

(7 pages)

Reg. No. :

Code No. : 7818

Sub. Code : WCHM 11/
VCHC 11

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2024.

First Semester

Chemistry — Core

ORGANIC REACTION MECHANISM — I

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (15 × 1 = 15 marks)

Answer ALL questions.

Choose the correct answer :

1. According to Hammond postulate the transition state of 1st step exothermic reaction should have the structure that resemble the _____
- (a) Reactant (b) Product
(c) Intermediate (d) Transition state

2. A catalyst may be defined as a substance which lowers the _____ of a reaction.
- (a) Activation energy (b) Threshold energy
(c) Kinetic energy (d) Free energy
3. The Hammett equation in organic chemistry relates structure to both equilibrium constants and rate constants for
- (a) Reaction of meta and para substituted benzene
(b) Free radical reaction
(c) Photochemical reactions
(d) Multicenter reactions
4. Meta directing groups are called _____ groups.
- (a) Activating (b) Deactivating
(c) Both (a) and (b) (d) None of the above
5. The rate of sulfonation of benzene can be significantly enhanced by the use of
- (a) A mixture of nitric and sulfuric acid
(b) Concentrated sulfuric acid
(c) Solution of SO₃ in sulfuric acid
(d) SO₃

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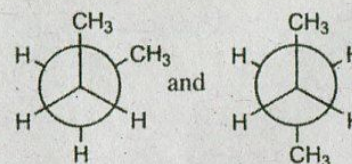


6. The function of FeCl_3 in chlorination of benzene is to produce
 (a) Cl (b) Cl^+
 (c) C (d) Cl^-
7. m-Bromoanisole on treatment with KNH_2 in liq. NH_3 gives
 (a) o-Anisidine (b) p-Anisidine
 (c) m-Anisidine (d) both (a) and (c)
8. The correct formula of the solvent DMSO is
 (a) $(\text{CH}_3)_2\text{S}(\text{OH})_2$ (b) $\text{CH}_3\text{SO}_2\text{CH}_3$
 (c) CH_3SOCH_3 (d) $\text{CH}_3\text{SO}_3\text{H}$
9. $\text{S}_{\text{N}}1$ reaction increases for allylic substrate present at
 (a) 1,2 position (b) 1,3 position
 (c) 1,4 position (d) 3,5 position
10. Optical activity exhibited by the molecule which
 (a) is symmetrical as whole
 (b) contain two asymmetric center
 (c) contain a triple bond
 (d) Has a double bond with two groups different from are another at either side

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11. The two hydrogens at C-2 and C-3 in (2R, 3S) tartaric acid are
 (a) Enantiotopic
 (b) Diastereotopic
 (c) Homotopic
 (d) Constitutionally heterotopic
12. The following pair of isomer is an example of



- (a) Enantiomer (b) Geometrical isomer
 (c) Optical isomer (d) Diastereomer
13. Bridgehead hydrogen of the conformers of cis-decalins is positioned as
 (a) a,a (b) a,e
 (c) e,a (d) Pseudo a-pseudo e
14. In the complete rotation of butane from 0° to 360° the gauche staggered conformation appears
 (a) Twice (b) One
 (c) Trice (d) Four times

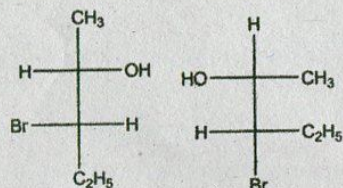
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[P.T.O.]



15. The molecule represented by the below mentioned two structure are



- (a) Identical (b) Enantiomer
(c) Diastereomers (d) Epimer

PART B — (5 × 4 = 20 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

16. (a) Compare transition state and intermediate state.

Or

- (b) Write short note on Taft equations.

17. (a) Heterocyclic compounds pyrrole, furan and pyridine are classified as aromatic compounds. Justify.

Or

- (b) Discuss the mechanism of nitration of benzene.

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18. (a) Discuss Benzyne mechanism.

Or

- (b) Write short note on Von-Richter rearrangements.

19. (a) Explain the sequence rule for R and S nomenclature.

Or

- (b) Write brief note on the stereochemistry of biphenyls.

20. (a) Discuss briefly about the types of ORD curves.

Or

- (b) State and explain Bredt's rule.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 600 words.

21. (a) Discuss the techniques of trapping for the detection of reaction intermediates.

Or

- (b) Describe the kinetic methods for the determination of reaction mechanism.

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22. (a) Define annulenes. Comment on aromatic character of following annulenes [14]
annulene [10] annulene.

Or

- (b) Discuss the mechanism of SE1 reaction. Why does SE1 reaction lead to racemization?

23. (a) (i) Discuss the factors affecting reactivity of aromatic nucleophilic substitution reaction.

- (ii) What is Rosenmund reduction?

Or

- (b) (i) Define Ambident nucleophiles.

- (ii) Compare SN¹ and SN² reaction.

24. (a) Explain the following :

- (i) Optical purity

- (ii) Chiral shift reagents

- (iii) Chiral solvating reagent.

Or

- (b) Discuss in detail about prostereoisomerism.

25. (a) Discuss the conformational analysis of Cis and Trans decalins.

Or

- (b) Elaborate the characteristics of cyclohexane chair conformations.

