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AB-233674

M.Sc. (Semester-II) Examination, June-2025

(Backlog)

CHEMISTRY

(Organic Chemistry-II)

Time Allowed : Three Hours

Maximum Marks : 70

Note : This question paper is divided into four sections. Attempt questions of all four sections as per given direction. Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note: Attempt **any ten** questions. Each question carries 1 mark.

[10x1=10]

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(1)

[P.T.O.]

1. Choose the correct answer :

(i) Hofmann elimination typically leads to :

- (a) The most substituted alkene
- (b) The least substituted alkene
- (c) The formation of a carbocation
- (d) The attack of a nucleophile

(ii) Pyrolytic Syn-elimination is most commonly observed in :

- (a) E_1 reactions
- (b) E_2 reactions
- (c) Ester thermal reactions
- (d) Electrophilic substitution

(iii) In E_2 elimination, the correct orientation for maximum reactivity is :

- (a) Cis-periplanar
- (b) Syn-periplanar
- (c) Anti-periplanar
- (d) Gauche

(iv) The Woodward-Hoffmann rules are based on :

- (a) Free radical mechanism
- (b) Molecular orbital symmetry
- (c) Carbocation stability
- (d) Electrophilic addition

(v) A (4+2) cycloaddition is also known as :

- (a) Diel's - Alder reaction
- (b) Sigmatropic rearrangement
- (c) Electrocyclic reaction
- (d) Ene reaction

(vi) Which of the following is a cheletropic reaction?

- (a) Diel's Alder reaction
- (b) Sulphur dioxide reacting with butadiene
- (c) Cope rearrangement
- (d) Claisen rearrangement

(vii) Sigmatropic rearrangement involve :

- (a) Breaking of Sigma bonds only
- (b) Migration of Sigma bonds accompanied by pi electron shift
- (c) Free radical intermediates
- (d) Carbocation rearrangements

(viii) The excited singlet state differs from the ground state in :

- (a) Electron Spin Orientation
- (b) Number of Protons
- (c) Charge
- (d) Mass

(ix) The Di- π -methane rearrangement involves :

- (a) Migration of a single carbon atom
- (b) Formation of a new π bond
- (c) Rearrangement of two π -system
- (d) Radical chain reactions

(x) In photochemistry, isomerisation of alkenes usually results from :

- (a) S_N^1 substitution
- (b) Light induced rotation about the double bond
- (c) Hydrogen abstraction
- (d) Radical addition

(xi) Which condition favours anti-Markonikov addition of HBr to alkene?

- (a) Presence of Water
- (b) Peroxides
- (c) Acidic Medium
- (d) Basic Medium

(xii) Which of the following compounds would undergo nucleophilic addition more readily?

- (a) Ethen
- (b) Acetylene
- (c) Ethane
- (d) Formaldehyde

SECTION-B

(Very Short Answer Type Questions)

Note : Attempt any five questions. Each question carries 02 marks. (Word limit 25-30 words). [5x2=10]

2. (i) What is the key difference between E_1 and E_2 mechanism?
- (ii) Define Pyrolytic syn-elimination.
- (iii) What does the Woodward Hoffmann rule predict?
- (iv) Give an example of a (4+2) cycloaddition reaction.
- (v) What is a sigmatropic reaction?
- (vi) What initiates a photochemical reaction in organic compound?
- (vii) Mention one product of Di- π -methane rearrangement.

SECTION-C

(Short Answer Type Questions)

Note : Attempt any five questions. Each question carries 04 marks. (Word limit : 250 words) [5x4=20]

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(6)

3. (i) Explain the E_1 CB mechanism and mention conditions under which it occurs.
- (ii) State the Woodward-Hoffmann rules and explain their significance in pericyclic reactions.
- (iii) What are sigmatropic rearrangements? Explain with an example of a (1,5)-hydride shift.
- (iv) Define Cheletropic reactions and give one characteristic feature of such reactions.
- (v) Explain the process of absorption of light in organic molecules and its effect on their electronic states.
- (vi) Describe the Di- π -methane rearrangement mechanism in photochemistry.
- (vii) Explain 1,3 dipolar cycloaddition in detail.

SECTION-D

(Long Answer Type Questions)

Note : Attempt any three questions . Each question carries 10 marks. (Word limit : 500 words) [3x10=30]

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(7)

[P.T.O.]

4. (i) Discuss the mechanism of E_1 and E_2 elimination reactions. Compare their stereochemistry, kinetics and substrate preferences.
- (ii) Explain the orientation of the double bond in elimination reactions with reference to Hoffmann and Saytzeff rules. Include examples and mechanistic details.
- (iii) What is Diel's Alder Reaction? Explain regioselectivity and stereoselectivity in detail with suitable examples.
- (iv) Describe the photochemistry of alkenes and aromatic compounds including mechanisms of isomerisation, ring closure and rearrangements.

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