

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

TIME: 3 hours

FULL MARKS: 70

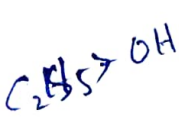
1. Draw the structure of the following compound: 1-Bromo-4-sec. butyl-2-methylbenzene. 1
2. Arrange the following compounds in increasing order of their acid strength:
 Propan-1-ol, 2,4,6-trinitrophenol, 3-nitrophenol, 3,5-dinitrophenol, phenol, 4-methylphenol. 1
3. What is the unit of rate constant 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:
 $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_2\text{H}_5\text{NH}_2$, $(\text{C}_2\text{H}_5)_2\text{NH}$, NH_3 1
 (b) Arrange the following in increasing order of their basic strength in aqueous solution:
 NH_3 , $(\text{CH}_3)_3\text{N}$, $(\text{CH}_3)_2\text{NH}$, CH_3NH_2 1
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, $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$ in 100 mL of 0.01 M oxalic acid solution. 2
14. Depict the galvanic cell in which the cell reaction is $\text{Cu} + 2\text{Ag}^+ (\text{aq}, 1\text{M}) \rightarrow 2\text{Ag} + \text{Cu}^{2+} (\text{aq}, 1\text{M})$. 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 $\text{Ni}^{2+}|\text{Ni}$ electrode when the cell potential for the cell $\text{Ni} | \text{Ni}^{2+} (1\text{M}) || \text{Cu}^{2+} (1\text{M}) | \text{Cu}$ is 0.59 V (Given $E_{\text{Cu}^{2+}/\text{Cu}}^0 = 0.34 \text{ V}$). 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



12
16
16
45

16
3

23
14
48
85



$$m = \frac{n}{v}$$

30

$$S = \frac{m}{v}$$

$$v = \frac{m}{S}$$

- ✓ 21. (a) For the reaction, $2A + 3B \rightarrow 4C + 2D$, the concentration of C is increased by $2.5 \times 10^{-4} \text{ mol L}^{-1}$ 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 $\text{C}_7\text{H}_5\text{N}$ 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.

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

- ✓ 27. Define the following terms:

(a) Coordination sphere

(b) Coordination number

(c) Ambidentate ligand

- ✓ 28. Write the IUPAC name of the following complexes:

(a) $\text{Ca}_2[\text{Fe}(\text{CN})_6]$

(b) $[\text{Co}(\text{NH}_3)_4\text{Cl}(\text{NO}_2)]\text{NO}_3$

(c) $\text{K}[\text{PtCl}_3(\text{NH}_3)]$

(d) $[\text{Co}(\text{CN})(\text{CO})_2(\text{NO})]^-$

(e) $\text{Ba}[\text{CrF}_4\text{O}]$

- ✓ 29. Write equations of the following reactions:

(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:

(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

$$\frac{32}{64} = \frac{2}{98}$$

$$1 \times \frac{10}{9}$$

93/98

$$\frac{100}{98}$$

$$3 \times \frac{100}{98} \times \frac{100}{98}$$

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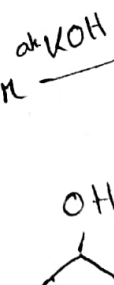
(d) Ethanamine to methanamine

(e) Benzene to diphenyl

$$\frac{34}{57} \times \frac{9}{100}$$

$$\frac{9}{100} = 6.9$$

$$S = 6.9 \text{ km}$$



1x5=5

$$\frac{40}{16}$$

$$\frac{6.9}{6.21}$$

$$1+x-3=0$$

$$x=2$$

$$+2+x-6=0$$

$$x=4$$

$$x+0-1-1-1=0$$

$$x-1=-1$$

$$x=11$$

$$+2+x-4-2=0$$

$$x=4$$

1x5=5

$$M = \frac{w_2}{w_1} \times \frac{M_1}{M_2}$$