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B.Sc/1st Sem (H)/CHEM/22(CBCS)

2022

1st Semester Examination

CHEMISTRY (Honours)

Paper : C 1-T

(Organic Chemistry-I)

[CBCS]

Full Marks : 40

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

1. Answer any *five* questions : 2×5=10

(a) The tertiary amine $(CF_3)_3N$ has practically no basic character — Explain.

(b) Explain homoaromaticity with an example.

~~(c)~~ What do you mean by pseudoasymmetric centre?
Give example.

(d) Azulene has an unexpectedly high dipole moment — Explain.

~~(e)~~ Indicate the symmetry elements present in (i) Allene
(ii) (E) - 1, 2-dichloroethene.

P.T.O.

(2)

- (f) Arrange the following compounds in order of increasing heat of hydrogenation with reason : 1-butane, E - 2-butane, Z - 2-butane.
- (g) Draw the orbital picture for the following compound indicating the state of hybridization in each carbon and oxygen atom : $\text{CH}_3\text{-CH=CH=O}$.
- (h) Draw the Sawhorse and Newmann projections for the following compound Butane - 2L, 3D - diol.

Group - B

Answer any *four* questions :

5×4=20

2. (a) Discuss the procedure to resolve a racemic alcohol with suitable example. Outline the reaction steps.

3

- (b) Define the terms Racemisation and Racemic modification.

2

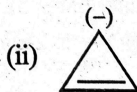
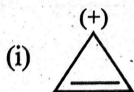
3. (a) Draw all the π -molecular orbital of buta - 1, 3, - diene. Justify their relative energies. Indicate the highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) in the ground state of buta-1, 3-diene.

4

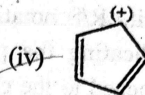
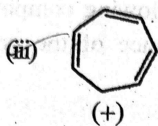
- (b) What are invertomers?

1

4. (a) Predict which of the following compounds is aromatic, anti aromatic or non aromatic?

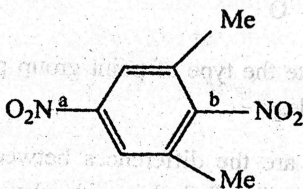


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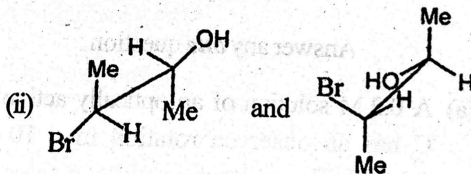
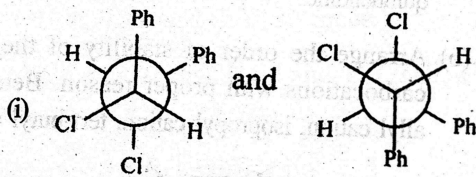
2

(b) Which C-N bond (a or b) of the following compound has higher bond energy and why? 2



(c) Calculate the double bond equivalent (D.B.E) of the following : $C_5H_{12}O$. 1

5. (a) Identify each pair as homomer, enantiomer, diastereomer :

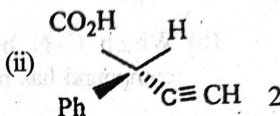
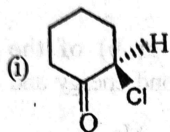


2

P.T.O.

(4)

- ✓ (b) Write R/S notation of the following compounds indicating the priority sequence of the groups attached to the chiral centre



- ✓ (c) Indicate the type of point group present in vinyl chloride. 1

6. (a) What are the differences between basicity and nucleophilicity? Explain with relevant examples. 3
(b) Explain why C_2-C_3 bond length in propene is smaller than the C-C bond length of propane. 2
7. (a) Compare the basic strengths of triethylamine and quinuclidine. 2
(b) Arrange the order of stability of the following carbocations with proper reason. Benzyl cation, allyl cation, isopropyl cation, tert-butyl cation. 3

Group - C

Answer any *one* question :

10×1=10

8. ✓ (a) A 0.2 M solution of an optically active compound C has an observed rotation in a 10 cm cell of (+) 0.4° . The molecular weight of the compound is 150. What is the specific rotation of C? 2

- (b) "All asymmetric molecules are dissymmetric, but all dissymmetric molecules are not asymmetric" —
Justify. 2
- (c) Both *meso*-tartaric acid and racemic tartaric acid are optically inactive. State the reason for the optical inactivity in each case. 2
- (d) Arrange the following compounds in order of increasing acidity. Give reason for your answer.
 $\text{CH}_2 = \text{CH}-\text{COOH}$, $\text{CH} \equiv \text{C}-\text{COOH}$,
 $\text{CH}_3\text{CH}_2\text{COOH}$ 3
- (e) What are epimers? 1
9. (a) Compare the acidities of benzoic acid and salicylic acid. 2
- (b) Draw all possible stereo isomers of $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH} = \text{CHCH}_2\text{CH}_3$ and designate them by (R/S) and (E/Z) notations. 3
- (c) Which of $\text{CH}_2\text{Br}-\text{CH}_2\text{Br}$ and $\text{CH}_2(\text{OH})-\text{CH}_2\text{OH}$ has higher dipole moment. Explain. 2
- (d) Explain the following term with an example :
Chirotopicity. 2
- (e) Draw as directed
erythro-3-amino-2-butanol (anti form in Sawhorse presentation) 1
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