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Name.....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2020

(CBCSS)

Chemistry

CHE 1C 03—STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS

(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 weight of 1.

1. Cyclopentadiene has a pka value 15 which is quite high (for a H bonded to sp3 carbon). Account for this observation.
2. Instead of adopting a planar structure assisting complete overlap of its *p* orbitals, cyclooctatetraene exists as a tub shaped molecule. Explain.
3. Differentiate between classical and non-classical carbocations.
4. What are coformationally biased molecules? Give examples.
5. Draw the preferred conformation of *trans*- and *cis*-1-*methyl*-3-isopropylcyclohexane.
6. What are the destabilizing interactions present in axially substituted cyclohexanes ?
7. Write down the structure of a prochiral compound and assign the stereodescriptor for the prochiral center.
8. Draw all 1, 3-dimethyl cyclohexanes. Which of these are chiral ?
9. What are chiral auxiliaries ? Give an example of one used in asymmetric Diels-Alder reactions.
10. Illustrate Sharpless asymmetric epoxidation reaction and specify the reagents and conditions employed.

(8 × 1 = 8 weightage)

Turn over

Section B

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

11. Discuss the effect of resonance on the acidity of carboxylic acids. Give examples.

12. Explain the aromaticity of cyclopentadienyl anion and [18] annulene, based on Huckel's rul

13. State Hammond postulate and apply it to predict the relative rates of solvolysis of 2-bromopro and 2-methyl-2-bromopropane.

14. Illustrate the terms kinetic and thermodynamic control with appropriate examples.

15. Explain the origin of optical isomerism in certain cummulenes and biphenyls.

16. What is the basic principle involved in resolution of racemates ? Explain the applicati S-brucine in resolution ?

17. Explain the stereochemistry of reduction with CBS reagent with any suitable example.

18. With a suitable example, explain an asymmetric aldol reaction by Zimmerman-Traxler mod

(6 × 2 = 12 weigh

Section C

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

19. Discuss the effect of hydrogen bonding on the physical and chemical properties (including reac of organic compounds. How does hydrogen bonding affect conformation of 1, 2–, 1, 3– a 4-cyclohexanediols ?

20. (a) Write a detailed note on the application of isotope effects in the study of reactions mecha Discuss with suitable examples.

    (b) Write a brief note on Bredt's rule.

21. Discuss the effect of conformation on the course and rate of reactions in cyclohexane systems sufficient example.

22. (a) Explain the concept of asymmetric induction and illustrate the prediction of stereoch outcome with Felkin-Ahn model, in an appropriate example.

    (b) Write a note on symmetric hydroboration reactions.

(2 × 5 = 10 weig