II – PUC – CHEMISTRY (34)

MODEL QUESTION PAPER -1

For reduced syllabus 2020-21

Time: 3 hours 15 minutes **Maximum Marks: 70**

Instructions:

1. The question paper has four parts: A, B, C and D. All parts are compulsory.
2. Write balanced chemical equations and draw labelled diagrams wherever required.
3. Use log tables and the simple calculators if necessary. **(Use of Scientific Calculator is not allowed)**

PART- A

I. ANSWER ALL THE QUESTIONS. EACH QUESTION CARRIES 1 MARK. 10 × 1 = 10

1. What is the effect of temperature on molality of a solution?
2. How does the size of blood cell changes when placed in an aqueous solution containing less than 0.9% (m/v) sodium chloride?
3. The resistance of a conductivity cell containing 0.001M KCl solution at 298K is 1500Ω. What is the cell constant if conductivity of 0.001M KCl solution at 298K is 0.146 x 10-3 Scm^{-1}?
4. Give an example for pseudo first order reaction.
5. What is adsorption isotherm?
6. Noble gases have large positive values of electon gain enthalpy. Why?
7. Complete the following equation:

$$XeF_4 + \xrightarrow{143K} XeF_6 + O_2$$

8. Give an example for geminal halide.
9. Which type of Aldehydes does not undergo Cannizzaro's reaction?
10. What are nucleotides?

PART- B

II. ANSWER ANY FIVE OF THE FOLLOWING. EACH QUESTION CARRIES 2 MARKS. 5×2= 10

11. Give any two differences between amorphous and crystalline solids.
12. Write the overall cell reaction during the working of Daniel cell.
13. For the reaction R → P, the concentration of reactant changes from 0.03M to 0.02M in 25 min. Calculate the average rate of reaction in seconds.
14. How will you account for the following?
    i) Zr and Hf sizes are almost same.
    ii) What is the composition of mischmetal..
15. Explain Friedel-Crafts acylation with equation by taking chlorobenzene as example.
16. Explain Kolbe's reaction.
17. Give the preparation of phenol from cumene.
18. Explain carbylamine reaction with an example.

PART- C

III. ANSWER ANY FIVE OF THE FOLLOWING. EACH QUESTION CARRIES 3MARKS. 5×3= 15

19. Discuss the principle involved in the manufacture of ammonia by Haber's process along with the chemical equation. 3

20. Give any three reasons for the anomalous behavior of oxygen. 3

21. i) What is aqua regia?

ii) Write the structure of chlorous acid.

iii) Complete the equation: $Br_2 + 5F_2$(excess) → _____ 1+1+1

22. i) Many copper(I) compounds are unstable in aqueous solution and undergo disproportionation. Explain.

ii) What are interstitial compounds? 2+1

23. a) Write general valence shell electronic configuration of d-block elements.

b) d-Block elements act as good catalysts. Give any two reasons. 1+2

24. Give any three postulates of Werner's theory of coordination compounds

25. Based on VBT, explain the formation of $[Ni(CN)_4]^{2-}$. 3

26. i) Write the structure of decacarbonyldimanganese(0), $Mn_2(CO)_{10}$.

ii) What are homoleptic complexes? Give an example. 1+2

PART –D

IV. ANSWER ANY THREE OF THE FOLLOWING. EACH QUESTION CARRIES 5MARKS. 3×5=15

27. a) Calculate the packing efficiency in a cubic close packed (ccp) structure.

b) An element having atomic mass 60u has fcc lattice, the edge length of the unit cell 400pm. Calculate the density of the crystal (N_A= 6.022 x 10^{23}) 3+2

28. a) Addition of 0.643g of a compound to 50mL of a liquid (density=0.879g/mL) lowers the freezing point from 5.51^0C to 5.03^0C. Calculate the molar mass of the compound. (K_f for benzene = 5.12KKgmol^{-1})

b) Give any two differences between ideal and non-ideal solutions. 3+2

29. a) The standard electrode potential for Daniel cell is 1.1V. Calculate the standard Gibbs energy change for the reaction;

$$Zn_{(s)} + Cu^{2+}{}_{(aq)} \rightarrow Zn^{2+}{}_{(aq)} + Cu_{(s)}$$

b) Write any two factors affecting ionic conductance. 3+2

30. a) Derive integrated rate equation for a first order reaction.

b) Which step of the reaction mechanism decides the order of reaction in complex reactions? 4+1

31. a) How does free energy and entropy changes during adsorption?

b) What is coagulating value? The coagulating value of A and B will be 2.4 x 10^{-3}millimole per litre and 1.2 X 10^{-2}millimole per litre, which one has higher coagulating power?

c) What is Craft temperature (T_k)? 2+2+1

V. ANSWER ANY FOUR OF THE FOLLOWING. EACH QUESTION CARRIES 5MARKS. 4×5=20

32. a) Write S_N2 mechanism and mention the order of this reaction.

b) What are Grignard reagents? Write its general formula. 3+2

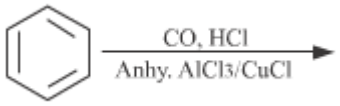
33. a) Explain the mechanism of dehydration ethanol to ethene.

b) Explain Williamson's synthesis with an example. 3+2

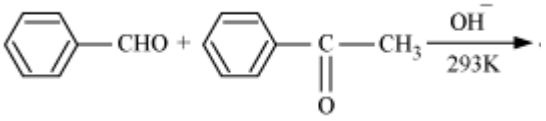
34. a) Lower members of aldehydes and ketones are miscible with water. Give reason

b) Complete the following reactions:

i)



ii)



c) How does acetaldehyde reacts with hydrazine? Give equation. 1+2+2

35. a) What is Hell-Volhard-Zelinsky reaction? Give an example

b) Explain the effect of electron withdrawing groups on acidity of carboxylic acid.

c) Explain decarboxylation of benzoic acid with equation. 2+2+1

36. a) Write the equation and IUPAC name of the product formed when aniline reacts with bromine water at room temperature.

b) Write the increasing order of basicity of the following amines in aqueous solution.

NH_3, $(C_2H_5)_3N$, $C_2H_5NH_2$, $(C_2H_5)_2NH$

c) How do you prepare primary amine by Gabriel's phthalimide synthesis? Give equation. 2+1+2

37. a) Write the Haworth structure of α -D-(+)glucopyranose.

b) What are fibrous proteins? Give an example.

c) Name the base which forms hydrogen bond with adenine in double stranded helix structure of DNA. 2+2+1

II – PUC – CHEMISTRY (34)

MODEL QUESTION PAPER -2

For reduced syllabus 2020-21

Time: 3 hours 15 minutes **Maximum Marks: 70**

Instructions:

1. The question paper has four parts: A, B, C and D. All parts are compulsory.
2. Write balanced chemical equations and draw labelled diagrams wherever required.
3. Use log tables and the simple calculators if necessary. **(Use of Scientific Calculator is not allowed)**

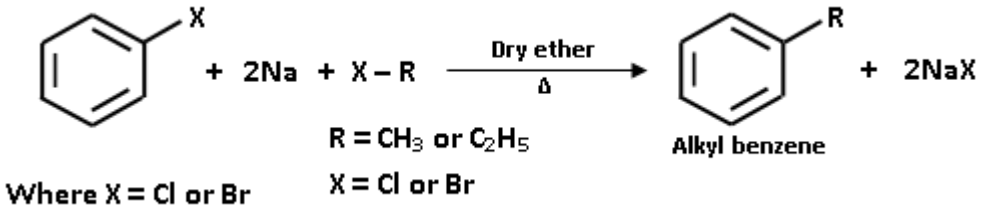
PART- A

I. ANSWER ALL THE QUESTIONS. EACH QUESTION CARRIES 1 MARK. 10 × 1 = 10

1. What is osmotic pressure?
2. Solubility of a gas in liquid decreases as the temperature increases. Why?
3. Define molar conductivity.
4. Consider the following reaction: $2HI_{(g)} \rightarrow H_{2(g)} + I_{2(g)}$, Write the expression for average rate of a reaction with respect to reactants for the reaction.
5. Which is the adsorbent used in the separation of noble gases?
6. Name the Noble gas which does not have general noble gas electronic configuration of ns^2np^6.
7. Complete the following reaction:

$$XeF_6 + 3H_2O \rightarrow \_\_\_\_\_ + 6HF$$

8. What is the name of the following reaction?



9. What is the hybridized state of carbon atom in a carbonyl group?
10. Name the sugar moiety present in DNA

PART- B

II. ANSWER ANY FIVE OF THE FOLLOWING. EACH QUESTION CARRIES 2 MARKS. 5×2= 10

11. Give two differences between Schottky and Frenkel defects in ionic solids.
12. Mention any two factors that determines the products of electrolysis
13. Plot a graph of ln[R] versus time for a first order reaction: R → Products. What does the intercept of the line represent?
14. What is lanthanide contraction? Write the most common oxidation state of lanthanoids.
15. Give reason:
    a). Tertiary alkyl halides undergo S_N^1 reaction very fast.
    b). Haloalkanes are soluble in organic solvents.

16. Explain Riemer-Tiemann reaction and write equation.

17. How anisole reacts with acetyl chloride [CH_3COCl] in the presence of anhydrous $AlCl_3$? Write the chemical equation for the reaction.

18. Write the IUPAC name of the product formed when aniline reacts with bromine water at room temperature and the equation for the same reaction.

PART- C

III. ANSWER ANY FIVE OF THE FOLLOWING. EACH QUESTION CARRIES 3MARKS. 5×3= 15

19. Give any three anomalous behaviour of Nitrogen. 3

20. i) How sulphur dioxide is prepared in the laboratory?

ii) Give a reaction to show that moist sulphur dioxide is a good reducing agent. 2+1

21. i) Explain the action of Conc. HCl on $KMnO_4$ crystals .

ii) Give an example for one oxoacid of chlorine. 2+1

22. i) Calculate the magnetic moment of Fe^{2+}.

ii) Name the 3d element which contains highest number of unpaired electrons in the ground state. 2+1

23. i) Cr^{2+} is reducing agent whereas Mn^{3+} is oxidizing even though both have d^4 configuration. Why?

ii) Among Zn^{2+} and Cu^{2+} which is colourless? 2+1

24. i) Write the energy level diagram for the crystal field splitting in octahedral complexes.

ii) What is ambidentate ligand? 2+1

25. Explain hybridization, geometry and magnetic property of $[CoF_6]^{3-}$ ion on the basis of Valence Bond theory (Atomic number of Co = 27) 3

26. i) Define co-ordination number of a metal ion in a complex? What is the co-ordination number of Fe in $[FeCl_2(en)_2]Cl$.

ii) Is Metal carbonyl, homoleptic or heteroleptic complex? 2+1

PART –D

IV. ANSWER ANY THREE OF THE FOLLOWING. EACH QUESTION CARRIES 5MARKS. 3×5=15

27. a) Calculate the packing efficiency in a body centred cubic (BCC) structure.

b) Metallic iron crystallizes in a particular type of cubic unit cell. The unit cell edge length is 287pm. The density of iron is $7.87 gcm^{-3}$. Calculate the number of iron atoms per unit cell. [Given: Atomic mass of Fe is 56 & $N_A = 6.023 \times 10^{23}$]. 3+2

28. a) The boiling point of benzene is 353.23K. When 1.8g of non-volatile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11K. Calculate the molar mass of the solute. (Given K_b for benzene is $2.53 Kkg\ mol^{-1}$).

b) Define mole fraction of a solute in a binary solution and how is it related to relative lowering of vapour pressure. 3+2

29. a) Calculate the EMF of the cell for the reaction.

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

Given: $E^{o}(Mg^{2+}/Mg) = -2.37V$ & $E^{o}(Ag^{+}/Ag) = 0.80V$

$[Mg^{2+}] = 0.001M$; $[Ag^{+}] = 0.0001M$; $F = 96487Cmol^{-1}$ & $\log 10^{5} = 5$

b) What is limiting molar conductivity? Represent graphically the variation of molar conductivity with concentration of acetic acid. 3+2

30. a) Derive integrated rate equation for a zero order reaction.

b) Calculate the half-life period of a first order reaction, if the rate constant of the reaction is $6.93x10^{3}s^{-1}$. 3 + 2

31. a) Give differences between lyophilic sols and lyophobic sols with respect to reversibility and stability.

b) What is Tyndall effect?

c) Mention any two methods to coagulate lyophobic sols. 2+1+2

V. ANSWER ANY FOUR OF THE FOLLOWING. EACH QUESTION CARRIES 5MARKS. 4×5=20

32. a) Write SN^{1} mechanism for the conversion of t-butyl bromide to t-butyl alcohol.

b) Give any two reasons – Aryl halides are less reactive towards nucleophilic substitution reactions than alkyl halides.

c) What is racemic mixture? 2+2+1

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

b) (i) What is the effect of Electron withdrawing group on the acidity of phenol.

(ii) Arrange o -, m- and p- nitro phenols in the order of their increasing acidity. 3+1+1

34. a) How is Ethanal (Acetaldehyde) prepared from acetyl chloride by Rosenmund reduction.

b) Explain Wolf-Kishner reduction by taking Acetone (Propanone) as an example. 3+2

35. a) Give the preparation of Methanoic acid (Formic acid) from Methanol (Methyl alcohol).

b) A carboxylic acid is treated with alcohol in presence of conc.H_2SO_4. Name the reaction & Give its general equation.

c) Give reason: Benzoic acid does not undergo Friedel-Crafts reaction. 2+2+1

36. a) How do you convert methyl cyanide into ethyl amine by reduction by catalytic hydrogenation method?

b) When aniline is treated with HNO_2 at 273K-278K, benzene diazonium chloride is formed. Write the equation and name the reaction.

c) Give reason: Methyl amine is more basic than ammonia. 2+2+1

37. a) Write the Haworth structure of β-D(+)glucopyranose.

b) How peptide bonds are formed? How many peptide bonds are present in a tetrapeptide?

c) What is a nucleoside? 2+2+1