H.S. SECOND YEAR
TEST 1 EXAMINATION 2024
SUBJECT: CHEMISTRY

TIME: 3 hours **FULL MARKS: 70**

1. Draw the structure of the following compound: 1-Bromo-4-sec. butyl-2-methylbenzene. **1**

2. Arrange the following compounds in increasing order of their acid strength: **1**
Propan-1-ol, 2,4,6-trinitrophenol, 3-nitrophenol, 3,5-dinitrophenol, phenol, 4-methylphenol.

3. What is the unit of rate constant of n^{th} order reaction? **1**

4. Mention the factors that affect the rate of a chemical reaction. **1**

5. Define solubility of a substance. **1**

6. Give an example of liquid-solid solution. **1**

7. What do you mean by chelating ligand? **1**

8. Draw the structure of $EDTA^{4-}$ and also identify its donor atoms. **1**

9. Write the four differences between rate of reaction and rate constant? **2**

10. **(a)** Arrange the following in decreasing order of their basic strength: **1**
$C_6H_5NH_2$, $C_2H_5NH_2$, $(C_2H_5)_2NH$, NH_3
(b) Arrange the following in increasing order of their basic strength in aqueous solution: **1**
NH_3, $(CH_3)_3N$, $(CH_3)_2NH$, CH_3NH_2

11. **(a)** Explain why aniline is less basic than ethylamine. **1**
(b) Why aniline does not undergo Friedel-Crafts reaction? **1**

12. 0.38 g sample of $NaNO_3$ is dissolved in 250 mL flask. What is the molarity of the solution? **2**

13. Calculate the number of molecules of oxalic acid, $(COOH)_2.2H_2O$ in 100 mL of 0.01 M oxalic acid solution. **2**

14. Depict the galvanic cell in which the cell reaction is $Cu + 2Ag^+ (aq, 1M) \rightarrow 2Ag + Cu^{2+} (aq, 1M)$. Which electrode is negatively charged? **1+1= 2**

15. Define: (a) Electrode potential (b) Standard Electrode Potential **1+1= 2**

16. Calculate the standard reduction electrode potential of the $Ni^{2+}|Ni$ electrode when the cell potential for the cell $Ni\,|\,Ni^{2+}\,(1M)\,\|\,Cu^{2+}\,(1M)\,|\,Cu$ is 0.59 V (Given $E^0_{Cu^{2+}/Cu} = 0.34$ V). **2**

17. Both carboxylic acid and alcohol can form intermolecular hydrogen bonding. But the boiling point of carboxylic acid is more than that of corresponding alcohol. Why? **2**

18. Mention the two main functions of salt bridge? **2**

19. How will you distinguish between primary, secondary and tertiary alcohols? Explain with chemical reactions. **3**

20. (a) Explain why phenol is more acidic than ethyl alcohol. **1**
(b) Although phenoxide ion has more number of resonating structures than carboxylate ion, carboxylic acid is a stronger acid than phenol. Why? **2**

21. **(a)** For the reaction, $2A+3B \rightarrow 4C+2D$, the concentration of C is increased by 2.5×10^{-4} mol L^{-1} in 5 minutes. Calculate (i) the rate of formation of C and (ii) the rate of disappearance of B. **1+1= 2**

(b) How does rate of reaction responds to change in concentration of reactant and why? **1**

22. **(a)** A reaction is first order in A, second order in B and zero order in C. How is the rate reaction affected when the concentrations of A, B and C are doubled? **2**

(b) The rate of a gaseous reaction is decreased by 27 times when the volume of the reaction vessel is increased by 3 times. What is the order of the reaction? **1**

23. **(a)** Calculate the molality of 1 litre solution of 93% H_2SO_4 (weight/volume). The density of the solution is 1.84 g/mL. **2**

(b) What is the effect of temperature on molarity of a solution? **1**

24. **(a)** A 6.9 M solution of KOH in water contains 30% by mass of KOH. Calculate the density of the KOH solution. **2**

(b) What will be the molarity of a solution obtained by mixing 800 mL of 0.5 M HCl with 200 mL of 1 M HCl ? **1**

25. Discuss the mechanism of aldol condensation. **3**

Or

An organic compound A having formula C_7H_5N on hydrolysis with dil. HCl gives B. B on heating with ammonia gives C.C is heated with Br_2/KOH gives D. D on treatment with nitrous acid under ice cold condition gives E. E is treated with HCl in Cu_2Cl_2 gives F. Identify from A to F and write the sequence of reactions. **3**

26. Define homoleptic and heterolytic complex with one example of each. **3**

27. Define the following terms: **1x3=3**

(a) Coordination sphere **(b)** Coordination number **(c)** Ambidentate ligand

28. Write the IUPAC name of the following complexes: **1x5=5**

(a) $Ca_2[Fe(CN)_6]$

(b) $[Co(NH_3)_4Cl(NO_2)]NO_3$

(c) K $[Pt\ Cl_3\ (NH_3)]$

(d) $[Co\ (CN)\ (CO)_2\ (NO)]$

(e) $Ba\ [CrF_4O]$

29. Write equations of the following reactions: **1x5=5**

(a) Finkelstein Reaction

(b) Swarts Reaction

(c) Rosenmund Reduction reaction

(d) Hoffmann Bromamide Degradation Reaction

(e) Friedel-Crafts alkylation of haloarenes

30. Convert the following: **1x5=5**

(a) 1–bromopropane to 2–bromopropane

(b) Propan–2–ol to Propan–1–ol

(c) Benzoyl chloride to Benzaldehyde

(d) Ethanamine to methanamine

(e) Benzene to diphenyl