B.Sc./5th Sem (H)/CHEM/23(CBCS)

2023

5th Semester Examination

CHEMISTRY (Honours)

Paper : C 12-T

[Organic Chemistry - V]

[CBCS]

Full Marks : 40 Time : Two Hours

The figures in the margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

Group - A

Answer any ***five*** questions from the following :

$2\times5=10$

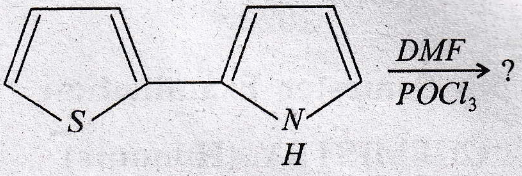
1. Explain why *cis* –1, 4-cyclohexane diol exists preferably in twist boat conformation.

2. Pyridine is used as a basic solvent in many organic reactions including oxidation reactions while pyrrole can not be used. Why?

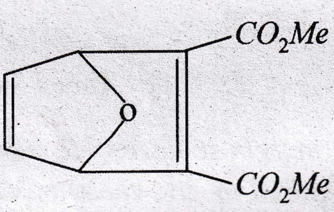
3. How will you bring about chain shortening in aldose?

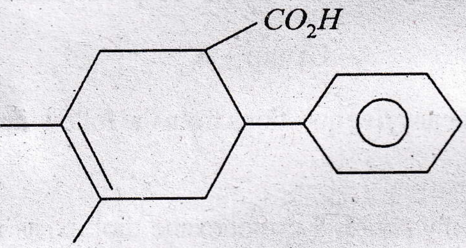
4. What is denaturation of protein? Mention two conditions under which denaturation occurs.

5. Predict the product(s) with mechanism.



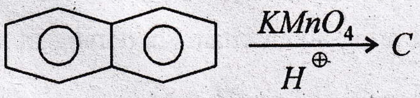
6. The following compounds have been synthesized by Diels-Alder reaction. Identify the diene and dienophile components.

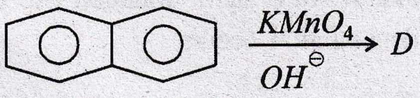
(i) 

(ii) 

7. Why indole-3-aldehyde does not undergo cannizaro reaction?

8. Predict the products (C, D).

(i) 

(ii) 

Group - B

Answer any ***four*** questions from the following :

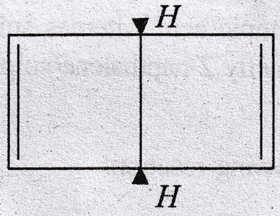
5×4=20

9. (a) Esters of *trans*-4-*t* butyl cyclohexane carboxylic acid undergoes saponification at a much faster rate $\left(k_{trans}/k_{cis}=20\right)$ than the *cis* isomer — Explain.

Would you expect a similar difference in reaction rate, when the cyclohexyl substituent is in the alcohol part?

(b) In anhydrous methanol, the equilibrium of D-glucose contains 50% α-form whereas in H_2O it is 38%. Explain. 3+2

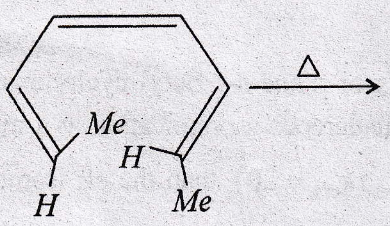
10. (a) Although Dewar benzene (*bicyclo* [2, 2, 0] hexa 2, 5 – *diene*) is less stable by 60 kcal than its isomer benzene, its conversion into benzene is surprisingly slow (E_{act} = 37 kcal). Explain.



(Dewar benzene)

P.T.O.

(b) Identify the product(s) of the following reaction showing F.M.O. interaction :



2+3

11. (a) Proline and hydroxyproline gives yellow colour with ninhydrin — Explain.

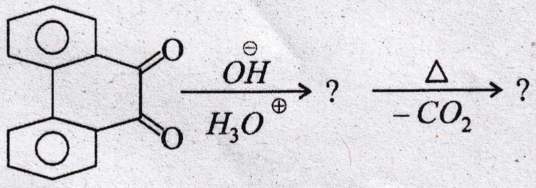
(b) Synthesize *L*-Leucine using Gabriel phthalimide synthetic approach. 2+3

12. (a) When 2-acylfuran is allowed to react with NH_3 in sealed tube at high temperature, 3-hydroxy-pyridine derivative is obtained — Explain with mechanism.

(b) Synthesize quinoline by using aniline and α, β unsaturated carbonyl compound. 2+3

13. (a) Sulphonation of napthalene at 80°C yields chiefly 1-napthalene sulphonic acid whereas sulphonation at 160°C yields chiefly 2-napthalene sulphonic acid — Explain.

(b) Complete the following reaction.



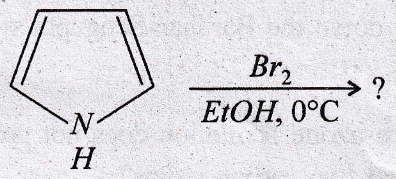
3+2

14. (a) Carry out the following transformations :

(i) D-Arabinose $\rightarrow$ D-mannose

(ii) D-glucose $\rightarrow$ D-fructose.

(b) Predict the major product :



3+2

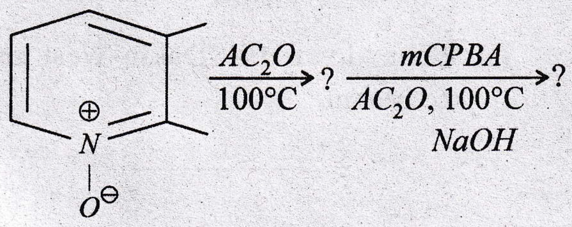
Group - C

Answer any ***one*** question : 10×1=10

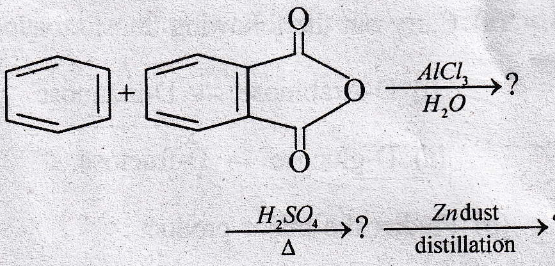
15. (a) Predict the most stable conformation of 1-methyl-1-phenyl cyclohexane.

(b) Predict the product(s) with plausible mechanism :

(i)



P.T.O.

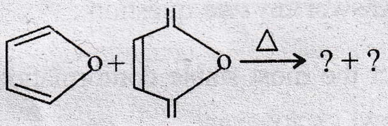
(ii) 

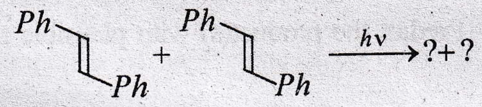
(c) Write down the Bardhan-Sengupta synthesis.

2+(2+3)+3

16. (a) Why osazone formation does not proceed beyond the first two carbon atoms?

(b) Write the products of the following reaction with stereochemistry and F.M.O. explanation.

(i) 

(ii) 

(c) Write down the Dakin-West reaction with mechanism. 3+(2×2)+3