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MCH–012

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

Term-End Examination

June, 2026

MCH-012 : STEREOCHEMISTRY AND REACTIVE INTERMEDIATES

Time : 2 Hours *Maximum Marks : 50*

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

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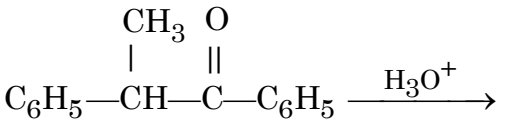
1. (a) Complete the following reaction. Explain why the resulting mixture is optically inactive. 5



(b) Draw the two enantiomers for the allene, 1-bromo-1-chloro-1, 2-butadiene. Explain the type of chirality present in the molecule. Assign the absolute configuration (R or S) to one of the enantiomers. 5

2. (a) Draw the Newman projections for the conformations of *n*-butane. Explain which conformation is more stable and why. 5

(b) Draw the chair and boat conformations of cyclohexane. Explain the type of strain present in each conformation. Which conformation is more stable and why ? 5

3. (a) Draw the wedge and dash structure for (S)-alanine. Explain the steps involved in assigning R/S configuration to the molecule.

(b) Taking a suitable example, explain the principle of chemical correlation for determining the configuration of a compound. 5

4. (a) Describe the method of quasi-racemates for the correlation of configuration of

compounds. Explain how this method uses phase diagrams of mixtures to determine the two chemically similar, but different, optically active compounds which have the same or opposite configurations. 5

(b) Describe the Felkin-Ahn model with the help of suitable examples. Explain the proposed transition state geometry. How does it better account for stereoselectivity with bulky nucleophiles. 5

5. (a) Write the mechanism of Benzil-Benzilic acid rearrangement. 5

(b) Differentiate between carbocations and carbanions with respect to their structure and reactivity. 5

6. (a) What is the difference in the stereochemistry of products when a singlet carbene and a triplet carbene are added to an alkene ? 5

(b) Explain the concept of axial chirality. Explain how this phenomenon allows molecules like allenes and spiranes to be optically active without traditional chiral center. 5

7. (a) Which two rules are treated under sector rules ? For which chromophores, these rules can be used. Explain with the help of an example. 5

(b) Write all the steps in free radical addition of HBr. Explain why the peroxide effect is observed for HBr and not HCl in such addition reactions. 5

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