

**MASTER OF SCIENCE IN
CHEMISTRY/MASTER OF SCIENCE
IN ANALYTICAL CHEMISTRY
(MSCCHEM/MSCANCHEM)**

Term-End Examination

June, 2025

**MCH-012 : STEREOCHEMISTRY AND
INTERMEDIATES**

Time : 2 Hours

Maximum Marks : 50

Note : Answer any *five* questions. All questions carry equal marks.

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1. (a) For $\text{HOOCCHBr}-\text{CH}(\text{F})\text{CH}_3$ molecule, draw the following projections : $2\frac{1}{2}$
- (i) Fischer projection
- (ii) Newman projection (eclipsed conformation)

(iii) Sawhorse projection (staggered conformation)

(b) For $\text{HOOCCH(OH)-CH(OH)-CH}_3$ molecule draw the following projections : $2\frac{1}{2}$

(i) Fischer projection

(ii) Newman projection (staggered conformation)

(iii) Flying wedge projection

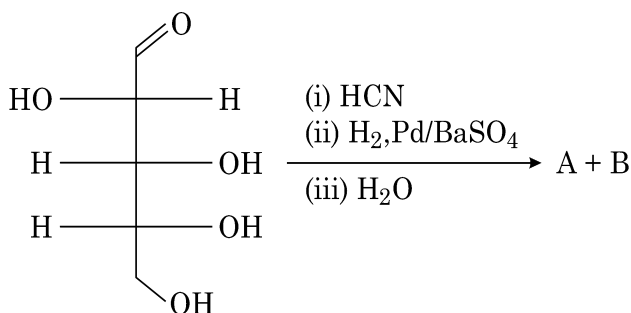
(c) What is meant by Pseudoasymmetry ? Explain its concept with the help of an example. 5

2. (a) Draw the wedge and dash structures indicating the chiral centre(s) for the following compounds and assign their R/S configuration : 5

(i) 1, 2-dibromopropane (both the isomers)

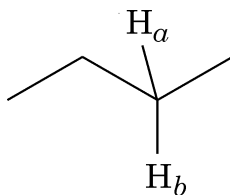
(ii) 2-bromo-4-chloropentane (in any two of the isomers)

- (b) Compare the chair and boat conformations of cyclohexane in terms of their structure and stability. Draw all the isomers of cyclohexane-1, 3-diol in its chair form. Which conformation will be more stable and why ? 5
3. (a) The chain lengthening reaction with HCN and then reduction of D-arabiose leads to a mixture of products A and B under the conditions given below : 5



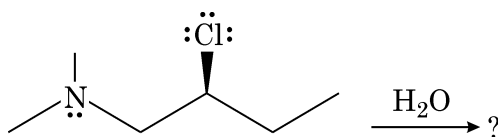
Assign the R/S configuration at any *two* of the stereocentres of products A and B. What type of isomers are A and B ?

- (b) Explain the terms topicity, enantiotopic and diastereotopic. Identify the H_a and H_b hydrogens as enantiotopic or diastereotopic in the following compound. Justify your answer using the substitution-addition criterion : 5



4. (a) Differentiate between stereospecific and stereoselective reactions with the help of a suitable example for each type. 5
- (b) List various ways of predicting the mechanism of an organic reaction by the formation of an intermediate. Give an example to explain any *one* of these ways. 5

5. (a) Write the product formed in the following reaction : 5

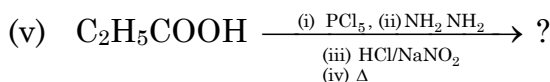
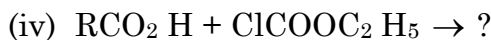
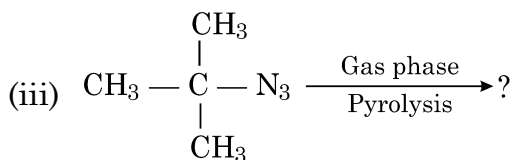
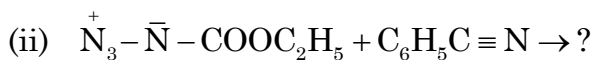
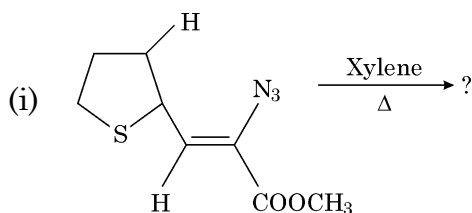


Give the mechanism and indicate the stereochemistry, configuration at the chiral carbon of the product formed.

- (b) Compare the benzil-benzilic acid rearrangement with pinacol-pinacolone rearrangement taking an example in each case. 5
6. (a) Differentiate between a carbocation and a carbanion in terms of their hybridisation, geometry giving the structure, stability on the basis of inductive effect and the nature in a substitution reaction. 5

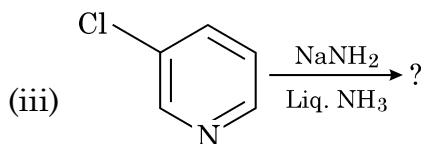
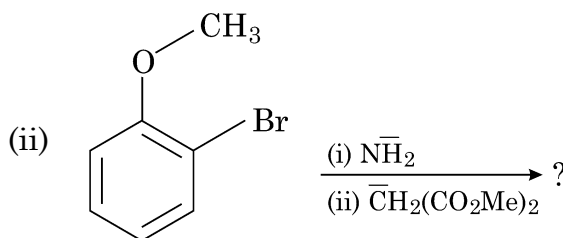
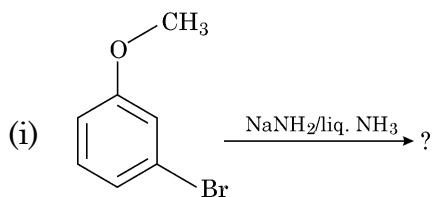
- (b) What happens when an ether is stored for a long duration ? Write the mechanism involved and explain the process it undergoes. 5

7. (a) Write the products of the following reactions : 5



- (b) Write the preferred products formed in any *two* of the following reactions and

the steps involved. Give reasons for your answer : 5



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