

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2021
(Regular/Improvement/Supplementary)

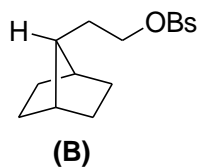
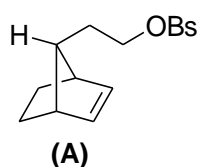
CHEMISTRY
FCHE1C03- STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS

Time: 3 Hours

Maximum Weightage: 30

Section A: Short answer questions. Answer any *eight* questions. Each carries *one* weightage.

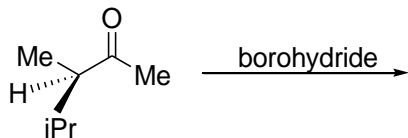
1. Explain the aromaticity of cyclooctatetraene and [10]-annulene.
2. Which of the following undergo acetolysis faster? Justify your answer.



3. a) With help of potential energy curve, discuss the stability of the conformers of ethane.
b) Draw the most stable conformer of methyl cyclohexane.
4. Write the configuration of the alkene formed by the elimination of one molar equivalent of HBr from *erythro* and *threo* bromo-1,2-diphenylpropane.
5. What is enantiomeric excess? Calculate the enantiomeric excess and specific rotation of a mixture containing 6 g (+) butan-2-ol and 4g (-) butan-2-ol.
6. Explain the Cram's chelation control in reaction of chiral ketone with carbon-based nucleophiles.
7. What is Pechman reaction? Give its mechanism.
8. Arrange benzoic acid, *meta*-hydroxy benzoic acid and *para*-hydroxy benzoic acid in the decreasing order of acidity. Justify your arrangement.
9. Among *erythro* and *threo* isomers of butan-2,3-diol, which is more populated? Justify your answer.
10. Compare the rate of chromic acid oxidation of axial and equatorial hydroxyl group to ketones.

(P.T.O.)

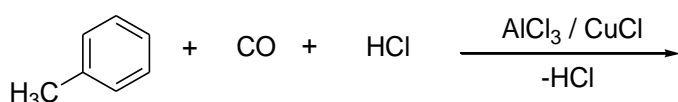
11. Differentiate conformation and configuration with suitable examples.
12. Identify the two alcohols formed in the borohydride reduction shown below. Use Cram's rule to predict the major product.



(8×1 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage.

13. Identify the product of the following reaction. Name the reaction and write the mechanism of the reaction.



14. Write a note on different chemical evidences for the investigation of reaction mechanisms.
15. Compare the rate of esterification of menthol, isomenthol, neomenthol and neo isomenthol.
16. Explain the effect of conformation on the course and rate of E1 and E2 elimination reactions in methylchlorocyclohexane systems.
17. a) Briefly explain the stereo isomerism shown by aldoximes, ketoximes and diazo compounds.
b) How do we assign E and Z nomenclature in abC=Ccd type alkenes. Explain with suitable examples.
18. a) Explain the Chiral pool synthesis of beetle pheromone component (s)-(-)- ipsenol from (s)-(-) leucine with proper mechanism?
19. Explain the use of following in asymmetric synthesis?
 - (a) BINAL-H
 - (b) Oxazolidinone
 - (c) IPC_2BH

(4×3 = 12 weightage)

Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.

20. Briefly explain the following.

- (i) Aromaticity of neutral and charged annulenes and reason for the stability of aromatic compounds.
- (ii) Aromaticity of azulenes, fulvenes and fulvalenes.
- (iii) Homoaromaticity with examples.
- (iv) The IPSO attack in aromatic electrophilic substitution reactions.
- (v) The S_NAr mechanism of aromatic nucleophilic substitution reactions.

21. a) Write a note on transition state theory. **Derive the equation to calculate values of ΔH^\ddagger and ΔS^\ddagger .** Give the significance of the values.

b) Briefly explain Taft Equation and explain the terms.

22. a) What is ring flipping? Explain why ring flipping is not possible for 4-*t*-butylcyclohexanol.

b) Draw the structure of adamantane. Can we introduce a double bond in the ring system of it? Substantiate your answer.

c) Discuss the conformational analysis of ethylene glycol.

23. a) Show how the stereochemical descriptions *R* and *S* are assigned to chiral allenes and biphenyls based on CIP rule.

b) Draw the Fischer projection formula of (2*S*-3*R*) 3-bromo-butan-2-ol.

c) Draw bond line formula of (2*S*, 3*E*) 7-phenylhept-3-en-2-ol.

(2×5 = 10 weightage)