

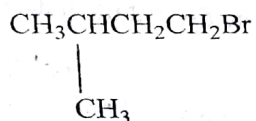
HS SECOND YEAR PRE FINAL 1 EXAM 2024

SUB: CHEMISTRY

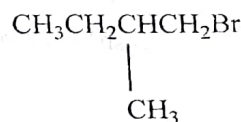
Time: 3 hours

Full Marks: 70

1. Give an example of aldohexose. 1 ✓
- ✓ 2. Why is $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ blue in colour? 1
- ✓ 3. What is effective collision? 1
- ✓ 4. Write two characteristics of catalyst. 1
5. State Faraday's Second Law of electrolysis. 1 ✓
6. Though Cu, Ag and Au have completely filled d-subshell, yet they are considered as transition elements. Why? 1 ✓
- ✓ 7. How will you prepare salol from salicylic acid? 1
- ✓ 8. Which alkyl halide from the following pairs would you expect to react more rapidly by an $\text{S}_\text{N}2$ mechanism and why? 1



or



- ✓ 9. Explain why $(\text{CH}_3)_3\text{C}-\text{O}-\text{CH}_3$ on reaction with HI gives $(\text{CH}_3)_3\text{C}-\text{I}$ and CH_3-OH as the main products and not $(\text{CH}_3)_3\text{C}-\text{OH}$ and CH_3-I . 2

10. Write the following reactions:

- a) Hell-Volhard-Zelinsky reaction
- b) Hunsdiecker reaction

11. Distinguish between: (with proper chemical reactions)

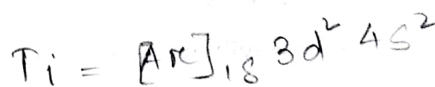
- a) Acetaldehyde and Acetone
- b) Ethylamine and dimethylamine

- ✓ 12. Ti^{4+} compounds are colourless in aqueous solution but Ti^{3+} compounds are violet coloured. Explain. 2

- ✓ 13. The activation energy of a reaction is 75.2 kJ mol^{-1} in the absence of a catalyst and $50.14 \text{ kJ mol}^{-1}$ with a catalyst. How many times will the rate of reaction grow in the presence of the catalyst if the reaction proceeds at 25°C ? 2

- ✓ 14. Write the mechanism of Reimer Tiemann reaction. 2

- ✓ 15. Methanamine can be prepared by using Gabriel phthalimide synthesis but aromatic primary amine cannot. Explain why? 2



16. At 25°C, the vapour pressure of pure benzene is 100 torr while that of pure ethyl alcohol is 44 torr. Assuming ideal behaviour, calculate the vapour pressure at 25°C of a solution which contains 10 g of each substance. 2 ✓

17. What are non-ideal solutions? Explain non-ideal solutions showing negative deviation with graphical representation. 1+1=2

18. What pressure (bar) of H_2 would be required to make emf of hydrogen electrode zero in pure water at 25°C? 2 ✓

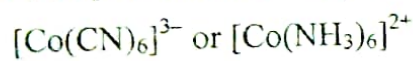
19. a) Define glycosidic linkage. 1 ✓

b) What happens when glucose is treated with i) HCN ii) HNO_3 . (Give reactions). 36
22
2
22
2
2

20. a) What are carbohydrates? 46
25
230
230
46

b) Sucrose is an invert sugar. Why? 15
CH₂-OH
26
24+6+16
30+16
46

21. a) Which complex has larger crystal field splitting and why? 2
L+6A+0
24+6+16
30+16
46



b) Draw a figure to show the splitting of degenerate d-orbitals in an octahedral crystal field. 1
11952
1192
32

c) Discuss the role of coordination compounds in analytical chemistry. 1 ✓

22. a) $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic. Explain why? 1½

b) On the basis of VBT, find the geometry and magnetic behaviour of $[Cu(CN)_4]^{2-}$. 1½

23. (a) How does rate constant of a reaction depends upon temperature? 1

(b) A first order reaction is 50% completed in 40 minutes at 300K and in 20 minutes at 320K. Calculate the activation energy of the reaction. 2

24. a) Write the general electronic configuration of transition elements. 1

b) What is meant by 'disproportionation' of an oxidation state? Give an example. 2

25. The air is a mixture of a number of gases. The major components are oxygen and nitrogen with approximate proportion of 20% and 79% by volume at 298 K. The water is in equilibrium with air at a pressure of 10 atm at 298 K. If the Henry's law constants for oxygen and nitrogen at 298 K are 3.3×10^7 mm and 6.51×10^7 mm respectively, calculate the composition of these gases in water. 3 ✓

26. Define molar conductivity of an electrolytic solution.

How do you explain with the help of graph, the increase in the value of molar conductivity with dilution in case of strong and weak electrolyte? 1+2=3

27. Three electrolytic cells A, B and C containing electrolytes ZnSO_4 , AgNO_3 and CuSO_4 respectively were connected in series. When a steady current of 1.5A was passed through them, 1.45g Ag were deposited at the cathode of cell B.

(a) How long did the current flow?

(b) What mass of copper and zinc were deposited? (At. mass of Cu = 63.5u, Zn = 65.3u, Ag = 108u)

1+2=3 ✓

28. a) Write the IUPAC name of the insecticide DDT and its preparation.

1+1=2

b) Why chloroform is stored in dark coloured air tight bottles (*also give reactions*)? 2

c) Explain why Grignard reagent should be prepared under anhydrous conditions. 1

29. Convert the following:

1x5=5

a) 2-chloropropane to 2-methyl propane

b) Benzene to 1-phenylethanol

c) Ethylchloride to Butan-2-one

d) Acetic acid to 2-methylpropan-2-ol

e) Ethene to propan-1-ol

Dichloro diphenyl methane



30. a) An organic compound A having formula $\text{C}_6\text{H}_7\text{N}$ on treatment with HNO_2 under ice cold condition gives B. B is treated with KCN in the presence of CuCN to give C. C on reduction with SnCl_2 and HCl followed by acidic hydrolysis gives D. Identify A, B, C and D with complete reactions.

2+1=3

b) An organic compound A having formula $\text{C}_3\text{H}_9\text{N}$ when treated with nitrous acid gave an alcohol (B) and N_2 gas. A on warming with chloroform and caustic potash gives C, which on reduction with LiAlH_4 or H_2 , Pd/C gives D. Identify A, B, C and D.

2

Or

An organic compound A having formula $\text{C}_7\text{H}_8\text{O}_2\text{N}$ on reduction with Fe/HCl gives B. B is treated with nitrous acid under ice cold condition gives C. C is oxidized with acidified $\text{K}_2\text{Cr}_2\text{O}_7$ to give D. D on heating with ammonia gives E. E on treatment with Br_2/KOH gives F. F is again treated with nitrous acid under ice cold condition gives G. G is treated with HBr in the presence of Cu gives H. If G is treated with warm water it gives I. I is treated with PCl_5 to give J. D is treated with thionyl chloride to give K, which is treated with Lindlar's catalyst to give L. L is treated with conc. NaOH to give M and N. N on acidic hydrolysis gives O. Identify A to O and write the sequence of reactions.

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