2024

M.Sc.

4th Semester Examination

CHEMISTRY

PAPER – CEM-403 (Organic Special)

Full Marks : 50

Time : 2 Hours

(CEM 403-Advanced Organic Chemistry-IV)

Group A

Answer any ***four*** bits: 2×4 = 8

1. Compare the stability of *trans*- decalin and *cis*-decalin.
2. Write down the structure of all isomers of perhydrodiphenic acid.
3. Write down the advantages of Felkin-Anh model.
4. What is Bürgi-Dunitz trajectory?
5. Draw all possible stereoisomers of trans-2-decalol
6. In case of menthone, the diaxial conformer is more preferred than diequatorial conformer. Give reason for this observation.

Group B

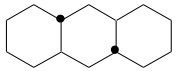
Answer any ***four*** bits: 4×4 = 16

7. Describe the application of ORD and CD spectroscopy.
8. What are the applications of Curtin-Hammett equation? Give one example.
9. Draw the Cram and Fekin-Anh models for (*S*)- benzoin and show that reaction with CH_3MgI gives the same stereochemical outcome.
10. The equilibrium data shows that in case of 2-bromo-4-t-butylcyclohexanones the axial isomer predominates to the extent of 78% in CCl4 and to the extent of 63% in dioxane. Explain the observation.
11. What is Circular Birefringence? What is α-holoketone effect? Explain with suitable example.
12. What changes are observed in the nature of butane-gauche interactions when a methyl group is introduced at one of the bridgehead carbon atoms of *trans* and *cis* decalins. Comment on their symmetry point group and resolvability.

Group C

Answer any ***two*** questions 2x8=16

13. Draw all possible diastereomers of perhydroanthracene in 2D and 3D. Based on your 3D drawings, rank each structure in terms of energy. Clearly identify all gauche-butane, syn-pentane and flagpole interactions. And also comment on their chiralities.
14. Make a detail note on exciton chirality and Davydor splitting.
15. (a) Predict the sign of Cotton effect, with proper octant projection diagram, of the following compounds: (i) (*S*)-2-Fluorocyclohexanone (iii) (2*S*, 5*R*)-2-Chloro-5-methylcyclohexanone.
16. Draw the conformational structure of the following isomer of perhydroanthracene. Mention and explain the following regarding this isomer. (i) the sign of torsion angle at the ring junction within the central ring, (ii) the symmetry and chirality, (iii) additional interaction energy.



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Internal Assessment-10

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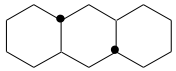

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