



MSc DEGREE (CSS) EXAMINATION, DECEMBER 2025

First Semester

M Sc Industrial Chemistry

Core Courses - CH060103 - ORGANIC CHEMISTRY - I

2020 Admission Onwards

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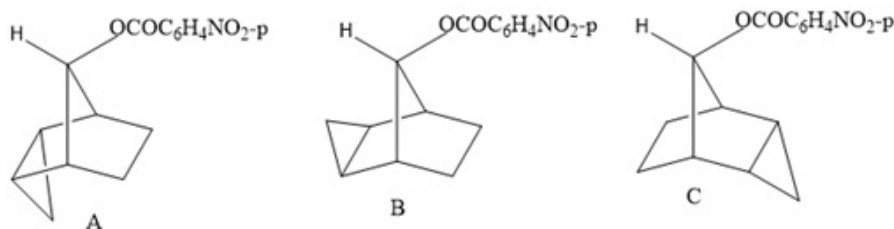
Time: 3 Hours

Weightage: 30

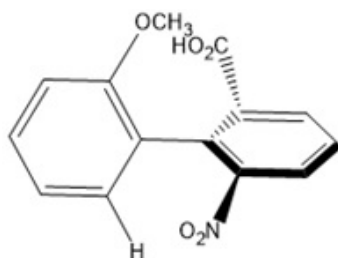
Part A (Short Answer Questions)

Answer any **eight** questions.Weight **1** each.

1. What are carbenes? Give the structure of singlet and triplet methylene
2. Identify among the following as aromatic, antiaromatic and homoaromatic:
a) Cyclopentadienyl anion. b) Cyclooctatetraene c) [12] annulene. (d) Naphthalene
3. Arrange the following compounds in order of increasing rate of solvolysis and explain the order:

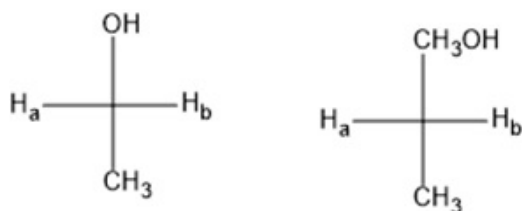


4. Give the mathematical form of Hammett equation and explain the terms.
5. The total number of stereo isomers possible for the formula $C_2BrClFI$
6. Assign R or S configuration of the following





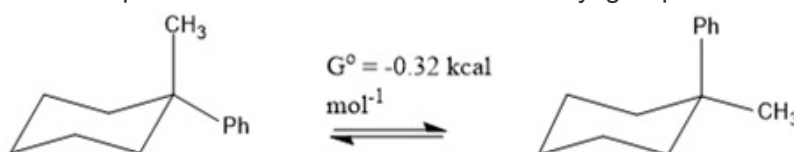
7. Label H_a and H_b in the following as enantiotopic, diastereotopic or homotopic



8. Define the terms:

- Conformational analysis
- gauche interaction.

9. Explain why 1-methyl-1-phenyl cyclohexane slightly favours a conformation that places the bulkier phenyl group in the axial position rather than the smaller methyl group.



10. What is the stereoselective reaction? Give an Example.

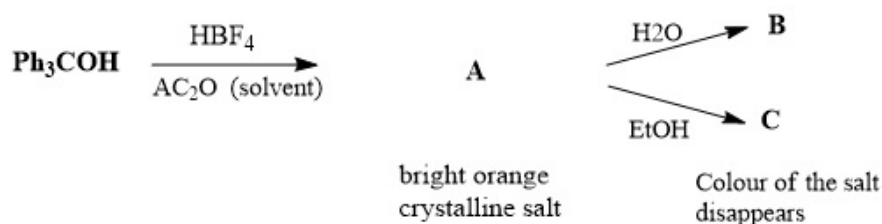
(8×1=8 weightage)

Part B (Short Essay/Problems)

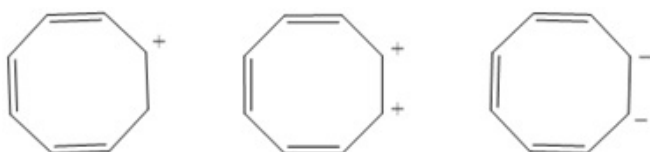
Answer any **six** questions.

Weight 2 each.

11. Explain the following reactions and observations with equations.



12. How do you generate the following species from COT? Predict with reasons whether they are aromatic, non-aromatic, anti-aromatic or homo aromatic

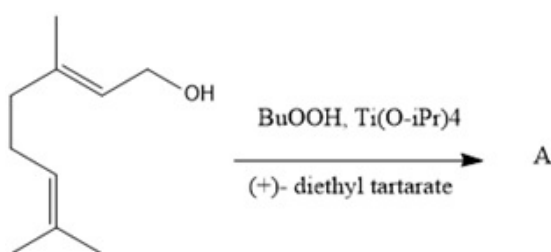


13. Explain the thermodynamically controlled reaction and kinetically controlled reaction of Esterification of acid chlorides with the help of energy profile diagram.
14. Explain the mechanism, and its evidence, for B_{AC}2 and A_{AC}2 ester hydrolysis.





15. Explain the stereochemical aspects of adamantane
16. With suitable examples discuss geometrical isomerism in cyclic systems.
17. (a) Explain why the cis- 4- hydroxycyclohexanecarboxylic acid readily forms lactones on heating whereas the trans- isomer does not. Compare this result with cis- 3- hydroxycyclohexanecarboxylic acid.
(b) which one of cis- and trans-4 -t hydroxycyclohexanecarboxylic acid will act as a stronger acid in water and why?
18. What is the major product formed in the reaction given below and Propose a mechanism for the formation of the product A.



(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. Discuss the effects of hydrogen bonding (intra-and intermolecular) on boiling point, acidity, basicity and stability of conformational isomers. Use appropriate examples.
20. (a) What is resolution? Discuss the principle of resolution of a racemic modification by chemical method?
(b) Write briefly on the following resolution methods with suitable examples.
(i) Mechanical separation
(ii) Chemical method of separation of racemic carboxylic acid and alcohol
(iii) Kinetic resolution
21. (a) Using conformational arguments, assess the reaction rates of Esterification of menthol, isomenthol, neomenthol; and neoisomenthol and
(b) CrO_3 oxidation of cyclohexanols with axial and equatorial OH groups.
22. Write a short note on the following synthetic methods and illustrate with suitable examples.
1. Chiral pool
 2. Chiral auxiliaries
 3. Chiral reagent
 4. Asymmetric epoxidation

