PUC II CHEMISTRY

Model Question Papers 2023-24

II – PUC – CHEMISTRY (34)

MODEL QUESTION PAPER - 1

Time: 3 hours 15 minutes **Maximum 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 (problem) 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 ×15 = 15

1. The solubility of a gas increases in a liquid with
   (a) Increase of temperature (b) Reduction of gas pressure
   (c) Decrease in temperature (d) Amount of liquid taken
2. The unit of electrochemical equivalent is
   (a) Gram (b) Gram / Ampere
   (c) Gram/ Coulomb (d) Coulomb / gram
3. In an $H_2 - O_2$ fuel cell,
   (a) The cell reaction is $2H_2O\,(l) \rightarrow 2H_2(g) + O_2(g)$ (b) The cell reaction is $2H_2(g) + O_2(g) \rightarrow 2H_2O\,(l)$
   (c) The cell voltage is 2.0 V (d) Chemical energy is stored
4. In a reversible reaction, the function of the catalyst is
   (a) To increase the rate of the forward reaction
   (b) To influence the forward and backward reactions to the same extent
   (c) To reduce the time required for reaching the equilibrium state
   (d) To alter the velocity of the reaction
5. Which one of the following has the maximum number of unpaired electrons
   (a) Mg^{2+} (b) Ti^{3+} (c) V^{3+} (d) Fe^{2+}
6. Ligands, in complex compounds
   (a) Accept e^--pair (b) Donate e^--pair
   (c) Neither accept e^--pair nor donate (d) All of these happen
7. Conversion of glucose into ethyl alcohol is made by an enzyme
   (a) Zymase (b) Invertase (c) Maltase (d) Diastase

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. In fermentation by zymase, alcohol and CO_2 are obtained from
   (a)Invert sugar (b) Glucose (c)Fructose (d)All
10. Which of the following compound gives a ketone with Grignard reagent
   (a)Formaldehyde (b)Ethyl alcohol (c)Methyl cyanide (d)Methyl iodide
11. Which acid has least pK_a value
   (a) Cl_3CCOOH (b) $Cl_2CHCOOH$ (c) $ClCH_2COOH$ (d) CH_3COOH
12. Amines behave as
   (a)Lewis acids (b)Lewis bases
   (c)Aprotic acids (d)Amphoteric compounds
13. The order of basic strength among the following amines in benzene solution is
   (a) $CH_3NH_2 > (CH_3)_3N > (CH_3)_2NH$ (b) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$
   (c) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$ (d) $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$
14. The purine base present in DNA is
   (a) Adenine (b)Cytosine (c) Uracil (d)Thymine
15. A vitamin which plays a vital role in the coagulating property of blood is
   (a) Vitamin *A* (b)Vitamin *D* (c) Vitamin *E* (d) Vitamin *K*

II. Fill in the blanks by choosing the appropriate word from those given in the brackets: 5 × 1 = 05

(lanthanoid contraction , first, benzene sulphonyl chloride, negative, positive)

16. The type of deviation shown by minimum boiling azeotropes at specific composition towards Raoult's law_____
17. Inversion of cane sugar is example of…..... reaction.
18. Zr and Hf have almost equal atomic and ionic radii due to……
19. ----------derivatives of methane and ethane are called freons.
20. Hinsberg reagent is……

PART-B

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

21. Define Vant Hoff's factor? What is the conclusion drawn when Vant Hoff's factor of a solution is less than one?
22. Write any two differences between order and molecularity of a reaction.
23. What are ambidentate ligands? Give example.
24. How do you prepare alkyl flourides from alkyl chlorides? Write the general reaction.
25. Explain Etard's reaction.
26. What are essential amino acids? Give one example.

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 Fe^{+2} (atomic number 26).
28. Explain the manufacture of Potassium dichromate from chromite ore.
29. a) 3d Transition metals and their compounds are good catalysts. Give two reasons?
    b) Name the metals present in Brass alloy.

30. Using VBT explain, Geometry ,Type of hybridization and magnetic properties of the complex ion $[CoF_6]^{3-}$

31. a) Draw the structures of cis -trans isomers for $[Pt(NH_3)_2.Cl_2]$.
    b) How many ions are produced from the aqueous solution of complex $K_3[Al(C_2O_4)_3]$.

32. A) Draw the energy level diagram for the crystal field splitting in octahedral complexes.
    B) What is spectrochemical series?

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. What is corrosion? Mention two general methods for prevention of corrosion.
36. Derive integrated rate equation for first order gas reaction.

Part- D

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

37. i) Write the equations for the steps in SNI mechanism of the conversion of tert-butyl bromide into tert-butyl alcohol.
    ii) Explain Wurtz-Fittig's reaction.

38. i) Write the three steps involved in the mechanism of acid catalyzed dehydration of ethanol to ethane.
    ii) What is Lucas reagent? Which class of alcohols does not readily form turbidity with Lucas reagent?

39. I) Explain the preparation of phenol from cumene.
    ii) Explain Williamson's ether synthesis.

40. i) How benzene is converted into benzaldehyde by Gatterman- Koch reaction? Write equation.
    ii) Write the IUPAC name of CH_2=CH-CHO
    iii) Explain Cannizzaro's reaction with an example.

41. i) Among formic acid and acetic acid, which is weaker acid and why?
    ii) Explain Hell-Volhard –Zelinsky reaction. Give equation.
    iii) What is Formalin solution?

42. i) Explain Hoffmann bromamide degradation for the preparation of Aniline.
    ii) How do you convert a diazonium salt solution into iodobenzene? Give equation.
    iii) Why aromatic primary amines cannot be prepared by Garbriel synthesis?

43. a) Write Haworth's structure for maltose.
    b) What is meant by denaturation of protein? Which level of structure remains intact during denaturation of globular protein?
    c) Name the base present only in DNA but not in RNA.

PART – E (PROBLEMS)

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

44. 5.8g of a non volatile solute was dissolved in100g of carbon disulphide(CS_2). The vapour pressure of the solution was found to be 190 mm.of Hg. Calculate the molar mass of the solute given the vapour pressure of pure CS_2 is 195 mm.of Hg. [Molar mass of CS_2= 76 $gmol^{-1}$]

45. 300 cm^3 of an aqueous solution of a protein contains 2.12 g of the protein, the osmotic pressure of such a solution at 300K is found to be 3.89 x 10^{-3} bar. Calculate the molar mass of the protein. (R= 0.0823 L bar mol^{-1} K^{-1}.)

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

$Mg(s) + 2Ag^+(aq) \longrightarrow Mg^{2+}(aq) + 2\,Ag(s)$ Given: $E^o(Mg^{2+}/\,Mg) = -2.37$ V

$E^o(Ag^+/Ag)=0.80$ V, $[Mg^{2+}]=0.001$ M;$[Ag^+]=0.0001$M ,Log $10^5=5$

47. The resistance of 0.01M acetic acid solution is found to be 2220Ω, when measured in a cell has two electrodes of area of cross section 3.85cm^2 placed 10.5cm apart. Calculate conductivity.
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 of reaction increases by 2 times when the temperature of the reaction raised from 300K to 310K. Calculate the energy of activation of the reaction. [Given: R=8.314JK-1 mol-1]

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Class : II Year PUC
Subject : Chemistry(34)
Time : 3.15hours

II – PUC – CHEMISTRY (34)
MODEL QUESTION PAPER - 2

Academic Year: 2023-24
Maximum Marks:70
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 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 1X15=15

1) Following is an example for solid solution
   a) Camphor in nitrogen b) Glucose dissolved in water
   c) Copper dissolved in gold d) Ethanol dissolved in water
2) The value of vant hoff factor "I" for K_3 [Fe SO_4 $(CN)_4$] at infinite dilution is
   a) 4 b) 3 c) 7 d) 5
3) The cell used for the determination of pH of solutions is
   a) Dry cell c) Electrolytic cell
   c) Electrochemical cell d) Half Cell
4) For a reaction the rate law expression is $R = K[A]^{\frac{3}{2}}[B]^{-1}$ the order of the reaction is
   a) $\frac{3}{2}$ b) $\frac{1}{2}$ c) $\frac{5}{2}$ d) 1
5) Which of the following ion exhibit colour in aqueous solution
   a) Sc^{3+} b) Zn^{2+} c) Ti^{4+} d) Cu^{2+}
6) The coordination number of Co in $[Co(en)_3]CI_3$ is
   a) 3 b) 6 c) 2 c) 0
7) R-X + NaI $\xrightarrow{\text{dry acetone}}$ R-I+ NaX This reaction is known as
   a) Fittig reaction b) Swarts reaction
   c) Finkelstein reaction d) Wurtz reaction
8) The reducing agent used in the reduction of carboxylic acids to primary alcohols in excellent yield is
   a) H2/Pd b) $NaBH_4$ c) H_2/Ni d) $LiAIH_4$
9) IUPAC name of C_6H_5-O-CH_3
   a) Anisole b) Methoxy benzene c) Methyl phenyl ether d) Phenoxy methane
10) The oxidising agent used in Etards reaction
   a) CrO_2CI_2 b) CrO_3 c) $KMnO_4/H_2SO_4$ d) $K_2Cr_2O_7/H_2SO_4$
11) On heating benzoic acid with ammonia the major product formed is

a) Benzene b) Benzaldehyde c) Benzamide d) Benzamine

12) IUPAC name of $(CH_3)_3$ N is
a) Trimethyl amine b) N-Methyl amine
c) Methanamine d) N,N-Dimethyl methanamine

13) p-hydroxy azo benzene is prepared by the coupling reaction of phenol with
a) Benzoic acid b) Benzene diazonium chloride
c) Chloro benzene d) Aniline

14) Following is water soluble vitamin
a) Vitamin B b) Vitamin A c) Vitamin D d) Vitamin K

15) The nitrogen base not present in DNA is
a) Adenine b) Uracil c) Thymine d) Guanine

II. Fill in the blanks by choosing the appropriate word from those given in the brackets.1X5=5
(Promethium, Molality, Molarity, Phosgene, Collision frequency, ammonolysis.)

16) The concentration term which is independent of temperature is _____

17) Number of collisions per second per unit volume of the reaction mixture is called_____

18) Radioactive element of lanthanoids is _____

19) _____poisonous gas is obtained by slow oxidation of chloroform in the presence of heat and air

20) The process of cleavage of C-X bond by ammonia molecule is known as_____

PART - B

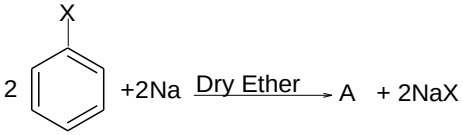
III. Answer any three of the following Each question carries two marks 3X2=6

21) What happens to the solubility of a gas in water with increase in temperature ? Give reason.

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

23) Write the cis and trans isomers of $[Co(NH_3)_4CI_2]$

24) Write the product A and name the reaction.



25) Explain Hell – Volhard - Zelinsky reaction with equation.

26) Write the Haworth structure of Maltose.

PART - C

IV. Answer any three of the following Each question carries three marks. 3X2=9

27) a) Calculate the spin only magnetic moment of Cu^{2+} ion.
b) Name the element of 3d series which exhibit highest oxidation state

28) Explain the manufacture of potassium dichromate from chomite ore with equations

29) What is lanthanoid contraction ? Mention any two consequences of it.

30) Write any three postulates of Werner's theory of coordination compounds

31) Using VBT account for the hybridization, geometry and magnetic properties of $[Co(NH_3)_6]^{3+}$ ion

32) a) What are homoleptic complexes ? Give example
b) Write the IUPAC name of $[Co(en)_3]\ CI_3$

V. Answer any two of the following Each question carries three marks 2X3=6

33) a) State Henry's law write its mathematical expression
b) Give an example for non ideal solution with positive deviation from Raoult's law

34) a) State i) Faradays first law ii) Kohlrausch law
b) Draw a neat labelled diagram of H_2-O_2 fuel cell

35) Draw a neat labelled diagram of SHE write its half cell reaction and what is its potential.

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) Write equations for the steps in SN1 mechanism of conversion of tert-Butyl bromide to tert-Butyl alcohol

b) Explain Swarts reaction with an example

c) What is chirality ?

38) a) Explain the mechanism of dehydration of ethanol to ethene

b) How does phenol reacts with concentrated nitric acid ? Give equation.

39) a) Explain Kolbe's reaction

b) How do you prepare methoxyethane by Williamson ether synthesis ? Write equation

c) What is Lucas reagent ?

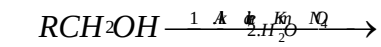
40) a) How is benzoyl chloride converted into benzaldehyde ? Write equation and name the reaction

b) How does propanone reacts with hydrazine ? Give equation.

41) a) Explain esterification reaction with equation

b) Among methanoic acid and ethanoic acid which is more acidic ? Give reason

c) Complete the following chemical reaction



42) a) Explain Hoffmann bromamide degredation reaction for the preparation of methanamine

b) Explain carbylamine reaction with equation

c) Among aniline and p-Nitroaniline which is more basic

43) a) What are non essential amino acids ?

i) Name naturally occurig α – amino acid which is not optically active.

b) Write chemical reactions to show glucose

i) Contains Six carbon atoms in straight chain

ii) Five – OH groups

c) Name the hormone which regulates the sugar level of blood.

PART – E (PROBLEMS)

VII Answer any three of the following. Each question carries three marks 3X3=9

44) On dissolving 3.46 g of a non volatile solute in 100 g of water, the boling point of solution was raised to that of pure water by 0.12 K calculate the molar mass of non-volatile solute [K_b for water = 0.51 KKg mol^{-1}]

45) Calculate the asmotic pressure in pascals exerted by a solution prepared by dissolving 1.0 g of polymer of molar mass 185000 in 450 mL of water at 37^0C [R=0.0821 L atm K^{-1} mol^{-1}]

46) Calculate the standard free energy change at 25^0C for the following electrochemical cell

$Cu(s) \mid Cu^{2+}(aq) \parallel Ag^{+}(aq) \mid Ag(s)$ [Given E^0_{Cu} = 0.34v and E^0_{Ag} = 0.80V]

47) A column of length 50 cm and area of cross section 0.785 cm^2 is filled with 0.05 M NaOH solution. The resistance of the column is found to be $5.55X10^3$ ohm. calculate the molar conductivity of the solution.

48) A first order reaction is 75% completed in 30 minutes calculate its half life period [log 4 = 0.6021]

49) The rate of a particular reaction doubles when the temperature changes from 25^0C to 35^0C. Calculate the energy of activation of the reaction [Given : R = 8.314 JK^{-1} mol^{-1},log2=0.3010]

Class : II Year PUC
Subject : Chemistry(34)
Time : 3.15hours

II – PUC – CHEMISTRY (34)
MODEL QUESTION PAPER - 3

Academic Year: 2023-24
Maximum Marks:70
Number of questions: 49

PART - A

I. Select the correct option from the given choices 1X15=15

1) Two solutions that have the same osmotic pressure at a particular temperature are called
   a) Hypertonic solutions b) Isotonic solutions
   c) Hypotonic solutions d) Binary solutions

2) When molar conductivity of an electrolyte is plotted with the $\sqrt{c}$ the non-linear plot is obtained in case of
   a) KCl b) CH_3 COOH c) NaCl d) CH_3 COONa

3) During rusting iron is
   a) Reduced c) Oxidised c) Hydrated d) Dissolved in water

4) If the plot of $ln[R]$ *Versus time* is a straight line for a reaction of, $R \longrightarrow Products$ the reaction is of the
   a) Second order b) Third order c) First order d) Zero order

5) Due to the lanthanoid contraction which of the following pairs of elements have similar size ?
   a) Zr&Y b) Zr&Hf c) Zr&Zn d) Zr&Nb

6) $[Co(NH_3)_5SO_4]Br$ *and* $[Co(NH_3)_5Br]SO_4$ exhibit
   a) Ionisation isomerism b) Linkage isomerism
   c) Coordination isomerism d) Solvate isomerism

7) The reaction $R-Cl+NaI \xrightarrow{Dry\ Acetone} R-I+NaCl$ is Known as
   a) Wurtz reaction b) Fittig reaction c) Finkelstein reaction d)Kolbe's reaction

8) Most acidic compound among the following is
   a) p-nitrophenol b) p-cresol c) Phenol d) m-Nitrophenol

9) A better reagent to oxidise primary alcohols into aldehyde is
   a) PCC b) Alk.$KMnO_4$ c) Acidified $K_2Cr_2O_7$ d) CrO_3

10) The formation of cyanohydrin from a ketone is an example of
   a) Electrophilic substitution reaction b) Nucleophilic addition reaction
   c) Electrophilic addition reaction d) Nucleophilic substitution reaction

11) The reagent which can used for the conversion of $CH_3COOH \longrightarrow CH_3CH_2-OH$ is
   a) $LiAlH_4$/ether b) H_2,Pt c) $NaBH_4$ d) Na & C_2H_5 OH

12) The correct order of increasing basic nature for the bases NH_3, NH_3NH_2 & $(CH_3)_2$ NH in aqueous solutions
   a) $NH_3 < CH_3NH_2 < (CH_3)_2$ NH b) $(CH_3)_2$ NH < NH_3 < CH_3 NH_2
   c) $CH_3NH_2 < NH_3 < (CH_3)_2$ NH d) $CH_3NH_2 < (CH_3)_2$ NH < NH_3

13) Hinsbergs reagent is
   a) $C_6H_5SO_2$ Cl b) $C_6H_5SO_2$ NH_2 c) CH_3 COCl/Pyridine d) $(CH_3CO)_2O$/Pyridine

14) Which of the following bases is not present in DNA ?
   a) Adenine b) Guanine c) Cytosine d) Uracil

15) Water soluble vitamin is
   a) B b) A c) D d) E

II. Fill in the blanks by choosing the appropriate word from those given in the brackets. 1X5=5
(Enantiomers, Potassium Permanganate, ethylalcohol , zero, Potassium manganate, azeotropes.)

16) _____are the constant boiling binary mixtures having same composition in liquid & vapour phase.
17) The rate constant of a reaction is $3.64x10^{-3}$ mol L^{-1} S^{-1}, its order of reaction is _____
18) Manganese exhibits the maximum oxidation state in _____
19) An equimolar mixture of _____is racemic mixture
20) _____is formed when ethylamine reacts with nitrous acid.

PART - B

III. Answer any three of the following. Each question carries two marks 2X3=6

21) State Henry's law write its mathematical form
22) What is pseudo-first order reaction ? Give an example
23) Write IUAC names of following i) $[Cr(NH_3)_3 (H_2O)_3]Cl_3$ ii) $K_3[Cr(C_2O_4)_3]$
24) Explain wurtz-fittig reaction with an example
25) How does benzene reacts with acetyl chloride in the presence of anhydrous $AlCl_3$? Give equation.
26) Write the Haworth structure of maltose

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) Calculate the magnetic moment of Mn^{2+}ion (Atomic No of Mn=25)
    b) Cu^{2+} Salt solutions are colored give reason
29) a) Give any two difference between lanthanoids & Actinoids
    b) Actionids show variable oxidation state. Give reason
30) State any three postulates of Werner theory of coordination compounds
31) Using valence bond theory account for the hybridization geometry & magnetic property of $[Ni(CN)4]^{2-}$ (Atomic No of Ni=28)
32) a) What are heteroleptic complexes ? Give an example
    b) If $\Delta_o < P$, on the basis of crystal field theory write the electronic configuration of d^4-ion in octahedral complexes

V. Answer any two of the following. Each question carries three marks 3X2=6

33) a) What is reverse osmosis ? Mention its one practical utility
    b) Define the term molarity
34) Draw labeled diagram of Standard Hydrogen Electrode (SHE) write its half cell reaction & E^0 Value
35) a) Write the cathodic & anodic cell reaction of H_2 - O_2 Fuel cell
    b) How many Faradays of electricity required for the reaction $MnO_4^- \longrightarrow Mn^{2+}$
36) Derive the integrated rate equation for a first order reaction.

PART - D

VI. Answer any four of the following. Each question carries five marks 5X4=20

37) a) Explain S_N2 mechanism taking an example of chloromethane
    b) Haloarenes are less reactive towards nucleophilic substitution reaction then haloalkanes. Give reason
    c) What is chirality

38) a) Write the mechanism of acid catalysed dehydration of ethanol to ethene
b) Explain Kolbe's reaction

39) a) How is phenol manufactured from cumene
b) How anisole reacts with acetyl chloride in the presence of anhydrous $AlCI_3$? Write the chemical equation for the reaction
c) What is Lucas reagent?

40) a) Explain rosenmund's reduction of benzoyl chloride
b) Explain cannizzaro reaction with an example
c) Write the IUPAC Name of $CH_3COCH_2CH_2CH_3$

41) a) How carboxylic acids prepared from Grignard reagent ?
b) How do you convert benzoic acid to benzamide ? Write the equation.
c) What is the effect of electron withdrawing group on the acidity of carboxylic acids

42) a) How is methanamine prepared by Hoffmann bromamide degradation reaction ? Give equation
b) Explain carbylamine reaction with example
c) Between ammonia & aniline, which is more basic

43) a) What are essential amino acids ? Give an example
b) i) Which vitamin deficiency causes the disease scurvy
ii) Name a naturally occurring α-amino acid which is optically inactive
iii) Name the pentose sugar present in RNA molecule

PART – E (PROBLEMS)

VII Answer any three of the following. Each question carries three marks 3X3=9

44) Vapour pressure of chloroform ($CHCI_3$) & dichloromethane ($CH_2\ CI_2$) at 298K are 200 mm Hg & 415 mm Hg respectively Calculate vapour pressure of the solution prepared by mixing 25.5g of $CHCI_3$ & 40g $CH_2\ Cl_2$ at 298 k

45) 1.00g of a non-electrolyte solute dissolved in 50g of benzene lowered the freezing point of benzene by 0.40K the freezing point depression constant of benzene is 5.12K kg mol^{-1}. Find the molar mass of the solute

46) Calculate the EMF of the cell for the reaction $Mg_{(s)} + 2Ag^{+}_{(0.0001M)} \longrightarrow Mg^{2+}_{(0.001M)} + 2Ag_{(s)}$
Given $E^0_{Mg^{2+}/Mg} = -2.37\ V$ $E^0_{Ag^{+}/Ag} = -0.80V$

47) Resistance of a conductivity cell filled with 0.02M KCl solution is 520 Ω. Calculate the conductivity & molar conductivity of that solution [cell constant of the cell = 1.29 cm^{-1}]

48) A first order reaction takes 40 min for 30% decomposition calculate half-life of the reaction.

49) The rate of reaction increases by 2 times when the temperature of the reaction raised from 300 K to 310 K. calculate the energy of activation of the reaction [Given R=8.314J/K/mol]

II – PUC – CHEMISTRY (34)

TIME:3Hours 15 minutes **MODEL QUESTION PAPER - 4** SUBJECT: **CHEMISTRY (34)**

MARKS:70

PART-A

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

1. Van't Haff factor (i) for aqueons solution of electrolytes is :

a) Zero b) greater than 1, c) Less than 1 d) depends on nature of electrolytes

2. The Number of Faradays required to reduce one mole of Cu^{+2} to metallic copper is

a) One b) Two c) Three d) Four

3. Cell constant has unit

a) cm b)cm^{-1} c) cm^2 d) cm sec^{-1}

4. Decomposition of NH_3 on the Surface of tungsten is a reaction of

a) Zero order b) First order c) Second order d) fractional order

5. Which of the following ions are colored?

a) cu^+ b) Zn^{+2} c) Ti^{4+} d) V^{+3}

6. The number of Cl_2 atoms acting as ligands in the complex is $\left[\left[Co\left(H_2O\right)Cl\left(en\right)_2\right]\right]Cl_2$

a) 1 b) 2 c)3 d) None of these

7. The reaction $R-CH_2-Cl+NaI \xrightarrow{Acetone} R-CH_2-I+Nacl$ is called

a) Wurtz reaction b) Kolb reaction c) Finkelstin reaction d) Gatterman reaction

8. Picric acid is

a) trinitrotoluene b) trinitrobenzene c) 2,4,6-trinitrophenol d)1,3,4- trinitriphenol

9. The product Z in the following Sequence of reaction $C_2H_5-I \xrightarrow[aq.KOH]{} X \xrightarrow[Na]{} Y \xrightarrow[C\ H\ Br]{2,5} Z$

a) Butane b) Mixed Ether c) diethyl ether d) Propane

10. Tollen's reagent is

a) silver nitrate Solution b) ammoniacal silver nitrate Solution

c) ammonium nitrate Solution d) Silver Chloride Solution

11. Carboxylic acids exists in dimeric form even in vapors phase due to

a) Hydrogen bond b) Peptide bond c) Ionic bond d) Metallic bond

12. The state of hybridization of nitrogen atom in amines is

a) sp^2 b) sp^3 c) sp d) dsp^2

13. Among the following compounds NH_3, CH_3NH_2 , $C_6H_5NH_2$ & $C_2H_5NH_2$ the least basic compound is

a) NH_3 b) CH_3NH_2 c) $C_2H_5NH_2$ d) $C_6H_5NH_2$

14. Thiamine is a chemical name of

a) Vitamin A b) Vitamin B_1 c) Vitamin C d) Vitamin K

15. The polysacoharide used in manufacture of paper is

a) cellulose b) starch c) glucose d) sucrose

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

(Catalyst,CH_3Cl, Zinc, molality, less, normality, Cadmium)

16. _____does not affected by change in the temperature.

17. _____alters rate of reaction.

18. The non transitional metal present in brass is _____.

19. _____is polyhalogen compound.

20. Aniline is _____basic than methylamine.

PART -B

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

21. How does the boiling point of solvent varies when non volatile solute is dissolved in it ?Give reason

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

23. What are the chelate ligands? Give an example

24. How do you prepare Grignard reagent using alkylhalide?

25. Write the chemical reaction involved in conversion of formaldehyde to formaldoxime.

26. Name the hormones which regulates the glucose levels 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

a) M^{3+}ion (Z=24)
[2]

b) Transition metal ions exhibit catalytic activity, Give reason.
[1]

28. a) How does the acidified $KMnO_4$ oxidises KI ? Give equation
[2]

b) Among Cu^{+2}& Zn^{+2} Which is diamagnetic? [1]

29. Give reason

a) Actinoid exhibit a greater range of oxidation states . [1]

b) Zr & Hf have the almost identical atomic radii. [1]

c) Actinoid contraction is greater from element to element then Lanthanoid contraction. [1]

30. Write the IUPAC names and the type of isomarism for the following complexes [3]

a) $[Co(NH_3)_5Br]SO_4$ b) $[Co(NH_3)_5SO_4]Br$

31. Using VBT explain geometry, hybridision & magnetic property of $[Ni(CN)_4]^{2-}$ [3]

27. a) Draw the enery level diagram to show ‘d’ orbital splitting in an octahydral crystal field.

b) Which type of isomerism arises in coordination Compound containing ambidentate ligand?

PART-D

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

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

b) What are ideal solutions? [1]

34. Write the symbolic representation,half cell reaction & electrode potential of standard hydrogen electrode. [3]

35. Explain experimental determination of conductance of electrolytic solution by using wheatstone bridge.[3]

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

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

37.a) Write SN_2 mechanism for conversion of methyl chloride to methyl alcohol. [2]

b) Explain wurtz- fittigs reaction.[2]

c) What are freons.[1]

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

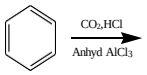
b) What is lucas reagent? Which class of alcohols does not produce turbidity with it at room temp.[2]

39. a) How is phenol manufactured by cumene process ?[3]

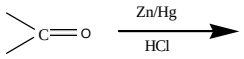
b) How does anisole reacts with bromine in ethanoic acid? Give equation. [2]

40. Complete the reaction

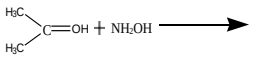
a) [1]



b) [1]



c) [1]



b)Explain aldol condensation with an example . [2]

41. a) How is carboxylic acid prepared from Grignard reagent? Write general equation. [2]

b) Explain esterification reaction and write the equation.[2]

c) Name one decarboxylating agent. [1]

42. a) Write the chemical name and structure of Hinsberg's reagent. 3°amines does not react with Hinsberg's reagent. Give reason [3]

b) Explain carbyl amine reaction with an example.[2]

43. a) Write Hawerth structure of sucrose. [2]

b) Name two components of starch. [2]

c) which nucleic acid contains the base uracil. [1]

PART-E (PROBLEMS)

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

44. The boling point of benzene is 353.23K, when 1.8 g of non-volatile solute was dissolved in 90g of benzene. The boling point is raised to 354.11K.Calculate the molar mass of the solute. (Given Kb for benzene is 2.53K kg $mole^{-1}$)

45. 100g of liquid A(molar mass 140g $mole^{-1}$)was dissolved in 1000g of liquid B (molar mass180g $mole^{-1}$). 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. The resistance of 0.01M acetic acid solution is found to be 2220 Ω . When measured in a cell has two electrodes of area of cross section 3.85 cm^2 placed 10.5 cm apart. Calculate conductivity.

47 Calculate the standard Gibbs energy(ΔG°)for the reaction at 298K

$Zn_{(s)}+2Ag^{+}_{(aq)} \rightarrow 2Ag_{(s)}+Zn^{2+}_{(aq)}$

[Given $E^{\circ}Zn^{2+}$ / Zn = -0.76 V , $E^{\circ}Ag^{+}$/ Ag = +0.8 V, F=96500 $Cmole^{-1}$]

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

49. The rate constance of the reaction are $2x10^{-2}$ sec^{-1} at 300K& $8x10^{-2}$ sec^{-1} at 320K. Calculate the energy of activation of the reaction (Given R=8.314 JK^{-1} $mole^{-1}$)

Academic Year: 2023-24 **II – PUC – CHEMISTRY (34)** **Maximum Marks:70**

Time: 3.15hours **MODEL QUESTION PAPER - 5** **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 answerwill 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 ×15 = 15**

1. The depression of freezing point is directly proportional to
a) Molality b) Molarity c) mass percentage d) mole fraction

2. In the salt bridge KCl is used because……..
a) KCl is an electrolyte b) K^+ & Cl^- have same mobility
c) K^+ & Cl^- isoelectronic d) Agar agar forms good jelly with KCl

3. How much charge is required for the reduction of 1 mol of $Cr_2O_7^{2-}$ toCr^{3+} ?
a) 5F b) 6F c) 3F d) 4F

4. The value of rate constant of a pseudo-first-order reaction
a) Depends only on temperature
b) Depends on the concentration of reactants present in small amounts
c) Depends on the concentration of reactants present in excess
d) Is independent of the concentration

5. Because of lanthanoid contraction, which of the following pairs of elements have nearly same atomic radii?
a) Zr (40) & Nb (41) b) Zr (40) and Hf (72)
c) Zr (40) and Ta (73) d) Zr (40) and Ti (22)

6. Metal present in chlorophyll is
a) Zinc b) Magnesium c) Calcium d) Sodium

7. Conversion of Chlorobenzene to diphenyl is possible by
a) Friedel-Craft's reaction b) Wurtz reaction
c) Wurtz-Fittig's reaction d) Fittig reaction

8. The IUPAC name of wood spirit is…….
a) Methanol b) Ethanol c) Methanal d) Ethanal

9. Heating phenol with Con. HNO_3 produces

a) o-nitrophenol b) p-nitrophenol

c) o & p nitrophenol d) picric acid

10. Lower members of aliphatic carboxylic acid are soluble in water. This is due to

a) Formation of hydrogen bonds with water.

b) Van der-Waals interaction with water molecules

c) Water is non-electrolyte

d) Due to London forces

11. The formation of cyanohydrins from a ketone is an example of

a) Nucleophilic substitution b) Nucleophilic addition

c) Electrophilic addition d) Electrophilic substitution

12. The amine which cannot be prepared by Gabriel phthalimide synthesis

a) Methanamine b) Ethanamine c) Aniline d) Propanamine

13. The product formed when aniline is treated with $NaNO_2$ and dry HCl (nitrous acid) at 273-278k is

a) Nitrobenzene b) Ethyl benzene

c) Benzene diazonium chloride d) phenol

14. Which of the following bases is not present in DNA?

a) Adenine b) Guanine c) Cytosine d) Uracil

15. Animal starch is the name for

a) Glycogen b) Lactogens c) Cellulose d) Maltose

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

(Collision frequency, Halothane, Weaker, Transition elements, Endothermic) 5 × 1 = 05

16. The process of dissolution of gas in liquid is ……..

17. The number of collision per second per unit volume of the reaction mixture is known as……..

18. Zn element regarded as…….

19. ..... is used as an anesthetic during surgery.

20. Aniline is… ..... base than ammonia.

PART - B

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

21. Write the two differences between the positive and negative deviation of non-ideal solution.

22. Write the energy distribution curve showing temperature dependence of rate of reaction.

23. What are the chelates? Give one example.

24. Explain Friedel crafts alkylation reaction.

25. How to convert acetaldehyde into crotonaldehyde? And give the name of the reaction.

26. Write the Haworth structure of Sucrose.

PART - C

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

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

28. Define lanthanoid contraction. Write any two consequences.

29. a) Transition metals are good catalysts. Give reasons

b) What is Mischmetal? Write its composition.

30. a) Write the any two postulates of Werner's theory of coordination compounds.
    b) Write the IUPAC name of the compound $K_3[Fe(C_2O_4)]$
31. Using VBT explain the geometry, hybridization and magnetic property of $[Ni(CN)_4]^{-2}$.
32. a) Draw the energy profile diagram of crystal field splitting in octahedral complexes.
    b) Define linkage isomerism.

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

33. a) State Henry's law. Give its mathematical expression.
    b) What is reverse osmosis?
34. Draw the diagram and explain the SHE. Write electrode reactions and mention its potential.
35. What is secondary battery? Explain lead storage battery with reaction.
36. Derive an integrated rate equation for rate constant of a zero order reaction.

PART - D

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

37. a) Explain the S_N1 mechanism using t-butyl bromide.
    b) Name the organic compounds formed when ethyl bromide reacts with the following reagents,
    i) Alcoholic KNO_2 ii) Alcoholic AgCN
38. a) Explain the mechanism of acid catalyzed dehydration of ethanol into ethane.
    b) How do you prepare salicylaldehyde using phenol.
39. a) Explain Kolbe's reaction.
    b) Among alcohols and phenols which one is more acidic? Give reason.
    c) Give the general reaction for Williamson's ether synthesis.
40. a) Explain the mechanism of addition of HCN to carbonyl group of aldehyde in presence of strong base.
    b) What is clemmenson's reduction reaction?
41. a) Explain HVZ reaction with an example
    b) How benzamide obtained from benzoic acid?
    c) what is Stephen's reaction?
42. a) Explain Hoffmann bromamide degradation reaction with example.
    b) How to distinguish 1^0, 2^0, and 3^0 amines by using Hinsberg's reagent.
    c) Between ammonia and aniline which is more basic?
43. a) How do you show that glucose contain carbonyl group?
    b) What is zwitter ion? Give an example
    c) Mention the disease caused by deficiency of vitamin K.

PART – E (PROBLEMS)

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

44. 31g of an unknown molecular material is dissolved in 500g of water. The resulting solution freezes at 271.14k. Calculate the molar mass of the material.
    Given: K_f for water = 1.86kkgmol^{-1} T_f^0 of water = 273K.
45. 300 ml of an aqueous solution of protein contains 2.12 g of a protein. The osmotic pressure of such a solution a 300 k is found to be 3.89×10^{-3} bar. Calculate the molar mass of protein. $(R = 0.0823\ L\ bar\ mol^{-1}\ k^{-1})$
46. Calculate the EMF of the cell in which the following reaction takes place
    $Ni(s) + 2Ag^+\ (0.002M) \rightarrow Ni^{2+}\ (0.160M) + 2Ag\ (s)$ (Given, $E^-_{cell} = 1.05\ V$)
47. The standard electrode potential for Daniel cell is 1.1 V. $Zn(s)|\ Cu^{2+}(aq)||\ Cu(s)|Zn^{2+}(aq)$
    Write overall cell reaction and the standard Gibb's energy for the reaction. [F= 96487 c/mol]

48. The decomposition of A into products has value of k as $4.5 \times 10^3\ s^{-1}$ at 10 ℃ and energy of activation $60\ kjmol^{-1}$. At what temperature would k be $1.5 \times 10^4\ s^{-1}$?

49. The following data for the first order decomposition of N_2O_5 at constant volume are,

Time / s	Total pressure
0	**0.5**
100	**0.512**

Calculate rate constant.

II – PUC – CHEMISTRY (34)

TIME:3Hours 15 minutes **MODEL QUESTION PAPER - 6** MARKS:70

Instructions:

1) The question paper has five parts. All parts are compulsory.
2) a) Part –Acarries20 marks .Each question carries 1mark
   b) Part-Bcarries06 marks. Each question carries 2marks
   c) Part-Ccarries15 marks. Each question carries 3marks
   d) Part –Dcarries20 marks. Each questioncarries5marks
   e) Part-E carries 09 marks. Each question(problem) carries 3marks
3) In Part A questions, First Attempted Answer will be considered for awarding marks.
4) Write balanced chemical questions 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 ×15 = 15**

1. Which among the following is a colligative property?
a) Osmosis **b) Osmotic pressure** **c) Optical activity** **d) boiling point**

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

3. Molar conductivity of a solution increses with
a) Decrease in concentration b)Increase in concentration
c) Decrease or Increase in concentration d) molar conductivity

4. Thermal decomposition of HI on gold surface is example of
a) Zero order b) First order c) Second order d) half order

5. Which of the following ions are colored?
a) Cu^+ b) Zn^{+2} c) Ti^{4+} d) V^{+3}

6. The number of Cl_2 atoms acting as ligands in the complex is$[Co(H_2o)cl(en)_2]cl_2$
a) 1 b) 2 c)3 d) None of these

7. The reaction $R-CH_2-Cl+NaI \xrightarrow{Acetone} R-CH_2-I+Nacl$ **is called**
a) Wurtz reaction b) Kolbes reaction c) Finkelstien reaction d) Gatterman reaction

8. The most acidic among the following is
a) Phenol b) p-cresol c) p-nitro phenol d)Picric acid

9. The product Z in the following Sequence of reaction $C_2H_5-I \xrightarrow[aq.KOH]{} X \xrightarrow[Na]{} Y \xrightarrow[C_2H_5Br]{} Z$
a) Butane b) Mixed Ether c) diethyl ether d) Propane

10. Ammoniacal silver nitrate Solution
a) Fehling's reagent b)Schiff's reagent
c)Tollen's reagent d)Benidict's reagent

11. Carboxylic acids are obtained by treating Griganard reagent with
a) Ice b) Water c) CO_2 gas d)dry ice

12. Carbylamine reaction is answered by _____
a) Phenols b) Aldehydes c) 1^0amine d) 2^0amine

13. Among the following compounds NH_3 , CH_3NH_2 , $C_6H_5NH_2$& $C_2H_5NH_2$ the least basic compound is

a) NH_3 b) CH_3NH_2 c) $C_2H_5NH_2$ d) $C_6H_5NH_2$

14. The number of peptide bonds in tetra peptide is _____

a) 2 b) 3 c) 4 d) 5

15. Cellulose is a polymer of

a) Glucose b) fructose c) ribose d) sucrose

II. Fillintheblanksbychoosingtheappropriatewordfromthosegiveninthebrackets: 5 × 1 = 5

(Variable oxidation state,Grignard reagent, molality, less, Azeotropes, Concentration)

16. A liquid mixture which boils at constant temperature without undergoing any change in the composition is called _____.

17. In zero order reaction ,the rate is independent on _____of reactant.

18. Transitional metal show _____.

19. The common name of alkyl magnesium halide is _____.

20. Aniline is _____basic than methylamine.

PART -B

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

21. State raoult's law of relative lowering of vapour pressure. Write its mathematical form.

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

23. What is chelating agent? Give an example.

24. How do you prepare Grignard reagent using alkylhalide?

25. Explain Clemmensen reduction reaction.

26. Name the hormones which regulate the glucose levels in the blood.

PART -C

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

27. i. Give reason transition metals and their many compounds act as good catalysts. [2]

ii. Between Sc^{3+} and Cu^{2+} ions, which is colorless? [1]

28. a) How does the acidified $KMnO_4$ oxidises KI ? Give equation [2]

b) Among Cu^{+2}& Zn^{+2} Which is diamagnetic? [1]

29. Give reason

a) Actinoid exhibit a greater range of oxidation states . [1]

b) Zr & Hf have the almost identical atomic radii. [1]

c) Actinoid contraction is greater from element to element then Lanthanoid contraction. [1]

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

b) Give the facial (fac) and meridional (mer) isomeric structures of $[Co(NH_3)_3(NO_2)_3]$. [3]

31. Using VBT explain geometry, hybridision & magnetic property of $[Ni(CN)_4]^{2-}$ [3]

32. Write the postulates of Werner's theory of co-ordination compounds. [3]

PART-D

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

33. a)State Henry's law and mention its two important applications. [3]

34. i. State Faradays first law of electrolysis.

ii.What is limiting molar conductivity? Draw a graph of λm v/ s $\sqrt{c}$ for Acetic acid (weak electrolyte) solution. [3]

35. Explain the construction and working principle of Daniel cell . [3]

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

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

37. a) Write SN**1**mechanism for conversion trt.butyl bromide into ter.butyl alcohol. [3]

b) Explain wurtz- fittigs reaction. [2]

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

b) What is lucas reagent? Which class of alcohols does not produce turbidity with it at room temp? [2]

39.a) How is phenol manufactured by cumene process? [3]

b) How does anisole reacts with bromine in ethanoic acid? Give equation. [2]

40. a)What is Etard reaction? Write the chemical reaction. [2]

b) Explain aldol condensation with an example. [2]

c) Why acetaldehyde do not undergoes Cannizzaro's reaction? [1]

41. a)Explain Hell-volhard zelinsky (HVZ) reaction? [2]

b) What is esterification reaction?Write the equation. [2]

c) Name one decarboxylating agent. [1]

42. a)Explain Hoffmann bromamide reaction with example. [2]

b) Explain carbyl amine reaction with an example. [2]

c) Write the IUPAC name of CH_3-NH-C_2H_5. [1]

43.a) Write the Haworth structure of Lactose. [2]

b) What is Fibrous protein? Give an example. [2]

c) Which nitrogenous base present only in DNA but not in RNA? [1]

PART-E (PROBLEMS)

VII. Answer any four of the following. Each question carries three marks. 3 × 3 = 09

44. The boling point of benzene is 353.23K, when 1.8 g of non-volatile solute was dissolved in 90g of benzene. The boling point is raised to 354.11K.Calculate the molar mass of the solute.(Given Kb for benzene is 2.53K kg mole^{-1})

45. 5.8g of non-volatile solute was dissolved in 100g of carbon disulphide (CS2).
The vapour pressure of the solution was found to be 190mm of Hg. calculate the molar Mass of the solute given the vapour pressure of pure CS2 is 195mm of Hg [molar mass of CS2 = 76 g/mol].

46. The resistance of 0.01Macetic acid solution is found to be 220 Ω .When measured in a cell has two electrodes of area of cross section 3.85 cm^2 placed 10.5 cm apart. Calculate conductivity.

47. Calculate the standard Gibbs energy (ΔG°) for the reaction at 298K

$Zn_{(s)}+2Ag^+_{(aq)} \rightarrow 2Ag_{(s)}+Zn^{2+}_{(aq)}$

[Given $E^\circ Zn^{2+}$ / Zn = -0.76 V ,$E^\circ Ag^+$/ Ag = +0.8 V, F=96500 Cmole^{-1}]

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

49. The rate constants of a reaction at 300K and 400K are 0.034s^{-1} and 0.136 s^{-1}respectively.Calculate the value of Ea.

CLASS : PUC II **II – PUC – CHEMISTRY (34)** **MAX MARKS : 70**

MODEL QUESTION PAPER - 7

INSTRUCTIONS :

1. Question paper has five parts. All parts are compulsory
2. Part- a carries 20 marks. Each question carries 1 mark.
   Part-b carries 06 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 equation and neat labelled diagram wherever necessary
5. Use log table and simple calculator if necessary

PART A

I SELECT THE CORRECT OPTION FROM THE GIVEN CHOICES. **1 X 15 = 15**

1. Solubility of a gas in liquid
   a) Increases with increase in temperature
   b) Decreases with increase in temperature
   c) Unaffected on changing the temperature
   d) Decrease with increase in pressure

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

3. The number of Faradays required to reduce one mol of Cu^{2+} to metallic copper is
   a) one b) two c) three d) four

4. The minimum energy a molecule should possess in order to enter into a fruitful collision Is known as :
   a) collision energy b) activation energy
   c) threshold energy d) reaction energy

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

6. Which of the following has magnesium ?
   a) chlorophyl b) haemoglobin
   c) carbonic anhydrase d) Vitamin B-12

7. The chemical name of Phosgene is
   a) Acetyl chloride b) Methyl chloride
   c) Carbonyl chloride d) Chloroform

8. Picric acid is
   a) trinitro toluene b) trinitro benzene
   c) 2,4,6- trinitrophenol d) 1,3,5-trinitrophenol

9. Solubility of alcohols in water is due to
 a) their ability to form hydrogen bonds with water molecules
 b) they do not form hydrogen bonds with water molecules
 c) they are lighter than water molecules
 d) none of the above

10. Decarboxylating reagent is
 a) NaOH + CaO b) NaOH c) Alc. KOH d) Zinc dust

11. Acetone reacts with Grignard reagent followed by Hydrolysis to form
 a) 3^0 alcohols b) 2^0 alcohols c) Ether d) No reaction

12. The amine which cannot be prepared by Gabriel phthalimide synthesis is
 a) Methanamine b) Ethanamine c) Aniline d) Propanamine

13. The gas liberated when ethyl amine reacted with HNO_2 at low temperature is
 a) NH_3 b) N_2 c) H_2 d) O_2

14. Which of the following is a Vitamin
 a) Aspartic acid b) Ascorbic acid c) Adipic acid d) Saccharic acid

15. Globular proteins are present in
 a) Blood b) Hair c) Nails d) All of these

II FILL IN THE BLANKS BY CHOOSING THE APPROPRIATE WORD FROM THOSE GIVEN IN THE BRACKETS **5 X 1 =05**

($LiAlH_4$, elimination, elementary, substitution, radioactive, shrink)

16. When RBC is placed in 1% NaCl solution the cell will _____

17. Molecularity is applicable only for _____reactions

18. Most of the Actinides are _____

19. Dehydrohalogenation of ethyl chloride is an example of _____reaction.

20. The amides on reduction with _____yield amines.

PART - B

III ANSWER ANY THREE OF THE FOLLOWING. EACH QUESTION CARRIES TWO MARKS. 3 X 2 = 06

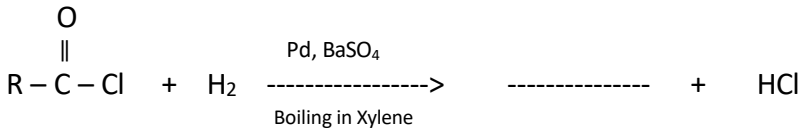
21. What are minimum boiling azeotropes ? Give example.

22. What are the main criteria for effective collisions according to simple collision theory ?

23. Define Linkage isomerism. Give an example.

24. Explain Wurtz – Fittig reaction with an example.

25. Complete the following reaction and write the name of the reaction.



26. What are non-reducing sugars ? Give an example.

PART – C

IV ANSWER ANY THREE OF THE FOLLOWING. EACH QUESTION CARRIES THREE MARKS. 3 X 3 = 09

27. Calculate the spin only magnetic moment of M^{3+} ion (Z= 24)
28. How is Potassium dichromate manufactured ? Write equation.
29. Explain the catalytic properties of Transition metals.
30. Write any three postulates of Werner's theory of coordination compounds.
31. On the basis of VBT explain the Hybridisation , Geometrical shape and Magnetic property of $[Co(NH_3)_6]^{3+}$
32. Explain Crystal Field splitting in Tetrahedral complexes with energy level diagram.

V. ANSWER ANY TWO OF THE FOLLOWING. EACH QUESTION CARRIES THREE MARKS 2 X 3 = 06

33. Write any three differences between Ideal and Non-ideal solutions.
34. Explain the working of Standard Hydrogen Electrode (SHE) with neat labelled diagram. Write the Symbolic notation of SHE.
35. State Kohlrausch law. Give any two applications of Kohlrausch law.
36. Derive an integrated rate equation for a First order reaction.

PART – D

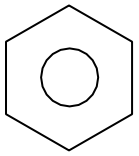
VI ANSWER ANY FOUR OF THE FOLLOWING. EACH QUESTION CARRIES FIVE MARKS. 4 X 5 = 20

37. a) Explain the mechanism involved in the conversion of tertiary butyl bromide into tertiary butyl alcohol.
    b) What is Swart's Reaction ? Explain with an example

38. a) Explain the mechanism of dehydration of Ethanol to ethene.
    b) How do you prepare 2^0 and 3^0 alcohols from Grignard reagent ? Write the general reactions.

39. a) How would you prepare phenol from Diazonium salt? Name the gas liberated in this reaction.
    b) Explain Williamson's Ether Synthesis with an example.

40. a) Explain Cannizzaro's reaction with an example.
    b) Write the mechanism of addition of HCN to aldehyde or ketone.
    c) Complete the following reaction by naming the compound 'A'



Benzene

CO, HCl

Anhyd, $AlCl_3$ (traces) CuCl

A

---

41. a) Explain Hell -Volhard- Zelinsky (HVZ) reaction.
    b) Among 4- nitro benzoic acid and 4- methoxy benzoic acid, which is more acidic ?
    c) Explain the effect of substituents on the acidity of Carboxylic acids.

42. a) Write the equations of reaction involved in the Gabriel Phthlimide synthesis of a Primary amine.
    b) Write the equations to convert Aniline into p- bromo aniline.

43. a) Write the Haworth structure of Maltose
    b) What is denaturation of Proteins ? Which level of structure remains intact during denaturation of Globular proteins?
    c) Name the sugar moiety present in DNA.

PART – E (PROBLEMS)

VII ANSWER ANY THREE OF THE FOLLOWING . EACH QUESTION CARRIES 3 MARKS 3 X 3 = 09

44. The vapour pressure of pure benzene at certain temperature is 0.850 bar. A non-volatile , non-electrolyte solid weighing 0.5 g when added to 39.9 g of benzene (molar mass is 78 g. mol^{-1}) Vapour pressure of the solution then is 0.845 bar. What is the molar mass of the solid substance ?

45. 18 g of glucose is dissolved in 1 kg of water . At what temperature will the solution boil at 1.013 bar ? K_b for water is 0.52 K kg mol^{-1}

46. Using Nernst equation for the following cell at 298 K and calculate the EMF.
    Al (s) l $Al^{3+}_{0.001\ M}$ ll $Cu^{2+}_{0.0001M}$ l Cu $_{(s)}$ Given $E^0_{Al^{3+}/\ Al}$ = -1.66 V and $E^0_{Cu^{2+}\ /\ Cu}$ = +0.34 V

47. A solution of Copper sulphate is electrolysed for 10 min with a current of 1.5 amperes. What is the mass of copper deposited at cathode ? (Given Atomic mass of copper = 63.5)

48. For the 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 2x 10^{-2} s^{-1} at 300K and 8x 10^{-2} s^{-1} at 320 K. Calculate the energy of activation of the reaction . (Given R = 8.314 JK^{-1} mol^{-1})

PUC II year | **II – PUC – CHEMISTRY (34)** **MODEL QUESTION PAPER - 8** | Marks: 70

Part – A

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

1) Name the law behind the dissolution of Carbon dioxide gas in soft drinks under high pressure.
   a) Roault's law b) Henry's law c) Ostwald dilution law d) Vant Hoff's law
2) Which of the following cell was used in Apollo space craft programme.
   a) Mercury cell b) Daniel cell c) H_2-O_2 fuel cell d) dry cell
3) During the electrolysis of molten Sodium chloride, the reaction occurs at anode is ?
   a) Chloride ions are oxidised b) Chloride ions are reduced
   c) Sodium ions oxidised d) sodium ions are reduced.
4) The unit of rate constant for zero order reaction.
   a) $L\ s^{-1}$ b) $L\ mol\ s^{-1}$ c) $mol\ L^{-1}\ s^{-1}$ d) $mol\ s^{-1}$
5) Which of the following species is/are paramagnetic?
   a) Fe^{+2} b) Zn^{+2} c) Ti^{+4} d) Sc^{+3}
6) I U P A C name of $[Pt(NH_3)_2Cl(NO_2)]$ is
   a) platinum diamine chloronitrite b) chloronitrito – N – ammine platinum (II)
   c) Diamine chlorido nitrito-N-platinum (II) d) Diamine chloro nitrito -N – platinate
7) When $CH_3CH\ Br\ CH_2\ CH_3$ is treated with alchoholic KOH, the major product produced is?
   a) But -1-ene b) But – 2 – ene c) Butan - 1 – ol d) Butan – 2 – ol
8) Lucas reagent test is used for.
   a) Alkyl halides b) Carboxylic acid c) Alcohols d) Aldehydes
9) Salicylaldehyde is preapared from phenol by.
   a) Gatterman Koch reaction b) Kolbe'a reaction c) Reimer Timann reaction
   d) Cannizzaro's reaction
10) The catalyst used in Rosenmund's reduction is.
   a) $HgSO_4$ b) Anhydrous $AlCl_3$ c) Anhydrous $ZnCl_2$ d) $Pb/BaSO_4$
11) which is the strongest acid.
   a) HCOOH b)CH_3COOH c) C_2H_5COOH d)$(CH_3)_2$-CH-COOH
12) Which of the following amines cannot be prepared by Gabriel phthalimide Synthesis.
   a) ethylamine b) Isopropyl amine c) Aniline d) Methylamine
13) Red dye test is used to distinguish between?
   a) Ethylamine and acetamide b) Ethylamine and aniline
   c) Urea and acetamide d) methylamine and ethylamine
14) which of the following polymer is stored in the liver of animals?
   a) amylose b) cellulose c) amylopectin d) glycogen

15) which of the following hormone helps in growth and development.
a) Thyroxin b) Estradial c) adrenalin d) insulin

II) Fill in the blanks by choosing the appropriate word from those given in the brackets (non-superimposable,azeotropic mixture, zero, hydrogen, zinc) 1×5=5

16) Solutions which distil without change in composition are called ----------
17) The decomposition of HI on the surface of gold is --------- order reacton.
18) The transition element which is colourless in both atomic state and oxidation state is--.
19) Optically active isomers which are ------on their mirror images are called enantiomers.
20) Solubility of ethylamine in water is formation of ----- bonding with water.

PART – B

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

21) a) What is reverse osmosis? Mention any two.
b) What type of deviation from Roault's law is observed when equal volume of ethanol and acetone are mixed? Mention the reason for it?
22) Show that the half-life period of a first order reaction is independent of the initial concentration of the reacting species?
23) Give the facial (fac) and meridional (mer) isometric structures of $[CoCNH_3)_3 (NO_2)_3]$
24) Write the general equation for Fittig reaction. Name the product formed in the reaction.
25) Complete the equation and the reaction $2HCHO + NaOH \rightarrow$ (Conc)
26) Name the components of starch.

Part – C

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

27) a) Calculate the spin only magnetic moment of Fe^{2+}
b) Why SC^{+3} salts are colourless where as Cr^{3+} salts are coloured.
28) Write the balanced equations in the manufacture of $K_2Cr_2O_7$

29) What is Lanthanoid contraction? What is the cause for it? Write the consequence of it.
30) Write the IUPAC name of the $[CoCl_2 (en)_2]^+$ ion. Write its cis and trans isomers of it.

31) Using V.B.T Explain geometry, hybridisation and magnetic property of $[Co (NH_3)_6]^{3+}$ ion (Atomic number of Cobalt is 27)
32) what are the Carbonyls? Give one example and the structure of it.

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

33) State Henry's law. Write its mathematical equation. Write Significance of Henry's law constant.

34) Draw the diagram of construction of S.H.E and write its half all reactions and Symbolic representations of standard hydrogen electrode.

35) Draw a neat labelled diagram of H_2-O_2 fuel cell and write the reactions occurring at cathode and anode.

36) Derive integrated rate equation for first order reaction.

Part – D

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

37) a) Write the equations for the steps in S_N1 mechanism of the conversion of tert-butyl bromide into tert-butyl alcohol.

b) Complete the following reaction. a) $C_2H_5OH + SOCL_2 \longrightarrow$ b) $C_2H_5Cl + KCN_{(alc)} \longrightarrow$

38) a) Explain the mechanism of dehydration of ethanol to ethene.

b) What is esterification? Give an example.

39) a) How is phenol manufactured by cumen process?

b) Complete the reaction

i) C_2H_5-O-C_2H_5 + HI $\rightarrow$ (excess)

ii) CH_3-C(CH_3)(CH_3)-O-CH_3 $\rightarrow$

40) a) Identify A. B. C in the following reaction and write the chemical reaction

$C_6H_5COCl \xrightarrow{H_2/Pd - BaSO_4} A \xrightarrow{NaOH\ (conc)}$ B + C

b) Explain Etard reaction with an example.

41) a) Identify the compounds A B and C in the following reaction and write chemical equation.

i) $CH_3 \xrightarrow{Mg\ ether} \xrightarrow[ii)\,Water]{i)\,CO2}$ ii) $\xrightarrow{C\ KOH\ H^+} C$

b) Explain esterification reaction with an example.

42) a) Explain carbylamine reaction.

b) Explain Hoffmann bromamide degradation for the preparation of aniline.

c) Give the IUPAC name of $H_3C - N(H) - CH_2 - CH_3$

43) a) Write the structure of maltose.

b) What is Zwitterion of an amino acid? Give its general structure.

c) Name the nitrogen base present only in DNA but not in RNA

PART- E

VII) Answer any three of the following. Each carries three marks. 3×3=09

44) 5.8 g of non-volatile solute was dissolved in 100 g of carbondislphide(CS_2). The vapour pressure of solution was found to be 190 mm of Hg. Calculate the molar mass of the solute given the vapour pressure of pure CS_2 is 195 mm of Hg. [molar mass of CS_2 Is =76 g mol^{-1}..

45) 200$cm^3$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 $\times 10^{-3}$ bar. Calculate the molar mass of the protein. [R =0.0831 L bar mol^{-1} K^{-1}]

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

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

47) A solution of Ni $(NO_3)_2$ is electrolysed between platinum electrodes using a current of ampheres for 20 min. What mass of Ni is deposited at the cathode? (Atomic mass of Ni = 58.7 g)

48) A first order reaction takes 40 min for 30% decomposition. Calculate half life period of a reaction.

49) The rate of a particular reaction doubles when the temperature changes from 300k to 310 k. calculate the energy of activation of the reaction.
(Given R= 8.314 JK^{-1} mol^{-1})

II – PUC – CHEMISTRY (34)
MODEL QUESTION PAPER - 9

I. Select the correct option from the given choices.

1. The solubility of a gas increases in a liquid with

a) Decrease in temperature b) Increase in temperature

c) Decrease in gas pressure d) Amount of liquid taken

2. The amount of electricity required to liberate 1 gram equivalent of Cu is

a) 96500F b) 1 F c) 1 C d) 96500A

3. Specific conductivity of a solution

a) Increases with dilution b) Decreases with dilution

c) Remains unchanged with dilution d) Depends on mass of electrolyte

4. A first order reaction is 50% completed in 't' seconds. The rate constant in 5' is,

a) 0.693 x t b) 6.93 x t c) $\frac{0.693}{t}$ d) 0.693 x $\frac{t}{2}$

5. A transition metal of 3d series which does not show variable oxidation state is

a) Ti b) Sc c) Fe d) Co

6. Isomers of $[Pt(NH_3)_2(Cl)_2]$ are –

a) One cis and one trans b) One trans and two cis

c) Optical d) Linkage

7. Methyl chloride can be converted to ethane using,

a) Ni/H_2 b) Zn-Cu / C_2H_5-OH c) Na/C_2H_5-OH d) Na / dryether

8. $R – X + R – 0 – Na \longrightarrow R – O – R + NaX$, represents

a) Cumene Process b) Kolbe's reaction

c) Williamson Synthesis d) Reimer – Tiemann reaction

9. Which of the following cannot be used to oxidize primary alcohol to Aldehyde.

a) CrO_3 in anhydrous medium b) PCC

c) Acidified KMnO4 d) Cu at 300^0 C

10. Oxidising agent used in Etard reaction is,

a) CrO_2Cl_2 b) CrO_3 c) $K_2Cr_2O_7$ d) $KMnO_4$

11. When a Ketone reacts with hydroxyl amine, The product obtained is,

a) Hydrazone b) Semicarbazone c) Oxime d) Imine

12. In the Hoffmann bromamicde degradation reaction of benzamide, the amine produced is,

a) Methanamine b) Ethanamine c) Propanamine d) Aniline

13. The reagent which can be used to distinguish the 1^0, 2^0 and 3^0 amines is,

a) Br_2 / H_2O b) $C_6H_5SO_2Cl$ c) Mixture of HNO_3 & H_2SO_4

d) HNO_3

14. The number of peptide bonds present in a tetra peptide is,

a) One b) Two c) Three d) Four

15. In a polynucleotide chain, the nucleotide units are joined together through,

a) Glycosidic Linkage b) Phosphodiester Linkage

c) Peptide Linkage d) Covalent bond

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

(Molecularity, increases, Benzenesulphonyl chloride swarts, order, Argon)

16. When glucose is dissolved in water, the boiling point of water _____

17. _____of a reaction cannot be determined experimentally.

18. Most abundant noble gas in air is _____.

19. $CH_3Br + AgF \longrightarrow CH_3\text{-}F + AgBr$, This is---------- reaction.

20. The chemical name of Hinsberg's reagent is _____.

PART - B

III. Answer any three of the following each question carries two marks. **3x2=6**

21. State Raoult's law of dilute solution and write its mathematical form.

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

23. For a given complex $[Co(NH_3)_5 No_2] Cl_2$ write its IUPAC name and linkage isomer.

24. Aryl halides are less reactive towards nucleophilic substitution reactions than alkyl halides. Give two reasons.

25. Explain Rosenumund reduction. Write the equation

26. i) Name a naturally occurring Alpha amino acid which is optically inactive.

ii) Give one example for a globular protein.

PART – C

IV. Answer any three of the following each question carries three marks. **3X3=09**

27. i) Transition metals form large number of complex compounds. Give any two reasons.

ii) Which of the following ions is coloured?

Sc^{3+}, Zn^{2+}, or Cr^{3+}

28. Write the equations involved in the preparation of potassium dichromate from Chromite ore.

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

30. Using VBT, account for the geometry and magnetic property of $[Ni(CN)_4]^{2-}$

(Given – atomic Number of Ni=28)

31. For the complex $[Co(en)_3]Cl_3$

i) Give the IUPAC name.

ii) Give the co-ordination number of the central metal ion.

iii) What type of stereisomerism does it exhibit?

32. i) Mention any two postulates of Werner's theory of coordination compound.

ii) When is linkage isomerism possible for a coordination compound?

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. i) State Kohlrausch's law of independent migration of ions.

ii) Write the reaction occurring at cathode and anode in H_2-O_2 fuel cell.

35. Explain standard hydrogen electrode. (SHE)

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

PART – D

VI. Answer any FOUR of the following each questions carries five marks. 4x5=20

37. a) Explain the steps involved in S_N1 mechanism for the conversion of t-butyl bromide to tert-butyl alcohol.

b) Complete the following reaction and write its name.

$2C_2H_5Cl + 2Na \xrightarrow{\text{Dry ether}} ? + 2NaCl$

38 a) Explain the mechanism of dehydration of ethanol to ethane.

b) What is Lucas reagent? Which class of alcohols does not readily form turbidity with Lucas reagent?

39. a) How is phenol prepared from cumene? Write the equation.

b) Explain Williamson's synthesis with an example.

40. a) Identify A & B in the following equation.

$$C{=}O + NH_2NH_2 \xrightarrow{-H_2O} A \xrightarrow[\text{Glycol}]{\text{KOH/Ethylene}} B + N_2 \uparrow$$
$$\text{Heat}$$

b) Explain Rosenmund reduction. Write the equation.

c) Lower members of aldehydes & Ketones are miscible with water. Give reason.

41. a) What type of carboxylic acids undergo Hell Volhard – Zelinsky (HVZ) reaction?

b) Write chemical equations for following conversions _____

i) Ethanoic acid to Acetamide

ii) Benzoic acid to m-Nitrobenzoic acid.

c) What is the effect of electron withdrawing group on the acidity of carboxylic acid?

42. a) i) $C_6H_5CONH_2 \xrightarrow{Br_2/NaoH} X$

ii) $X \xrightarrow[O^0C]{NaNO_2, Hcl} Y$

What are X & Y ? Name the reaction occurring in step (i)

b) Arrange the following in the increasing order of their basic strengths in the aqueous medium.

$(CH_3)_3N$, NH_3, CH_3NH_2, $(CH_3)_2NH$.

Give one reason for the trend observed.

43. a) Write the Haworth structure of Lactose

b) Give an example each for,

i) acidic Alpha amino acid ii) fibrous protein

c) Name the vitamin responsible for pernicious anaemia.

PART – E (Problems)

VII. Answer any Three of the following each question carries three marks. 3X3=09

44. On dissolving 3.46 g 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-kb of water =0.51 K Kg mol^{-1})

45. 300 cm^3 of an aqueous solution of a protein contains 2.12 g of the protein, the Osmotic pressure of such a solution at 300K is found to be $3.89X10^{-3}$ bar. Calculate the molar mass of the protein. (R=0.0823 L bar mol^{-1} K^{-1})

46. Calculate the value of G^0 at 298 K for the cell reaction,

$3Mg_{(S)} + 2Al^{3+}_{(aq)} \longrightarrow 3Mg^{2+}_{(aq)+} + 2Al_{(S)}$

(Given E^0_{Mg} = -2.36 V, E^0_{Al} = -1.66 V and F=96487C)

47. Electrolysis of aqueous sodium chloride solution was carried out by passing 5 A current for 3 hours. Calculate the Volume of hydrogen liberated at STP, at the cathode.[1F=96500C mol^{-1}, molar volume of hydrogen at STP=22400 Cm^3]

48. 75% of the first order reaction is completed in 30 minutes. Calculate rate constant of the 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 JK^{-1} mol^{-1}]

* * * * *

Class :II Year PUC

Time : 3Hrs.15min

Subject : Chemistry (34)

II – PUC – CHEMISTRY (34)
MODEL QUESTION PAPER - 10

Number of questions : 49

Maximum Marks : 70

Instructions :

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

PART A

I] Select the correct option from the given choices .Each carries **one** mark. (1 × 15 = 15)

1] The solution which show a large positive deviation from Raoult's law form

a) Maximum boiling azeotrope
b) Minimum or maximum boiling azeotrope
c) Minimum boiling azeotrope
d) None of these

2] A Galvanic cell become electrolytic cell when

a) $E_{cell} > E_{ext.}$
b) $E_{cell} = E_{ext.}$
c) $E_{cell} = 0$
d) $E_{ext.} > E_{cell}$

3] The electrolyte used in lead storage battery

a) 20% sulphuric acid
b) 50% lead sulphate
c) 35% lead sulphate
d) 38% sulphuric acid

4] Threshold energy is equal to

a) Activation energy – energy of molecules
b) Activation energy
c) Activation energy + energy of molecules
d) Potential energy of molecules

5] Which of the following statements is not true in case of interstitial compounds

a)They are chemically inert
b) They are soft
c) They are having high melting point
d) They retain metallic conductivity

6] Metal –Carbon bond in metal carbonyls possesses

a) σ character b) π character

c) both σ and π character d) neitherσ and π character

7] Aryl halide acquires partial C-Cl double bond character is due to

a) Inductive effect b) Resonance effect

c) Hyperconjugation effect d) Electromeric effect

8] The enzyme which can catalyse the conversion of glucose to ethanol

a) Maltase b) Distase

c) Zymase d) Invertase

9] From Williamson's synthesis, preparation of which of the following is possible?

a) only symmetrical ethers b) only asymmetrical ethers

c) Both (a) & (b) d) None of the above

10] Esters and anhydrides are derivatives of

a) aldehydes and ketones b) carboxylic acids

c) ethers d) alcohols

11] The strongest carboxylic acid among the following is

a) trichloroacetic acid b) acetic acid

c) trifluoracetic acid d) dichloroacetic acid

12] Hoffmann bromamide degradation reaction is shown by

a) $ArNH_2$ b) $ArCONH_2$

c) $ArNO_2$ d) $ArCH_2NH_2$

13] IUPAC name of $(CH_3)_3N$ is

a) Methylamine b) N-methyl amine

c) N,N -dimethyl methananmine d) N,N- diethyl methanamine

14] In fibrous proteins,polypeptide chains are held together by

a) van-der Waals forces b) hydrogen bonds

c) electrostatic forces of attraction d) covalent bonds

15] Which of the following is not present in nucleotide?

a) Guanine b) Cytosine

c) Adenine d) Tyrosine

II] Fill in the blanks by choosing appropriate word from those given in the brackets: (5 × 1 = 05)

(CO_2 ,association , elementary, atmospheric oxidation ,CCl_2F_2, dissociation)

16] When van't Hoff factor of a solution is less than one, solute in the solution undergoes_____.

17] Molecularity is applicable only for _____reactions.

18] Acidified KMnO4 oxidises oxalate ion to _____.

19] Freon-12 is _____.

20] Aniline is colourless liquid but get coloured on storage due to_____.

PART B

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

21] Define reverse osmosis. Mention its application.

22] Draw a graph of ln[R] vs. time for a first order reaction R→P. What is the intercept of the line?

23] What are homoleptic complexes? Give an example.

24] Write an equation to convert aryl halide to diphenyl & name the reaction.

25] Aldehydes are generally more reactive than ketones for nucleophilic addition reactions. Give two reasons.

26] Give an example of each of the following –

i) Water soluble vitamin. ii) Polysaccharides

PART C

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

27] Explain how potassium dichromate is manufactured from chromite ore? (show only balanced chemical equations)

28] Name the metal of the first row of transition series that –

i) has maximum number of unpaired electrons in its ground state. (1)

ii) has zero spin only magnetic moment in its +2 oxidation state. (1)

iii) Exhibits only +1 & +2 oxidation state. (1)

29] a) Give any two general characteristics of actinoids. (2)

b) Write general electronic configuration of lanthanoids. (1)

30] For the following complex, write formula & draw its cis & trans isomeric structures-

Diamminedichloridoplatinum(II)

31] Using VBT, account for the geometry, hybridisation & magnetic property of $[CoF_6]^{3-}$

(At. No. of Co is 27)

32] a) Define crystal field splitting. (1)

b) Among t_{2g} & e_g which set of orbital has more energy in tetrahedral complexes? (1)

c) Mention the set of orbitals which is known as t_{2g} ? (1)

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

33] State Henry's law & write its mathematical expression. Give any one application of it.

34] a) Define molar conductivity . What is its SI unit? (2)

b) What happens to molar conductivity when one mole of KCl dissolved in 1L is diluted to 5L? (1)

35] a) What are Fuel cells? Name the cell which is used in Apollo space programme. (2)

b) Which product is obtained at cathode on electrolysis of molten NaCl? (1)

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

PART D

VI] Answer **any Four** of the following. Each question carries **five** marks (4× 5 = 20)

37] a) Explain SN^1 mechanism for the conversion of tert.Butyl bromide to tert. Butyl alcohol Mention its reactivity order. (3)

b) Among isobutyl bromide & tert.Butyl bromide which has higher boiling point? Why? (2)

38] a) With an equation explain what happens when ethanol reacts with acetyl chloride ? What is the role of pyridine in this reaction? (2)

b) What is Lucas reagent? An organic compound when treated with Lucas reagent gives turbidity after 5 to 10 min. Identify the type of organic compound. (2)

c) Complete the following reaction. (1)

$$CO + 2H_2 \xrightarrow[573\text{-}673K]{ZnO\text{-}Cr_2O_3\ ,\ 200\text{-}300atm} A$$

39]a) How would you prepare picric acid from phenol? (2)

b) Explain with an equation how anisole reacts with methyl chloride in presence of anhydrous $AlCl_3$.Identify major & minor products. (2)

c) Ethers are miscible in water. Give reason. (1)

40] a) Give the preparation of acetaldehyde from acetyl chloride. Name the reaction. (2)

b) How does acetone reacts with hydroxylamine? (2)

c) What is the hybridisation of carbonyl carbon atom? (1)

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

b) How does the acidity of carboxylic acid varies if the substituent is electron releasing group why? (2)

c) Give the IUPAC name of HOOC-COOH. (1)

42] a) Write the molecular & structural formula of Hinsberg reagent. What is its reaction with tertiary amines? (3)

b) How is benzene diazonium chloride prepared from aniline? (2)

43] a) i) Glucose reacts with bromine water to form gluconic acid. What does it represents?

ii) Define anomers. (1 + 1)

b) Draw Haworth structure of Maltose. (2)

c) Mention the function of mineralocorticoids? (1)

PART E (NUMERICAL PROBLEMS)

VII] Answer **any three** of the following. Each question carries **three** marks. (3×3 = 09)

44] 31g of an unknown material is dissolved in 500g of water. The resulting solution freezes at 271.14K. Calculate the molar mass of the material.

[Given :K_f for water = 1.86K kg/mol T^0_f for water = 273K]

45] The density of 20 % (mass/mass) aq. KI is 1.202 g/cm^3 , Calculate molarity of KI solution.

[Given molar mass of KI = 166 g/mol]

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

$$\mathbf{Ni_{(s)} + 2Ag(0.002M) \rightarrow Ni^{2+}\ (0.160M) + 2Ag_{(s)}}$$

[Given E^0_{cell} = 1.05V]

47] How long has a current of 3 ampere to be supplied through a solution of silver nitrate to coat a metal surface of 0.42 g ? {Atomic mass of Ag= 108 g, 1F= 96500C}

48] What is the rate of reaction when the [acetaldehyde] = 1.75×10^{-3}M & the rate constant is $6.73 \times 10^{-6}\ M^{-1}s^{-1}$.

49] The rate constant of a first order reaction becomes 5 times when the temperature is raised from 350K to 400K. Calculate the activation energy for the reaction. (R= 8.314 J/K/mol)

MODEL QUESTION PAPER - 11

PART-A

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

1. Desalination of sea water is done by
   a) Reverse osmosis b) Osmosis c) Filtration d) Diffusion
2. The SI unit of molar Conductivity is
   a) S b) m^{-1} c) Sm^{-1} d) Sm^2/mol
3. During electrolysis of molten NaCl, the product obtained at Cathode is
   a) Na metal b) H_2 gas c) $Cl_2 gas$ d) None
4. The rate Constant of a zero-order reaction is given by
   a) $\frac{[R]o-[R]}{t}$ b) $\frac{[R]o}{2}$ c) $\frac{[R]o}{t}$ d) $\frac{[R]o}{k}$
5. Which of the following transition metal form colourless
   a) V^{2+} b) Cr^{3+} c) Zn^{2+} d) Ti^{3+}
6. Which among the following is didentate ligand.
   a) $C\bar{N}$ b) NH_3 c) CO d) en
7. Which among the following has the highest melting point
   a) O-dichloro benzene b) m-dichloro benzene
   c) P-dichloro benzene d) chloro benzene.
8. An example for a Secondary alcohol is
   a) Propan-2-0l b) Propan-1-0l c) methanol d) Ethanol
9. The IUPAC name of Picric acid is
   a) m-nitrobenzoic acid b) 2,4,6 to trinitrophenol
   c) 2,4,6-tribromophenol d) P-nitrophenol.
10. Carbolic acid is
    a) Salicylic acid b) Ethanol c) Salicylaldehyde d) Phenol
11. The hybridisation of Carbon of Carbonyl group is
    a) SP b) Sp^2 c) Sp^3 d) Sp^3d
12. Which of the following amines as Synthesized by Gabriel-pthalimide synthesis
    a) 1° Aromatic amines b) 1° Aliphatic amines
    c) Both a & b d) None.
13. The decreasing correct order of basic strength of amines is
    a) $(C_2H_5)_2NH > C_2H_5NH_2 > (C_2H_5)_3N$ b) $C_2H_5NH_2 > (C_2H_5)_3N) > (C_2H_5)_2NH$
    c) $(C_2H_5)_2N > (C_2H_5)_2NH > C_2H_5NH_2$ d) $C_2H_5NH_2 > (C_2H_5)_2NH > C_2H_5NH_2$
14. The water insoluble component of starch is
    a) Amylose b) Amylopectin c) Both a & b d) None
15. Number of peptide bond present in nano peptide chain is
    a) 1 b) 9 c) 8 d) 0

II. Fill in the blanks by choosing the appropriate word from those given in the bracket. $5 \times 1 = 5M$

($P = K_{H.X}$, Pseudo first order, H_2, Nonpolar, Sp^3)

16. The mathematical form of Henry's law is _____
17. Acid hydrolysis of sucrose is a _____reaction
18. The gas Liberated when lanthanoids are treated with acids is _____
19. $SN2$ reaction is favoured by _____
20. The hybridisation of N-atom in amines is _____

PART-B

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

21. State Henry's law. write its mathematical from.
22. Define Pseudo first order reaction. Give one example.
23. Define ambidentate ligand. Give one example.
24. Explain swartz reaction.
25. Explain Rosenmund's reduction with an example.
26. What is denaturation of proteins? Give one example.

PART-C

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

27. Calculate the spin only magnetic moment of $Mn^{2+}(Z = 25)$.
28. Explain the structure of Chromate ion (cro_4^{2-}).
29. Give two reasons why transition elements form complex compounds. which element of 3d series shows highest oxidation state?
30. Explain linkage isomerism with an example.
31. Using VBT, explain geometry, hybridisation & magnetic property of $[Co(NH_3)_6]^{3+}$ (Atomic number of Co is 27).
32. Explain Crystal field splitting in octahedral Complex.

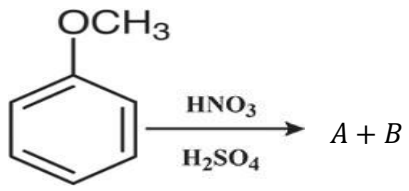
V. Answer any two of the following. Each question carries three marks. **$2 \times 3 = 6$M**

33. Define electrochemical series. Mention two significances.
34. Explain standard hydrogen electrode with next labelled diagram.
35. Define Secondary batteries. Mention anodic & Catholic reactions involved in it.
36. Derive integrated rate equation for zero order reaction.

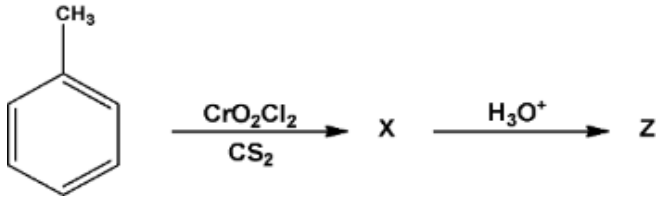
PART-D

VI. Answer any five mark four of the following. Each question carries five marks. **$4 \times 5 = 20$M**

37. a. Explain SN_2 mechanism. (3M)
    b. What are polyhalogeno Compounds? Give one example. (2M)
38. a. Explain mechanism of dehydration of ethanol to ethene. (3M)
    b. Define etherification reaction. Write its general equation. (2M)
39. a. Explain preparation of Phenol from isopropyl alcohol. (3M)
    b. Predict A & B in following reaction. (2M)



40. a. Predict X, Z & name of the reaction. (3M)



b. why aldehydes & Ketones are soluble in H_2O? (1M)

c. Name the chemical reagent which is used preserve biological specimens in laboratory. (1M)

41. a. Explain HVZ reaction. (3M)

b. How benzoic and undergoes nitration? write its chemical equation. (2M)

42. a. Explain Hoffman bromamide degradation reaction. (2M)

b. How will you distinguish 1°, 2°& 3°amines. (3M)

43. a. With suitable reaction show that glucose has Six Carton atoms which are linked in a Straight chain. (2M)

b) What are essential amino acids? Give one example. (2M)

c) Give an example for optically inactive amino acid. (1M)

PART-E (Problems)

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

44. Calculate the mole fraction of ethylene glycol $(C_2H_6O_2)$ in a solution Contaning 20% of $C_2H_6O_2$ by mass.

45. The BP of C_6H_6 is 353.23K, when 1.80g of a non-volatile solute was dissolved in 90g of benzene, the BP is raised 354.11K. Calculate the molar mass of the solute. K_b for benzene is 2.53K kg/mol.

46. Write the Nernst equation & Calculate the EMF for the following cell
$Mg_{(s)}|Mg^{2+}_{(aq)}(0.001M)||Cu^{2+}_{(aq)}(0.0001M|Cu_{(s)}$

47. The standard electrode potential of Daniel cell is 1.1V. Calculate the standard Gibbs energy for the reaction.

$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

48. The initial Concentration of N_2O_5 in the following first order reaction.

$2N_2O_5 \rightarrow 4NO_2 + O_2$

The Concentration of N_2O_5 was $1.2X10^{-2}$ mol/L.

The concentration of N_2O_5 after 60 min was $0.2X10^{-2}$ mol/L.

Calculate rate constant.

49. The rate Constant of Chemical of reaction doubles for an increase of 10K temperature from 298k. Calculate the activation energy.

II – PUC – CHEMISTRY (34)
MODEL QUESTION PAPER - 12 **Maximum 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 × 15 = 15**

1. Copper dissolved in gold is an example for which solution?
a) Gas in solid b) liquid in solid c) solid in solid d) solid in liquid
2. The Molar Conductivity is known as Limiting Molar Conductivity when concentration approaches
a) Zero b) Unity c) Infinity 4) none of the above
3. The electronic conductance depends on
a) Nature and Structure of the metal b) Number of valence electrons per atom
c)Temperature d) All of the above
4. The inversion of Cane Sugar is an example for which reaction
a) First Order b) Second Order c) Zero Order d) Pseudo first order
5. Which of the following is not regarded as Transition metal?
a) Zinc b) Cadmium
c) Mercury d) All of the above
6. $KCl.MgCl_2.6H_2O$ is the molecular formula of which of the following double salt?
a) Carnallite b) Mohr's Salt c) Potash Alum d) Phosgenite
7. Phenol is also called as
a) Carboxylic acid b) Carbolic acid c) Salicylic acid d) Ethanoic acid
8. The common name of Benzene-1,2-diol is
a) Resorcinol b) Quinol c) Catechol d) Cresol
9. Glucose and Fructose undergo fermentation in the presence of which enzyme;
a) Zymase b) Sucrase c) Amylase d) Maltase
10. Conversion of Benzene to Benzaldehyde in the presence of anhydrous $AlCl_3$ or CuCl is which named reaction
a) Etard b) Stephen c) Rosenmund d) Gatterman -koch

11. Fehling solution B is made of ?

a) Copper sulphate b) Sodium Potassium Tartarate

c) Sodium Borohydride d) Zinc-Amalgam

12. Which of the following compound is used as an anaesthetic in dentistry

a) Adrenaline b) Ephedrine

c) Novocain d) Benadryl

13. Which of the following is known as Hinsberg's Reagent?

a) Benzene Sulphonyl Chloride b) Carbylamine

c) Methanamine d) Sodium Nitrite

14. Starch consist of which of the following components:

a) Amylose b) Amylopectin

c) Both a and b d) none of the above

15. Which one of the following is essential amino acid

a) Valine b) Glycine

c) Alanine d) Glutamine

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

(Independent , Scandium, Cryoscopic constant, Pyramidal, Freons,) 5×1 = 5

16. Freezing point depression constant, K_f is also called as_____.

17. For First order reaction $t_{1/2}$ is _____ of $[R]_0$

18. _____is a transistion element which does not exhibit variable oxidation states.

19. The Chloroflurocarbon compound of ethane and methane are called as _____.

20. The geometry present in amines is _____.

PART - B

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

21. What are Azeotropes ? Mention its types.

22. Give two factors which influence the rate of the chemical reaction?

23. What are homoleptic and heteroleptic complexes? Give examples .

24. What are enantiomers? Give examples

25. Give the Etard reaction. Which is the oxidizing agent used in Etard reaction?

26. What is zwitter ion? Give its structure.

PART - C

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

27. Calculate the magnetic moment of a divalent ion in aqueous solution it its atomic number is25?

28. Explain the manufacture of Potassium dichromate($K_2Cr_2O_7$).
29. Give any three chemical reactions of Lanthanoid's and explain them.
30. Define Isomerism in co-ordination compounds. Give the types of structural isomerism with examples for each?
31. Using Valence bond theory(VBT), explain geometry, hybridization and magnetic property of $[Co(NH_3)_6]^{3+}$. (Atomic number of Cobalt = 27).
32. Draw the energy level diagram for the crystal field splitting in octahedral complexes. Write the relation between Δ_o and Δ_t for the complexes having same metal, the same ligand and metal ligand distance.

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

33. What is Raoult's law? Give its equation . What are ideal and non – ideal solutions ?
34. State Kohlraush law of independent migration of ions. Mention two applications of it.
35. What is electrolytic cell? State Faraday's first and second law of electrolysis.
36. What is zero order reaction? Derive integrated rate equation for zero order reaction.

PART - D

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

37. a) Explain substitution Nucleophilic Bimolecular (S_N2) reaction .
    b) What are ambident nucleophiles ? Give example. (3+2)
38. a) Give the mechanism of acid catalysed hydration reaction of Alkenes.
    b) Give the reaction of phenol using cumene process. (3+2)
39. Give the chemical reaction for the following and explain.
    a) Kolbe's reaction
    b) Reimer-Tiemann reaction
    c) Williamson Synthesis
    d) Esterification
    e) Reaction of phenol with zinc dust
40. Give any five reactions for the preparation of Aldehydes .
41. a) Complete the following reaction
    i) $RCOOH + PCl_5 \longrightarrow$
    ii) $3RCOOH + PCl_3 \longrightarrow$
    iii) $RCOOH + SOCl_2 \longrightarrow$
    b) Explain Hell-Volhard-Zelinsky reaction. (3+2)
42. Explain structure basicity relationship of amines.
43. Give the structural Elucidation of Glucose .

PART – E (PROBLEMS)

VII. Solve any three problems of the following. Each question carries three marks. 3 × 3= 9

44. Calculate the mole fraction of Ethylene glycol ($C_2H_6O_2$) in a solution containing 20% of $C_2H_6O_2$ by mass .

45. 45 g of Ethylene glycol ($C_2H_6O_2$) is mixed with 600g of water. Calculate
    a) The freezing point depression
    b) The freezing point of the solution.

46. The Vapour pressure of pure liquids A and B are 450 and 700 mmHg respectively , at 350K. Find out the composition of the liquid mixture if total vapour pressure is 600 mmHg . Also find the composition of the vapour phase .

47. The standard electrode potential for daniell cell is 1.1V . Calculate the standard gibbs energy for the reaction:

$$Zn(s) + Cu^{2+}(aq) \longrightarrow Zn^{2+}(aq) + Cu(s)$$

48. Calculate the Equilibrium constant of the reaction :

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

$$E^{o}_{(cell)} = 0.46V$$

49. Resistance of a conductivity cell filled with 0.1 mol L^{-1} KCl solution is 100 ohm . If the resistance of the same cell when filled with 0.02 mol L^{-1} KCl solution is 520 ohm . Calculate the conductivity and molar conductivity of 0.02 mol L^{-1} KCl solution . The conductivity of 0.1 mol L KCl solution is 1.29 S/m .