SECOND YEAR MODEL EXAMINATION FEBRUARY 2023

CHEMISTRY

ANSWER ANY **FOUR** QUESTIONS

1. Number of moles of the solute per kilogram of the solvent is:
   (a) Mole fraction (b) Molality (c) Molarity (d) Molar mass (1)
2. Which of the following is not a colligative property?
   i) Osmotic pressure ii) Elevation of boiling point iii) Vapour pressure iv) Depression of freezing point (1)
3. Write the rate equation for the second order reaction. (1)
4. In which of the following, the central atom/ion is in zero oxidation state.
   i) $[Ni(CN)_4]^{2-}$ ii) $[NiCl_4]^{2-}$ iii) $[Ni(CO)_4]$ iv) $[Ni(NH_3)_6]^{2+}$ (1)
5. _____is a test to distinguish between aldehydes and ketones. (1)

ANSWER ANY **TEN** QUESTIONS

6. 200 cm^3 of aqueous solution of a protein contains 1.26 g of protein. The osmotic pressure of the solution at 300 K is found to be 8.3 x 10^{-2} bar. Calculate the molar mass of protein. (R = 0.083 $LbarK^{-1}mol^{-1}$) (2)
7. Galvanic cells are classified into primary and secondary cells. Write any two differences between primary and secondary cells. (2)
8. $KMnO_4$ is a purple coloured crystal and it acts as an oxidant. How will you prepare $KMnO_4$ from MnO_2? (2)
9. What are the postulates of Werner's theory? (2)
10. Write any two differences between SN^1 and SN^2 reactions. (2)
11. Complete the reactions: (2)
    (a) $CH_3CH_2Br \xrightarrow{AgCN}$ .....
    (b) $CH_3CH_2Br \xrightarrow[\text{Dry ether}]{Na}$ .....
12. Explain the following:
    i) Esterification ii) Williamson Synthesis (2)
13. Explain aldol condensation taking CH_3-CHO as example. (2)
14. How is a primary amine distinguished from a secondary amine using a chemical test? (2)
15. Explain the amphoteric behaviour of aminoacid. (2)

ANSWER ANY **TEN** QUESTIONS

16. a) What do you mean by colligative properties? (1)
    b) For determining the molecular mass of polymers, osmotic pressure is preferred to other properties. Why? (1)
    c) Name the law which helps us to determine partial vapour pressure of a volatile component in a solution. State the law. (1)
17. a) Solutions having same osmotic pressure is called ----------.
    b) Give the relationship between rate of the reaction and temperature.
    c) Which is more acidic : Aceticacid OR Formic acid (3)
18. Kohlrausch's law helps to determine the degree of dissociation of weak electrolyte at a given concentration.
    i) State Kohlrausch's law. (1)
    ii) The molar conductivity (λ_m) of 0.001 M acetic acid is 4.95 x 10^{-5} S cm^2 mol^{-1}. Calculate the degree of dissociation (α) at this concentration if the limiting molar conductivity (λ^0_m) for H^+ is 340 x 10^{-5} S cm^2 mol^{-1} and for CH_3COO^- is 50.5 x 10^{-5} S cm^2 mol^{-1}. (2)
19. For a first order reaction half life period is independent of initial concentration of its reacting species.
    i) What is mean by half life period of a reaction? (1)
    ii) By deriving the equation for $t_{½}$ of first order reaction, prove that $t_{½}$ is independent of initial concentration of reacting species. (2)

20. $[Co(NH_3)_5SO_4]Cl$ and $[Co(NH_3)_5Cl]SO_4$ are co-ordination compounds.
    a) Identify the isomerism shown by the above compounds. (1)
    b) Write the IUPAC names of the above compounds. (2)
21. Haloalkanes and haloarenes are organohalogen compounds.
    i) Suggest a method for the preparation of alkyl chloride. (1)
    ii) Aryl halides are less reactive towards Nucleophilic substitution reactions. Give reason. (2)
22. Alcohols are compounds with general formula R-OH.
    a) Alcohols are soluble in water. Give reason? (1)
    b) Explain a method for the manufacture of ethanol. (2)
23. How are the following conversions carried out? Represent the chemical reactions.
    a) Ethanol to ethanal (1)
    b) Phenol to picric acid (1)
    c) Phenol to benzene (1)
24.
    a) Explain nucleophilic addition reaction of carbonyl compounds with one example (2)
    b) i) Show the order of reactivity of following compounds in nucleophilic addition;
    CH_3-CHO, CH_3-CO-CH_3,HCHO
    (1)
25. Amines are basic in nature.
    a) Arrange the following compounds in the increasing order of their basic strength.
    NH_3, $C_2H_5NH_2$, $C_6H_5NH_2$, $(C_2H_5)_2NH$ (1)
    b) How will you convert aniline to chlorobenzene? (2)

26. Biomolecules are formed by certain specific linkages between simple monomeric units.
    Write the names of linkages and monomeric units in the following class of biomolecules.
    i) Starch ii) Protein iii) Nucleic acid (3)

ANSWER ANY **FOUR** QUESTIONS

27. We can construct innumerable number of Galvanic cells on the pattern of Daniel cell by taking combination of different half cells.
    a) What is a Galvanic cell? (1)
    b) Name the anode and cathode used in the Daniel cell? (1)
    c) Name the cell represented by $Pt_{(s)}/H_{2(g)}/H^+_{(aq)}$. (½)
    d) According to the convention, what is the potential of the above cell at all temperatures? (1)
    e) Write the use of the above cell? (½)

28. a)The rate of a reaction quadruples when the temperature changes from 293 K to 313 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature. (3)
    b) Define activation energy (Ea) (1)
29. a)Transition elements are'd' block elements. Write any four characteristic properties of transition elements. (2)
    b)What is Lanthanoid contraction? (1)
    c)Write any two consequences of Lanthanoid contraction. (1)
30. a)Valence Bond Theory (VBT) can explain the magnetic behaviour and shape of complexes. Using VBT explain the diamagnetism and square planar shape of $[Ni(CN)_4]^{2-}$. (2)
    b) i) Suggest the shape of the following complexes – $[Ni(CO)_4]$ and $[CoF_6]^{3-}$ (1)
    ii) The central ion Co^{3+} with co-ordination number 6 is bonded to the ligands NH_3 and Br^- to form a dipositive complex ion. Write the formula of the complex ion. (1)

31. a)Write simple chemical tests and observations used to distinguish between the following compounds:
    i) Propanal and propanone (1)
    ii) Phenol and benzoic acid (1)
    b) Write the names of the reagents used to bring about the following transformations
    i) C_6H_5-COCl --→ C_6H_5-CHO ii) CH_3-COOH --→ CH_2Cl-COOH (2)

****

Prepared by

MARIA JYOTHI K.A, St.SEBASTIANS H S S KUTTIKKAD
JEETHI R,GMBHSS CHALAKUDY
RANJINI GHSS CHAIPNKUZHY
ASHA M PAUL St.SEBASTIANS H S S KUTTIKKAD
PRIYA M GMBHSS CHALAKUDY
REKHA K MRS CHALKUDY
USHA N M UHSS MAMBRA
JOSSY UHSS MAMBRA
SUNITHA UHSS MAMBRA