

C 4714

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Name.....

Reg. No.....

**SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2021**

(CBCSS)

Chemistry

CHE 2C 07—REACTION MECHANISM IN ORGANIC CHEMISTRY
(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. In cases where choices are provided, students can attend **all** questions in each section.
2. The minimum number of questions to be attended from the Section / Part shall remain the same.
3. There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.

Section A

*Answer any **eight** questions.*

Each question carries a weightage of 1.

1. What are ambident nucleophiles ? Explain with examples.
2. In aromatic electrophilic substitution reactions, each hydrogen atom of donor-substituted aromatic compound should be substituted faster than a H atom in benzene and each hydrogen atom of acceptor-substituted aromatic compound should be substituted more slowly than a H atom in benzene. Explain.
3. Explain the mechanism of Hofmann elimination, highlighting the stereochemical relationship of the substrate and product.
4. Arrange the following in order of stability : CF_2 , CCl_2 , CBr_2 and CH_2 . Justify.
5. Indicate the mechanism of Dieckmann condensation reaction. Comment on the synthetic utility of this reaction.
6. Predict the product in the CN^- catalyzed condensation of benzaldehyde and p-dimethylaminobenzaldehyde. Indicate mechanism involved.
7. Given the triplet energies of norbornene (70 - 78), benzophenone (70) and acetophenone (78), predict the products obtained when each of the ketone is irradiated with norbornene.

Turn over

8. Write down the mechanism of di- π methane rearrangement.
9. Illustrate Paterno-Büchi reaction with a suitable example.
10. Cholesterol undergoes oxidation of side chain under various conditions. Give the structure of two major products formed in these reactions.

(8 $\times$ 1 = 8 weightage)

Section B

*Answer any **six** questions.
Each question carries a weightage of 2.*

11. Explain the S_NAr and S_{RN}1 mechanisms of aromatic nucleophilic substitution with a suitable examples.
12. Explain the ion-pair mechanism of nucleophilic aliphatic substitution. Comment on the stereochemical outcome in such reactions.
13. Substitution and elimination reactions are often competing reactions. Why? What are the precautions to be taken to get the desired products?
14. Briefly discuss the main pathways of generation of carbanions. Comment on their structure and stability.
15. Explain Mannich reaction with an appropriate example.
16. Predict whether the thermal ring closure of a compound with three conjugated π -bonds is conrotatory or disrotatory. Explain.
17. Explain the following terms : i) photosensitization ; ii) quenching ; and iii) photoenolization.
18. Write a brief note on general structure and properties of anthocyanins.

(6 $\times$ 2 = 12 weightage)

Section C

*Answer any **two** questions.
Each question carries a weightage of 5.*

19. Discuss the mechanisms of electrophilic aromatic substitution with special reference to substituent effect on reactivity and orientation in mono and disubstituted benzene rings.
20. Discuss the major acid and base catalyzed mechanisms of ester hydrolysis.
21. Give one example each of : i) thermally allowed cycloaddition reaction ; and ii) photochemically allowed electrocyclic reaction. Justify the answer by FMO method.
22. Discuss the salient features of total synthesis of longifolene.

(2 $\times$ 5 = 10 weightage)