70

Instructions: 1] This Question paper consists of Five parts . All parts are compulsory.
2] a)Part -A carries 20marks. Each question carries 1mark.b)Part-B carries 6 marks. Each question carries 2 marks. c) Part-C carries 15 marks. Each question carries 3 marks. d) Part-D carries 20 marks. Each question carries 5 marks. e) Part-E carries 9 marks. Each question carries 3 marks.
3]In Part-A questions first attempted answer will be considered for awarding marks.
4]Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
5]Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6]Use log tables and simple calculator if necessary.[Use of scientific calculator is not allowed]

PART -A

I **Select the correct option from the given choices**   15x1 =15

1. The unitless concentration term is _____

   a) Mole fraction   b) Mass percent   c) Molarity   d) Both a and b

2. The charge on one mole of electron is

   a) 1C   b) 1F   c) 1.602×10^{-19} C   d) 9.1×10^{-31} C

3. During electrolysis of dilute sulphuric acid the product formed at anode is

   a) $S_2O_8^{2-}$ b) O_2 c) SO_2 d) H_2

4. For a reaction $2 NO_{(g)} + O_{2(g)} \rightarrow 2NO_{2(g)}$ the correct expression for average rate of a reaction is _____

   a) $r_{avg} = \dfrac{+\Delta[NO]}{\Delta t}$ b) $r_{avg} = \dfrac{-1}{2} \dfrac{\Delta[NO2]}{\Delta t}$ c) $r_{avg} = \dfrac{+1}{2} \dfrac{\Delta[NO]}{\Delta t}$ d) $r_{avg} = \dfrac{\Delta[O2]}{\Delta t}$

5. Number of unpaired electrons in Zn^{2+} is _____

   a) 3   b) 2   c) 0   d) 1

6. The oxidation number of central metal ion in complex $[Cr(NH_3)_3(H_2O)_3]Cl_3$ is

   a) +3   b) 0   c) +2   d) +6

7. Condition for the optical activity is _____
   a) Presence of superimposable mirror image
   b) Presence of plane of symmetry
   c) Absence of sterocentre
   d) Presence of nonsuperimposable mirror image

8. An example for simple ether is_____
   a) Methoxyethane   b) Phenoxybenzene
   c) Methoxy benzene   d) Ethoxybenzene

9. The phenol with higher acidic nature among the following is _____
   a) 2,4,6-Trinitrophenol   b) 3-Nitrophenol
   c) 2,4,6-Trimethylphenol   d) 3-Methylphenol

10. The reagent used to convert _____ is

_____

 a) $NaBH_4$ b) H_2/Pt

 c) $NH_2NH_2/KOH/$ethylene glycol   d) $Zn-Hg/$Conc. HCl

11. The product formed when a carboxylic acid is treated with phosphorouspentoxide (P_2O_5)

 a) Primary alcohol   b) Acid anhydride   c) Amide   d) Hydrocarbon

12. The correct decreasing order of basic strength in following amines is _____

 a) $C_2H_5NH_2 > (C_2H_5)_2NH > NH_3 > C_6H_5NH_2$

 b) $(C_2H_5)_2NH > C_2H_5NH_2 > C_6H_5NH_2 > NH_3$

 c) $(C_2H_5)_2NH > C_2H_5NH_2 > NH_3 > C_6H_5NH_2$

 d) $C_6H_5NH_2 > (C_2H_5)_2NH > C_2H_5NH_2 > NH_3$

13. The reagent used to convert benzenediazoniumchloride to benzene is _____

 a) H_2O b) Cu_2Cl_2/HCl c) Cu/HCl   d) CH_3CH_2OH

14. The hormone responsible for preparing the uterus for implantation of fertilized egg is

 a) Estradiol   b) Testosterone   c) Progesterone   d) Glucocarticoids

15. The vitamin soluble in water is _____

 a) A   b) C   c) D   d) K

II. Fill in the blanks by choosing the appropriate word from those given in brackets:

(Order, Manganese, Reverse osmosis, molecularity, $C_6H_5SO_2Cl$, $CHCl_3$)   5x1 = 5

16. Desalination of sea water can be done by _____.

17. _____ of a reaction can not be fraction.

18. A transition element with highest oxidation state is _____.

19. A poisonous gas phosgene is formed when _____ is exposed to air and light.

20. _____ is Hinsberg reagent.

PART-B

III. Answer any THREE of the following questions. Each question carries two marks.

21. What are azeotropes? Give an example.   3 x 2 = 6

22. Define half life period of a reaction. Mention the order of a reaction in which $t_{1/2}$ is independent of concentration of the reactant.

23. What is ionization isomerism in coordination compounds? Give an example.

24. Explain Finkelstein reaction with general equation.

25. Write the equation for self condensation of ethanal in presence of dilute sodium hydroxide.

26. What is Peptide linkage? How many peptide bonds are present in dipeptide?

PART – C

IV. Answer any THREE of the following questions. Each question carries 3 marks.

$3 \times 3 = 09$

27. a) How is Potassium permanganate $(KMnO_4)$ prepared commercially? Write an ionic equation.
b) Mention the geometry of manganate ion.

28. a) Give any two reasons for the catalytic activity of transition metals and their compounds.
b) Name the 3d series element that shows +1 oxidation state.

29. a) Write one difference and one similarity between Lanthanoids and Actinoids.
b) Why is the study of actinoids is difficult?

30. Give any two postulates and one limitations of Werner's theory of coordination compounds.

31. Using Valence Bond Theory (VBT), explain the geometry, hybridization and magnetic property of $[CoF_6]^{3-}$. (Z for Co is 27)

32. a) Explain Synergic interaction in metal carbonyls.
b) The transition elements and their compounds are coloured in nature. Why?

V. Answer any TWO of the following questions. Each question carries 3 marks.

$2 \times 3 = 06$

33. Write any three differences between ideal and non ideal solution.

34. For a standard Hydrogen electrode (SHE),

   a) Draw a neat labeled diagram.
   b) Write its half cell representation.
   c) Mention the value of its potential.

35. a) Mention any two methods to prevent corrosion.
b) Write the chemical composition of rust.

36. Derive an integrated rate equation for the rate constant of a first order reaction.

PART- D

VI. Answer any FOUR of the following questions. Each question carries 5 marks.

$4 \times 5 = 20$

37. a) Explain the mechanism involved in the conversion of chloromethane to methanol.
b) Aryl halides are less reactive towards nucleophilic substitution reactions. Give any two reasons.
c) Write the general formula of a Grignard reagent.

38. a) Write the mechanism for the Dehydration of ethanol to ethene.
b) How is phenol prepared from aniline?

39. a) Explain Friedel-Craft's methylation of anisole. alkylation
b) How is phenol converted to 2-Hydroxybenzoicacid? Give chemical equation. Diazotisation
c) Identify the less boiling compound among 1-Butanol and Ethoxyethane.

40. a) Explain Cannizaro's reaction with a suitable example.
b) Illustrate side chain oxidation of Toluene to Benzoicacid.

41. a) An alkyl magnesium halide 'A' reacts with carbondioxide (dry ice) followed by acid hydrolysis to give compound 'B'. On reduction with $LiAlH_4$, 'B' gives compound 'C'. On acidic dehydration, compound 'C' gives ethene. Identify A, B and C

b) Explain decarboxylation reaction of carboxylic acid.

42. a) Write the reaction involved in the Gabriel Phthalimide synthesis of a primary amine.

b) Explain coupling reaction of benzene diazoniumchloride with phenol.

c) Identify the more basic compound among Aniline, 4-Nitroaniline, 4-Methylaniline. ③ ⓶ ①

43. a) Write the Haworth structure of lactose.

b) Mention water soluble component and water insoluble component of starch.

c) Name the sugar moiety present in the RNA molecule.

PART E

VII. Answer any THREE of the following questions. Each question carries 3 marks.

$3 \times 3 = 09$

44. 45g of ethylene glycol ($C_2H_6O_2$) is mixed with 600g of water. Calculate a) The Freezing point depression and b) The Freezing point of the solution (Given K_f of water is 1.86 Kkgmol^{-1})

45. 200cm³ of an aqueous solution of protein contains 1.26g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57×10^{-3} bar. Calculate the molar mass of protein. (Given R=0.083L.mol^{-1}K^{-1})

46. Calculate the standard Gibbs fee energy for the reaction

$$Zn_{(s)} + Cu^{2+}_{(aq)} \rightarrow Zn^{2+}_{(aq)} + Cu_{(s)}$$

(Given: E° (Zn^{2+}/Zn) = -0.76V. E° (Cu^{2+}/Cu) = +0.34V and 1F= 96500C)

47. The resistance of 0.01M acetic acid solution is found to be 2220 Ω. The area of cross section between electrode of a cell is 3.85cm² and they are 10.5cm apart. Calculate the conductivity.

48. At 318 K, for a reaction $2N_2O_{5(g)} \rightarrow 4NO_2 + O_2$, the initial concentration of N_2O_5 is 2.33molL^{-1}. After 184 minutes it is reduced to 2.08molL^{-1}. Calculate average rate of the reaction in terms of minutes. What is the rate of production of NO_2 during this period?

49. For a first order reaction, R→ P the initial concentration of the reactant was 1.24×10^{-2}molL^{-1} at 318K. After 60minutes its concentration was reduced to 0.20×10^{-2} molL^{-1} Calculate the rate constant of the reaction at 318K.

❖❖❖❖❖❖❖

Code No: S 2193

II PUC PREPARATORY EXAMINATION JANUARY 2024

CHEMISTRY (34)

Total No. of Questions : 49

Date : 22-01-2024

Time : 10.00 AM to 01.15 PM

Total No. of printed pages : 4

Max Marks : 70

Duration : 3 Hours 15 Minutes

INSTUCTIONS:

1. Question paper has FIVE parts. All parts are compulsory
2. a) PART – A carries 20 marks. Each question carries 1 mark.
   b) PART – B carries 06 marks. Each question carries 2 marks.
   c) PART – C carries 15 marks. Each question carries 3 marks.
   d) PART – D carries 20 marks. Each question carries 5 marks.
   e) PART – E carries 09 marks. Each question carries 3 marks.
3. In PART – A, **FIRST ATTEMPTED ANSWERS** will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculator if necessary (Use of scientific calculator not allowed)

PART - A

I. Select the correct option from the given choices.   1x15 = 15

1. Molarity is
   a) Moles of solute/litre of solvent   b) Moles of solute / litre of solution
   c) Grams of solute/litre of solution   d) Moles of solute/ kg of solvent

2. An example for secondary cell is
   a) Leclanche cell   b) Daniel cell   c) Mercury cell   d) Nickel – cadmium cell

3. During electrolysis of aqueous sodium chloride, the gas liberated at anode is
   a) Hydrogen   b) Oxygen   c) Chlorine   d) Hydrogenchloride

4. Unit of rate constant of zero order reaction is
   a) $mol\ L^{-1}s$ b) $mol\ L\ s^{-1}$ c) $mol\ L^{-1}s^{-1}$ d) $mol^{-1}L\ s^{-1}$

5. The transition element that do not show variable oxidation state is
   a) Ti   b) Sc   c) Cu   d) V

6. Oxidation state of Iron in $K_4[Fe(CN)_6]$ is
   a) +2   b) +3   c) +6   d) +4

7. For the same alkyl group, the boiling points of alkyl halides vary as
   a) RI>RCl>RBr>RF   b) RI>RBr>RCl>RF
   c) RF>RCl>RBr>RI   d) RI> RBr>RF>RCl

8. With Lucas reagent, immediate turbidity is produced by
   a) Primary alcohols   b) Secondary alcohols
   c) Tertiary alcohols   d) None of these

(1)   P.T.O.

9. Among the following, trihydric alcohol is
   a) Ethanol   b) Ethylene glycol   c) Glycerol   d) Propanol

10. Fehling solution A is aqueous copper sulphate and Fehling solution B is
    a) Alkaline sodium potassium tartarate   b) Ammoniacal silver nitrate solution
    c) Conc HCl and Anhy $ZnCl_2$ d) Zinc amalgam and Conc HCl

11. Carboxylic acids exist in dimeric form even in vapour phase due to
    a) Hydrogen bond   b) Peptide bond   c) Ionic bond   d) Metallic bond

12. N – methylethanamine is a
    a) Primary amine   b) Secondary amine   c) Tertiary amine   d) None of these

13. Hinsberg reagent is
    a) Benzene sulphonyl chloride   b) Alcoholic potash
    c) Ammoniacal silver nitrate   d) Zinc amalgam and concentrated HCl

14. Invert sugar is
    a) Maltose   b) Sucrose   c) Lactose   d) None of these

15. Water soluble vitamin is
    a) Vitamin A   b) Vitamin C   c) Vitamin D   d) Vitamin E

II. **Fill in the blanks by choosing the appropriate word from those given in the brackets.**   5x1=5

(dye, one, refrigerant, two, five, insecticide)

16. Van't Hoff factor for NaCl (assuming complete dissociation) is _____

17. NH_4NO_2 ----------→ N_2 + $2H_2O$ is an elementary reaction. The molecularity is
    _____

18. The number of unpaired electrons present in Fe^{3+} (Z=26) is _____

19. Tetrachloromethane is_____

20. p – amino azobenzene is _____

PART - B

III. Answer **ANY THREE** of the following. Each question carries **TWO** marks   3x2=6

21. What is the effect of increase in temperature on the solubility of a solid in liquid, if the process of dissolution is a) exothermic b) endothermic.

22. Write Arrhenius equation relating the rate constant of a chemical reaction and absolute temperature. What is 'Ea' in the equation?

23. What are ambidentate ligands? Give one example

24. Explain Swarts reaction with example.

25. $CH_3 - CO - CH_3$ + Zn-Hg/HCl ------------→ _____ +H_2O , complete the reaction and name it.

26. What is a peptide bond? How many peptide bonds are there in a tetrapeptide?

(2)   P.T.O.

PART – C

IV. Answer ANY THREE of the following. Each question carries THREE marks.   3x3=9

27. Write the equations involved in the preparation of potassium dichromate from chromite ore.

28. a) The transition metals and their compounds are known for their catalytic activity. Give any two reasons.

    b) Mention the geometry of chromate ion (structure not necessary)

29. What is lanthanoid contraction? Mention two of its consequences.

30. Write the IUPAC names and the type of isomerism for the following complexes

    a) $[Co(NH_3)_5Br]SO_4$ and   b) $[Co(NH_3)_5 SO_4]$ Br

31. Using Valence Bond Theory [VBT], explain hybridization, geometry and magnetic property of $[Co(NH_3)_6]^{3+}$ ion.

32. a) What is spectrochemical series? Based on the relative magnitudes of Δ_0 (CFSE) and P (pairing energy) mention the conditions under which high spin and low spin complexes are formed.

V. Answer ANY TWO of the following. Each question carries THREE marks.   2x3=6

33. Mention any three differences between non ideal solutions showing positive deviation and negative deviation from Raoult's law.

34. State Kohlrausch's law of independent migration of ions. How conductivity and molar conductivity of electrolytes vary with dilution.

35. Write the neat labelled diagram of standard hydrogen electrode. Represent the cell.

36. Derive the integrated rate equation for the first order reaction.

PART -D

VI. Answer ANY FOUR of the following. Each question carries FIVE marks.   4x5=20

37. a) Explain S_N1 mechanism of reaction between tertiary – butyl bromide and hydroxide ion. What is the order of the reaction?

    b) Between propan-2-ol and butan-2 –ol, which one is optically active?

    c) What is the value of optical rotation of a racemic mixture?   3+1+1

38. a) How are primary, secondary and tertiary alcohols are prepared from Grignard reagents? Write general equations.

    b) Explain Williamson's ether synthesis.   3+2

39. a) Write the mechanism of dehydration of ethanol to ethene

    b) How is phenol converted to salicylic acid? Write equation.   3+2

40. a) How acetaldehyde reacts with dilute NaOH? Write equation.

   b) Explain GattermanKoch reaction.

   c) What is Tollen's reagent?   2+2+1

41. a) Explain the decarboxylation of carboxylic acids by writing general equation.

   b) Between methanoic acid and ethanoic acid, which is more acidic and why?

   c) Name the product formed when benzoic acid is nitrated.   2+2+1

42. a) How primary aliphatic amines react with nitrous acid? Write general equation.

   b) Write the equation for the reaction between benzene diazonium chloride and phenol in basic medium. Mention the colour of the product.

   c) Mention the foul smelling substance formed when a primary amine is heated with chloroform and alcoholic potash.   2+2+1

43. a) What are reducing sugars? Is maltose a reducing sugar?

   b) Name the naturally occurring amino acid which is optically inactive.

   c) Name the sugar moiety present in DNA.   2+2+1

PART –E (PROBLEMS)

VII. Answer ANY THREE of the following. Each question carries THREE marks.   3x3=9

44. The vapour pressure of pure benzene at a certain temperature is 0.850 bar. A non volatile non electrolyte solid weighing 0.5 g when added to 39g of benzene (molar mass 78gmol^{-1}.), vapour pressure decreases to 0.845 bar. What is the molar mass of the solid substance?

45. The boiling point of benzene is 353.23K. When 1.8 g of non volatile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11K. Calculate the molar mass of the solute. (Given K_b for benzene is 2.53Kkgmol^{-1})

46. Calculate the EMF of the cell for the following reaction at 298K

   Mg(s) + 2Ag$^+$ (0.0001M) ----→ Mg^{2+}(0.130M) + 2Ag(s). [Given E$^0_{Mg^{2+}/Mg}$ = -2.37V, E$^0_{Ag^+/Ag}$ =0.8V.]

47. Resistance of a conductivity cell filled with 0.1molL^{-1}KCl solution is 100Ω. If the resistance of the same cell when filled with 0.02 molL^{-1} KCl solution is 520Ω. Calculate the conductivity and molar conductivity of 0.02 molL^{-1} KCl solution. The conductivity of 0.1mol L^{-1} KCl solution is 1.29Sm^{-1}.

48. The half life period of a first order reaction is 69.3 min. Calculate the time required for 75% completion of the reaction.

49. The rate constants of a reaction at 500K and 700K are 0.02s^{-1} and 0.07s^{-1} respectively. Calculate energy of activation (Ea).

(4)

UKDPUCPA **II PUC PREPARATORY EXAMINATION JANUARY- 2024**

CHEMISTRY (34)

Time 3.15 Hours   Max Marks 70

Instructions:

1. Question paper has five parts. All parts are compulsory.
2. a. Part-A carries 20 marks. Each question carries 1 mark.
   b. Part-B carries 06 marks. Each question carries 2 marks.
   c. Part-C carries 15 marks. Each question carries 3 marks.
   d. Part-D carries 20 marks. Each question carries 5 marks.
   e. Part-E carries 09 marks. Each question carries 3 marks.
3. In Part-A questions first attempt answer will be considered for awarding marks.
4. Write balanced chemical equations and draw neat labelled diagram and graphs wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6. Use log tables and simple calculators if necessary (Use of scientific calculator is not allowed)

PART – A

I.   Select the correct option from the given choices.   (1x15=15)

1) According to Henry's law partial pressure of the gas in the vapour phase is proportional to its
   a) Molarity
   b) Molality
   c) Mole fraction
   d) Mass percentage

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

3) The SI unit of conductivity is.
   a) $S\ m^{-1}$ b) $S\ m$ c) $S\ m^2\ mol^{-1}$ d) $S\ Cm^2\ mol^{-1}$

4) In the reaction
   $2A + B \longrightarrow A_2B$ the reactant A will disappear at _____
   a) Twice the rate that B will disappear.
   b) Half the rate that B will disappear.
   c) The same rate that B will disappear.
   d) The same rate that A_2B will appear.

5) d-block elements form complexes due to
   a) Small size and high ionic charges
   b) large size and high ionic charges
   c) Small size and low ionic charges
   d) large size and low ionic charges

6) Metal-carbon bond in metal carbonyls possess
   a) σ character
   b) Π character
   c) both σ and Π character
   d) neither σ or Π character

7) The chemical name of phosgene is
   a) Acetyl chloride
   b) Carbonyl Chloride
   c) Methyl Chloride
   d) Chloroform

8) When phenol is treated with excess of bromine water it gives _____
   a) m-bromophenol
   b) o- and p-bromophenol
   c) 2,4-dibromophenol
   d) 2,4,6-tribromophenol

9) Anisole on treatment with conc.HNO_3 and conc.H_2SO_4 gives _____
   a) Phenol
   b) o- and p-nitroanisole
   c) Nitrobenzene
   d) m-nitroanisole

10) Decarboxylating reagent is
   a) NaOH
   b) NaOH + CaO
   c) alc. KOH
   d) Zinc dust

11) In Clemmenson reduction carbonyl compound is treated with _____ to form corresponding hydrocarbon
   a) Sodium amalgam + HNO_3
   b) Sodium amalgam + HCl
   c) Zinc amalgam + HNO_3
   d) Zinc amalgam + HCl

12) The IUPAC name of $(CH_3)_2N-C_2H_5$ is
   a) N,N-Dimethylethanamine
   b) 1,1-Dimethylethanamine
   c) N-Dimethylethanamine
   d) N-Ethyl-N-Methylmethanamine

13) Hinsberg's reagent is
   a) benzene sulphuryl chloride
   b) benzene sulphonyl chloride
   c) Chlorobenzene
   d) benzene carbonyl chloride

14) The helical structure of protein is stabilized by
   a) dipeptide bond
   b) peptide bond
   c) Hydrogen bond
   d) ether bond

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

II. Fill in the blanks by choosing the appropriate word from those given in the brackets:
   (hydrocarbons, Collision, Primary aliphatic amines, minimum boiling, effective nuclear charge, pseudo-first order   )
   (1x5=5)

16) The solutions which show a larger positive deviation from Raoult's law are called _____ azeotropes.

17) Inversion of cane sugar is an example for _____ reaction.

18) Lanthanoid contraction is due to increase in _____

19) Grignard reagents react with any source of proton to give _____

20) Gabrial-phthalimide synthesis is used for the preparation of _____

PART – B

III.   Answer any Three of the following. Each question carries two marks :   (3x2=6)

21) State Raoult's law and write its mathematical form.

22) What are the main criteria for effective collisions according to collision theory?

23) What are heteroleptic complexes? Give an example.

24) Explain Swart's reaction with an example.

25) Write the equation for the conversion of benzoyl chloride to benzaldehyde. Name the reaction.

26) Write the Haworth structure of Lactose.

PART- C

IV. Answer any Three of the following. Each question carries three marks : (3x3=09)

27) a) Calculate the spin only magnetic moment of Fe^{2+} ion (At. No. of Fe=26).

b) Cu^{2+} salts are coloured give reason. (2+1)

28) Write the balanced chemical equation for the reactions involved in the preparation of Potassium dichromate from chromate ore.

29) What is lanthanoid contraction? Mention two consequences of lanthanoid contraction.

30) Give the IUPAC name of $[CoCl_2(NH_3)_4]Cl$ and draw cis- and trans- isomers of $[CoCl_2(NH_3)_4]^+$

31) Give any three postulates of Werner's theory of Co-ordination compounds.

32) Based on VBT explain the Hybridisation, geometry and magnetic property of $[Ni(CN)_4]^{2-}$

V. Answer any TWO of the following. Each question carries three marks : (2x3=6)

33) a) Write any two differences between Ideal and Non-ideal solutions.

b) What are isotonic solutions ?

34) Draw labelled diagram of standard hydrogen electrode (SHE). Write its half cell reaction and E^0 value.

35) What are fuel cells? Write the cathode and anode reactions of Hydrogen – Oxygen fuel cell.

36) Derive an integrated rate equation for the rate constant of Zero order reaction.

PART - D

VI. Answer any Four of the following. Each question carries Five marks : (4x5=20)

37) a) Write the equations for the steps in S_N1 mechanism of the conversion of tert-butylbromide to tert-butyl alcohol.

b) Explain Wurtz reaction with an example.

c) What are enantiomers? (2+2+1)

38) a) Explain the mechanism of dehydration of ethanol to ethene.

b) How is salicylic acid converted to Aspirin? Write equation. (3+2)

39) a) Explain Cumene process for the preparation of phenol.

b) Explain Williamson's ether synthesis with an example. (3+2)

40) a) What happens when ethanal is treated with dil. NaOH? Write the equation.

b) Explain Cannizzaro's reaction. Write the equation.

c) Name the product formed when acetone undergoes Wolf-Kishner reduction. (2+2+1)

41) a) Explain esterification reaction. Write the equation.

b) Explain HVZ (Hell-Volhard-Zelinsky) reaction with equation.

c) What is the effect of –CH_3 group on the acidity of carboxylic acid? (2+2+1)

42) a) Explain Carbylamine reaction with equation.

b) Explain Hoffmann bromamide reaction with equation.

c) Which is more basic among methyl amine and aniline? (2+2+1)

43) a) What are non-essential amino acids? Give an example.

b) What is denaturation of proteins? Which level of structure remains intact during denaturation of protein?

c) Name the disease caused by the deficiency of vitamin-D. (2+2+1)

PART - E

VII. Answer any Three of the following. Each question carries Three marks : (3x3=09)

44) The vapour pressure of pure benzene at a certain temp. is 650 mm of Hg. A non-volatile, non-electrolyte solid weighing 0.5 g when added to 30 g of benzene (molar mass 78 g mol^{-1}), Vapour pressure of the solution then is 645 mm of Hg . Calculate the molar mass of the solid substance.

45) 2 g of a non-electrolyte solute dissolved in 100g of benzene lowered the freezing point of benzene by 0.40 K. The freezing point constant of benzene is 5.12 Kkgmol^{-1}. Calculate the molar mass of the solute.

46) Calculate the emf of the cell in which the following reaction takes place.

$Ni(s) + 2 Ag^+ (0.002 M) \longrightarrow Ni^{2+} (0.160 M) + 2 Ag (s)$ Given $E^0_{cell} = 1.05$ V

47) The standard electrode potential for Daniell cell is 1.1 V. Calculate the standard Gibb's energy for the reaction

$Zn(s) + Cu^{2+} (aq) \longrightarrow Zn^{2+} (aq) + Cu (s)$

48) 70% of a first order reaction is completed in 30 minutes. Calculate the rate constant of the reaction.

49) The specific reaction rate of a reaction doubled when temperature changes from 30^{0}C to 50^{0}C. Calculate the energy of activation of the reaction. (Given R= 8.314 JK^{-1}mol^{-1})

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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 [benzene ring] + CO + HCl $\xrightarrow{AlCl_3}$ [benzene ring]—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) $[Co(NH_3)_2 (H_2O)_3 (NO_2)]Cl_2$ 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+1)
   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) $CH_3-CO-CH_3 \xrightarrow{\text{Zn / Hg in HCl}}$ ____ $+ H_2O$
   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^{2}mol^{-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.

Govt. Of Karnataka

Deputy Director of School Education & Literacy (PU College), Yadagiri

SECOND YEAR PUC Preparatory EXAMINATION JANUARY - 2024

TIME : 3.15 Hours   CHEMISTRY (34)   Max Marks : 70

Instructions :
1) The question paper has 5 parts having 52 questions. All parts are compulsory.
2) a. Part - A carries 20 Marks Each question carries One mark
   b. Part - B carries 06 Marks Each question carries Two marks
   c. Part - C carries 15 Marks Each question carries Three marks
   d. Part - D carries 20 Marks Each question carries five marks
   e. Part - E carries 09 Marks Each question carries Three marks
3) In part A first attempted answer will be considered for for awarding marks.
4) Write balanced equations and draw neat labelled diagrams and graphs wherever necessary.
5) Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks.
6) Use log tables and simple calculator of necessary. (use of scientific calculator is not allowed)

PART -A

I. Select the correct option from the given choice   15×1=15

1. If the solute dissociates in solution, Vant Hoff factor is ;
   a) >1   b) <1   c) 0   d) =1
2. Which of the following is the example for inert electrode ?
   a) Silver electrode   b) Gold electrode   c) Zinc electrode   d) Copper electrode
3. Standard electrode potential of three metals X, Y and Z are -1.2V, to 0.5V, and -3.0V respectively. the reducing power of these metals will be ;
   a) Y>Z>X   b) X>Y>Z   c) Z>X>Y   d) X>Y>Z
4. Radiactive disintegration is an example of ;
   a) Zero order reaction   b) First order reaction   c) Second order reaction   d) Third order reaction
5. Which of the following shows maximum number of oxidation state ?
   a) Cr   b) Mn   c) Cu   d) Fe
6. The denticity of the EDTA (Ettylene diamine tetraacetated figancl is ;
   a) 2   b) 3   c) 6   d) 4
7. The halogen exchange method preferred for the preparation of alkyl iodide is ;
   a) Finkelstein reaction   b) Swartz reaction   c) Wurtz reaction   d) Fittig reaction
8. Which of the following is the least soluble in water ?
   a) n-Butyl alcohol   b) Methanol   c) n-Hexyl alcohol   d) n-Heptyl alcohol
9. In allylic alcohol, the hydroxy (-OH) is attached to,
   a) Sp^3 carbon   b) Sp^2 carbon   c) Sp carbon   a) dSp^3 carbon
10. The IUPAC name of H-CHO is ;
    a) Formaldehyde   b) Methonal   c) Methanol   d) Formic acid
11. Corboxylic acids exist in dimeric from even in vapour phase due to ;
    a) Ionic bond   b) Hydrogen bond   c) Peptide bond   d) Metallic bond.
12. Amines are gencrally ;
    a) Electrophilic   b) acidic   c) basic   d) Neutral
13. Corbylamine reaction is answered by;
    a) Corboxylic acids   b) 1-Amines   c) 2^0-Amines   d) Aldehydes
14. Which of the following is a polysacchoride ?
    a) Starch   b) Glucose   c) Fructose   d) Maltose
15. Ascorbic acid is a chemical name of;
    a) Vitamin A   b) Vitamin B   c) Vitamin C   d) Vitamin D

II. Fill in the blanks by choosing the appropriate word from those given in the brackets   5×1=5
   (Two, 3^0-Alkyal halilide, Zero, One, 1-Alkyl halide, 3^0-Amines)
16. The sum of mole fractions of all the components in a binary mixture is equal to...................
17. Units of rote of a reaction and rate constant for a.....................order reactions are same.
18. The common oxidation state of d-block is +2 due to loss of............ number of 4S electrons.
19. .... prefers to undesgo SN^1 reaction
20. Benzene sulphonyl chloride will not precipitation with...............

PART - B

III. Answer any Three of the following. Each question carries TWO marks   3×2=6
21. Mention any two applications of Henry's law.
22. Give any two differences between order and molecularity of a reaction ?
23. Between T^{4+} and T^{3+}, which is more stable ? Why ?
24. What is the optical activity ? Write the condition required for optical activity of a compound ?
25. Ketoness are less reactive than aldehycles. Give Two resons.
26. Name two harmones which regulate the glucose level in blood.

P.T.O.

PART – C

IV. **Answer any THREE of the following. Each question carries Three marks**   3×3=9

27. Explain the manufacture of potassium dichromate from chromite ore.
28. Calculate the spin only magnetic moment of Fe^{3+} ion [Atomic number of Fe= 26].
29. What is lanthanoid contraction ? What is the cause for it and write any one consequences of it.
30. Write the IUPAC name of co-ordination compound $[Co(NH_3)_5]Cl$, and identify co-ordination sphere and counter ion present in the complex.
31. On the basis of VBT explain hybridisation, geometry & magnetic property of complex $[CoF_6]^{3-}$
32. Define crystal field splitting. Write the significance of Δ_o & pairing energy in the formation of low spin complexes.

V. **Answer any TWO of the following. Each question carries Three marks**   2×3=6

33. Write any three differences between solution showing positive and negative deviations of non-ideal solutions.
34. Define conductivity and molar conductivity. Write SI unit of molar conductivity.
35. What are fuel cells ? Write anodic and cathodic reactions taking place in H_2-O_2 fuel cell.
36. Derive an integrated rate equation for zero order reactions.

PART – D

VI. **Answer any Four of the following. Each question Carries five marks.**   4×5=20

37. a) Write the reaction mechanism involved in the reactions.
   $$CH_3Cl + NaOH \longrightarrow CH_3OH + NaCl$$ 3
   b) Explain fittig reaction with an example ?   2
38. a) Describe the hydroboration - oxidation reaction of propene   3
   b) Expalin Kolbe's reaction   2
39. a) Explain the mechanism of dehydration of ethanol to ethene   3
   b) Explain Williamson ether synthesis with an example.   2
40. a) Identify A, B and C in the following reactions.

   b) Write the important condition required for the molecules to under go condensation reaction and cannizzaro's reaction   2
41. a) Explain Rosenmund reduction with an example.   2
   b) Explain decarboxylation of sodium acetate with equation.   2
   c) Whate is the effect of electron withdrawing group on the acidity of carboxylic acids   1
42. a) Explain with a chemical equations for the conversion of aniline to A-bromoaniline   3
   b) How is aniline converted to benzene diazonium chloride ? Give equation   2
43. a) Write Haworth structure of maltose.   2
   b) Explain denaturation of protein. Which level of protein? structure remains intact during dinaturation of protine ?   2
   c) Name the bond present between two nucleotides   1

PART – E (problems)

VII. **Solve any THREE problems, of the following. Each question Carries three marks**   3×3=9

44. Calculate the molality of 20 % (w/w) potassium iodide aqmous solution. Give Automic mass of potassium & Iodine are 39 $gmol^{-1}$ and 127 $gmol^{-1}$. respectively
45. An aqueous solution of organic compound containing 0.6 g of it dissolved in 21.7 g of water, freezes at 272.187 K. If the value of Kf is 1.86 K $kgmol^{-1}$ for water which freezes at 273 K, Calculate the molecular mass of organic compound.
46. For the reaction
   $$Zn_{(s)} + Ag_2O + H_2O_{(l)} \longrightarrow Zn^{2+}_{(aq)} + 2 Ag_{(s)} + 2 OH^{-}_{(aq)}$$
   Determine E°_{cell} and ΔG°. (E°_{zn} = -0.76V and E°_{Ag} = +0.80V)
47. Calculate limiting molar conductivity of calcium sulphate. Limiting molar conductivity of calcium and sulphate ions are 119.9 and 160.0 sem^2mol^{-1} respectively.
48. The rate constant of a certain reaction is 10min^{-1}. Calculate the half-life period of this reaction in seconds
49. The rate constant of a reaction at 250K and 400 K are 0.01 S^{-1} and 0.03 S^{-1} respectively. Calculate the energy of activation of the reaction [Given R= 8.314$JK^{-1}mol^{-1}$] [log_{3}=0.4771]

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GOVERNMENT OF KARNATAKA
KARNATAKA SCHOOL EXAMINATION & ASSESSMENT BOARD

Class: II Year PUC **MODEL QUESTION PAPER** **Academic Year:** 2023-24

Subject: Chemistry (34) **Maximum Marks:**70

Time: 3.15hours **Number of questions:** 49

Instructions:

1. Question paper has FIVE parts. All parts are compulsory.

2. a. Part-A carries 20 marks. Each question carries 1 mark.

   b. Part-B carries 06 marks. Each question carries 2 marks.

   c. Part-C carries 15 marks. Each question carries 3 marks.

   d. Part-D carries 20 marks. Each question carries 5 marks.

   e. Part-E carries 09 marks. Each question carries 3 marks.

3. In Part- A questions,**first attempted answer**will be considered for awarding marks.

4. Write balanced chemical equations and draw neat labeled diagrams and graphswherever necessary.

5. Direct answers to the numerical problems without detailed stepsand specific unit for final answer will not carry any marks.

6. Use log tables and simple calculator if necessary (use of scientific calculator is not allowed).

PART - A

I. Select the correct option from the given choices. **1 $\times$15 = 15**

1. Aquatic species are more comfortable in cold water rather than in warm water. This is due to

   a) solubility of oxygen is more in warm water.

   b) solubility of oxygen is more in cold water.

   c) solubility of gases increases with decrease of temperature.

   d) both (b) and (c).

2. Which of the following cell was used in Apollo space programme?

   a) Mercury cell b) Daniel cell c) H_2–O_2 Fuel cell d) Dry cell

3. During electrolysis of aqueous solution of NaCl, the reaction preferred at anode is

   a) $2H_2O(l) \rightarrow O_2(g) + 4H^+(aq) + 4e^-$ b) $H_2O(l) + e^- \rightarrow$ ½ $H_2(g) + OH^-$

   c) $Cl^-(aq) \rightarrow$ ½ $Cl_2(g) + e^-$ d) ½ $Cl_2(g) + e^- \rightarrow Cl^-(aq)$

4. Order of a reaction is determined by

   a) balanced chemical equation b) unbalanced chemical reaction

   c) experimental rate expression d) thermo-chemical equation

5.Ionic character decreases in the following oxides.

   a) $Mn_2O_7> MnO_2>MnO$ b) $MnO> MnO_2> Mn_2O_7$

   c) $Mn_2O_7>MnO> MnO_2$ d) $MnO> Mn_2O_7> MnO_2$

6. The oxidation state of Fe in [Fe(CO)$_5$] is

   a) + 2 b) 0 c) + 3 d) + 5

7. The gases liberated when primary alcohols react with thionyl chloride are

   a) SO_2 and H_2 b) $H_2$and HCl c) $SO_2$and HCl d) $NO_2$and H_2

8. Phenol molecule is less stable than phenoxide ion because

   a) phenol resonance structures have charge separation but not in phenoxide ion.

   b) phenoxide ion resonance structures have charge separation but not in phenol.

   c) both Phenoxide ion and phenol resonance structures have charge separation

   d) both Phenoxide ion and phenol resonance structures do not have charge separation

9. Glycerol is an example for

   a) dihydric alcohol   b) dihydric phenol   c) trihydric phenol   d) trihydric alcohol

10. Tollen's reagent is a

   a) silver nitrate solution   b) ammonical silver nitrate solution

   c) ammonium nitrate solution   d) silver chloride solution

11. Carboxylic acids exists in dimeric form even in vapour phase due to

   a) Hydrogen bond   b) peptide bond   c) ionic bond   d) metallic bond

12. The state of hybridization of orbitals of Nitrogen atom in amines is;

   a) sp^2 b) sp^3 c) sp d) dsp^2

13. Benzene diazonium chloride reacts with phenol to form p-hydroxy azobenzene in

   a) acidic medium   b) neutral medium

   c) basic medium   d) both acidic and neutral medium

14. Thiamine is a chemical name of;

   a) Vitamin A   b) Vitamin B_1 c) Vitamin C   d) Vitamin K

15. The nitrogenous base adenine form hydrogen bonding with

   a) Thymine   b) Cytosine   c) Guanine   d) None of the above

II. Fill in the blanks by choosing the appropriate word from those given in the brackets:

   (phosgene, tin, hydrogen, molecularity, zinc, cellulose acetate)   **5 × 1 = 05**

16. Thesemi permeable membrane used in the reverse osmosis is _____.

17. The number of molecules taking part in the elementary reaction is called _____.

18. The non-transitional metal present in brass is _____.

19. The poisonous gas formed when chloroform is exposed to air and lightis _____.

20. Solubility of ethylamine in water is due to formation of _____bonding with water.

PART - B

III. Answer **any three** of the following. Each question carries **two** marks.   **3 × 2 = 06**

21. How does theboiling point of solvent varies, when a non-volatile solute is dissolved in it? Give reason.

22. Define order of a reaction. For which order reaction the unit of rate of reaction and rate constant is same?

23. What are chelate ligands? Give an example.

24. Write the general equation for Finkelstein reaction. What is the role of dry acetone in this reaction?

25. Complete the equation and name the reaction:

$$R - \overset{\overset{O}{\|}}{C} - CH_3 \xrightarrow{\text{NaOX}}$$
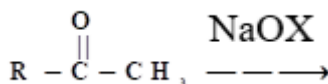
26. Name two hormones which regulate the glucose level in the blood.

PART - C

IV. Answer **any three** of the following. Each question carries **three** marks. 3 × 3 = 09

27. Calculate the spin only magnetic moment of $M^{3+}_{(aq)}$ ion. (Z = 24)

28. Explain the structure of dichromate ion ($Cr_2O_7^{2-}$).

29. What is Lanthanoid contraction? Mention two of its consequences.

30. Write the IUPAC names and the type of isomerism for the following complexes

(a) $[Co(NH_3)_5Br]SO_4$ and   (b) $[Co(NH_3)_5SO_4]Br$.

31. Using Valence Bond Theory [VBT], explain geometry, hybridisation and magnetic property of $[CoF_6]^{-3}$ ion. [Atomic number of Cobalt is 27].

32. Draw the energy level diagram for the crystal field splitting in tetrahedral complexes. Write the relation between Δ_0 and Δ_t for the complexes having same metal, the same ligand and metal-ligand distances.

V. Answer **any two** of the following. Each question carries **three** marks. 2 × 3 = 06
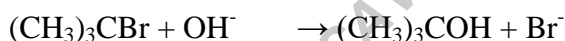
33. Write any three differences between ideal and non-ideal solutions.

34. State Kohlrausch's law of independent migration of ions. Mention two applications of it.

35. Explain the experimental determination of conductance of electrolytic solution by using Wheatstone bridge.

36. Derive integrated rate equation for first order gas phase reaction.

PART - D

**VI.** Answer **any four** of the following. Each question carries **five** marks. 4 × 5 = 20

37. a. Write the mechanism involved in the following reaction:

$$(CH_3)_3CBr + OH^- \rightarrow (CH_3)_3COH + Br^-$$

Identify the reactant on which rate of reaction depends.

b. Define stereocenter? How many asymmetric carbon atoms are there in 2, 3-dichlorobutane?(3+2)

38. a. Identify A, B and C in the following reaction:

$$A + H_2 \xrightarrow{Pd} C_2H_5OH$$

with $\xrightarrow[443k]{H_2SO_4} B$ and $\xrightarrow[413k]{H_2SO_4} C$
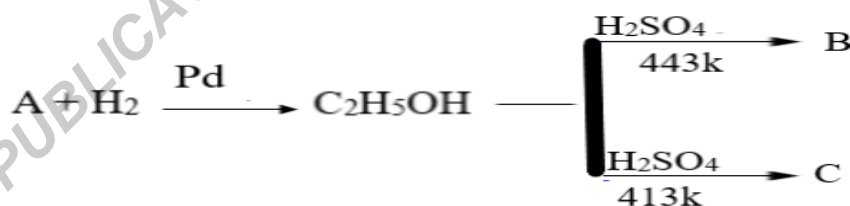
b. Describe the manufacture of methanol from water gas. (3+2)

39. a. An aromatic hydrocarbon 'A' having molecular formula C_9H_{12} is oxidised in the presence of air gives compound 'B'. The compound 'B' is treated with dilute acid gives two organic compounds 'C' and 'D'. The compound 'C' forms white precipitate 'E' with bromine water. Write the chemical reactions with names of A, B, C and E.

b. Give an example for unsymmetrical (mixed) ether. (4+1)

40. a. Write the chemical equation for the reaction when benzaldehyde is slightly heated with acetophenone in the presence of dilute alkali. Give the IUPAC name of the product.

b. Explain Rosenmund reduction with an example.

c. Alpha (α) -Hydrogens of aldehydes and ketones are acidic. Give reason. (2+2+1)

41. a. A Grignard reagent 'X' reacts with CO_2 (dry ice) followed by acid hydrolysis gives ethanoic acid. Write the chemical equation. Namethe compound 'X'?

    b.Between methanoic acid and ethanoic acid, which is more acidic? Give reason.   (3+2)

42. a.Write the chemical name and structure of Hinsberg's reagent. 3°- amines do not react with Hinsberg's reagent. Give reason.

    b.Explain Carbylamine reaction with an example.   (3+2)

43. a.(i)The penta-acetate of glucose does not react with Hydroxylamine. What does it indicate?

    (ii) Write chemical reaction to show the open chain structure of D-glucose which contains six carbon atom the straight chain.

    b. What is Zwitter ion of an amino acid? Give its general structure.

    c. Name the hormone responsible for the hypothyroidism?   (2+2+1)

PART – E (PROBLEMS)

VII. Answer**any three** of the following. Each question carries **three** marks. $3 \times 3 = 09$

44. 100 g of liquid 'A' (molar mass 140 gmol^{-1})was dissolved in 1000 g of liquid 'B' (molar mass 180 gmol^{-1}).The vapour pressure of liquid 'B' was found to be 500 torr. Calculate the vapour pressure of pure liquid 'A' if the total vapor pressure of the solution is 475 torr.

45. The boiling point of benzene is 353.23K. When 1.8g of non-volatile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11K. Calculate the molar mass of the solute. (Given K_b for benzene is 2.53Kkgmol^{-1}).

46. At 298K, the EMF of the cell: Mg(s) |Mg^{2+}(Q)||Ag$^+$(0.01)|Ag(s)is 3.022V. Calculate the value 'Q'. (Given: $E^o_{Mg2+/Mg}$ = -2.37V and $E^o_{Ag+/Ag}$ = 0.80V)

47. The resistance of 0.01M acetic acid solution is found to be 2220Ω, when measured in a cellhas two electrodes of area of cross section 3.85cm^2 placed 10.5cm apart. Calculateconductivity.

48. For a first order reaction, the half-life period is 120 min. Calculate the time required to complete 90% of the reaction.

49. The rate constants of a reaction are 2×10^{-2}s^{-1} at 300K and 8×10^{-2} s^{-1} at 320 K. Calculate the energy of activation of the reaction. (Given: R = 8.314JK^{-1}mol^{-1}).

SUBJECT: *Collection Of Question Papers For POCKET MARKS 70/73*: II PUC

Question Paper Part	Question Type	Number of Questions	Marks
PART - A	MCQ's	15/15	15/15
PART - A	Fill in the blanks	05/05	05/05
PART - B	Short Answer (SA = 02 Marks)	03/06	06/12
PART - C	Short Answer (SA = 03 Marks) Inorganic Chemistry	03/06	09/18
PART - C	Short Answer (SA = 03 Marks) Physical Chemistry	02/04	06/12
PART- D	Long Answer (LA = 05Marks)	04/07	20/35
PART - E	Short Answer (SA = 03Marks) Numerical problems	03/06	09/18
Total		35/49	70/115

WEIGHTAGE

Objectives	Number of Questions	Marks	Percentage
Remember	20	46	40%
Understanding	15	35	30%
Apply	07	19	17%
Hots	07	15	13%
Total	49	115	100%

SUBJECT: CHEMISTRY (34): II PUC
Collection Of Question Papers for POCKET MARKS 70/73

Chapter/ Content domain/Unit/ Theme	Number of hours	Marks	Remember (≈ 40%)				Understand (≈ 30%)				Apply (≈ 15 TO 20%)				HOTS (≈ 10 TO 15%)			
			VSA (01 Mark)	SA (02 Marks)	SA (03 Marks)	LA	VSA (01 Mark)	SA (02 Marks)	SA (03 Marks)	LA	VSA (01 Mark)	SA (02 Marks)	SA (03 Marks)	LA	VSA (01 Mark)	SA (02 Marks)	SA (03 Marks)	LA
Physical Chemistry																		
Solutions	14	13	1	-	1 (T)	-	-	-	-	-	1	1	-	-	-	-	-	1 (NP)
Electrochemistry	14	14	1	-	1 (T)	-	-	-	1 (T)	-	-	-	-	-	1	2 (NP)	-	-
Chemical Kinetics	14	13	1	-	1 (T)	-	1	1	-	-	-	-	1 (NP)	-	-	-	1 (NP)	-
Inorganic Chemistry																		
Coordination Compounds	12	12	-	-	2	-	1	1	-	-	-	-	-	-	-	-	-	-
The d & f - Block Elements	12	11	1	1	1	-	-	-	1	-	-	-	1	-	1	-	-	-
Organic Chemistry																		
Haloalkanes and Haloarenes	10	09	1	-	-	1	1	-	1	1	1	1	-	-	-	-	-	-
Alcohols, Phenols and Ethers	12	12	1	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-
Aldehydes, Ketones and Carboxylic Acids	14	14	1	1	1	-	-	-	-	-	-	-	1	1	-	-	-	-
Amines	08	08	1	-	1	1	-	-	1	1	-	-	-	-	1	-	-	-
Biomolecules	10	09	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
Total Teaching Hours & Marks	120	115	09	04	18	15	07	04	09	15	01	04	09	05	03	03	12	00
			46				35				19				15			
Total Questions		49	09	02	06	03	07	02	03	03	01	02	03	01	03	00	04	00

1. Weightage = Total marks/Number of teaching hours = 115/120 = 0.96 (i.e., 0.96marks for each hour)

2. Choice = out of 49 Questions only 35 Questions are to be answered.

Note: T = Theory;   NP = Numerical Problems; VSA = Very Short Answer (MCQ's and Fill in the Blanks); SA= Short Answer; LA = Long Answer

Collection Of Question Papers For POCKET MARKS 70/70

GENERAL GUIDE LINES:

1. Questions should not be vague and ambiguous. Answers should be available in the prescribed NCERT text book or based on the contents in the prescribed text book.

2. Intermixing of questions of different units is not allowed. 5 marks question may be framed as (3+2) as far as possible.

3. Avoid questions from:

a. Drawings involving 3D diagrams

b. The boxed materials with deep yellow bar in the text book are to bring additional life to the topic and are non-evaluative.

4. Questions on numerical data given in the form of appendix, numbered tables containing experimental data and life history of scientists given in the chapters should be avoided.

5. Frame the questions in such a way to strictly avoid ½ mark evaluation (or avoid value points for ½ marks.).

6. While framing Physical chemistry units (Unit 1, 2 & 3) questions for Part -A, B and C should not be Numerical problems. The Numerical Problems of these Units should be framed only in Part-E. This division is done to make for the students to learn and attempt to solve the Numerical Problems.

7. Application and HOTS (Higher Order Thinking Skills) questions can be selected from any chapter without changing the weightage of the chapter.