

U.G. 1st Semester Examination - 2021

CHEMISTRY

Course Code : BCEMCCHC101

Course Title : Organic Chemistry I

Full Marks : 30

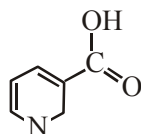
Time : 2 Hours

The figures in the right-hand margin indicate marks.

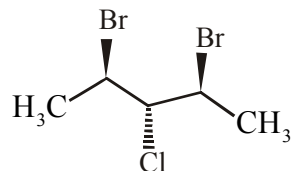
Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **ten** questions: 1×10=10

a) Calculate DBE of the following molecule.

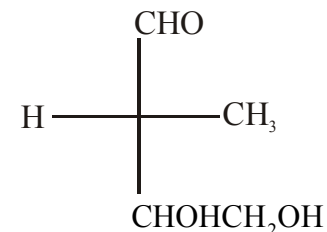


b) Convert the following zigzag projection into Fischer projection.

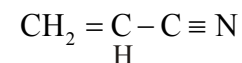


c) Write the symmetry elements present in CHDBrCl.

d) Designate the following compound as R/S.



e) Draw the orbital picture of

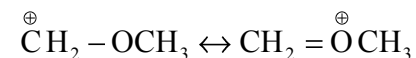


f) Give an example of a homoaromatic compound.

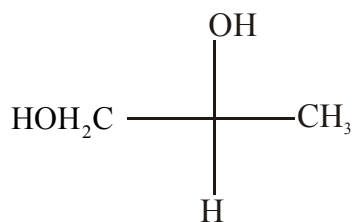
g) Draw the structure of triplet carbene.

h) Justify or criticize the following comment: Cyclopenta-1, 3-diene is antiaromatic because it has 4 π -electrons in the ring.

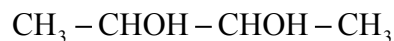
i) Which of the following resonating structure has greater contribution to the resonance hybrid and why?



j) Designate the following as D or L:



k) How many stereoisomers are possible for the following compound.



l) Explain the term chirotopicity with a suitable example.

m) Give one example for each of the following:

i) Nucleophilic carbene

ii) Electrophilic carbene

n) Draw the erythro form of 3-bromobutan-2-ol.

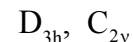
o) Write structure for (2E, 4E)-2, 4-Heptadiene.

2. Answer any **five** questions: $2 \times 5 = 10$

a) Assign point group of the following molecules:

Cyclobutane, 1, 2-dichlorobenzene.

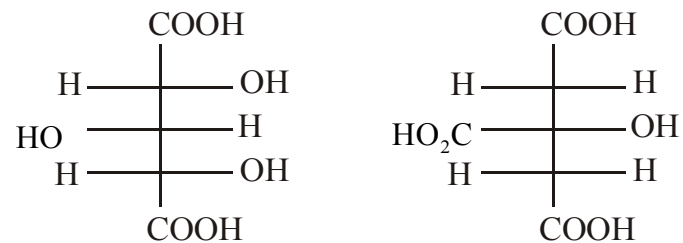
b) Give example of each of the following point groups:



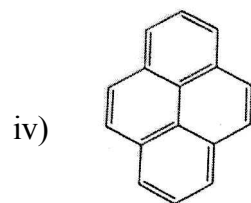
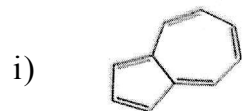
c) A sample of 2-Methyl-1-butanol has an observed specific rotation, $[\alpha]_D^{25}$, equal to $+1.151^\circ$. Calculate the enantiomeric excess (ee) of the sample. (The specific rotation of the pure enantiomer is $+5.756^\circ$.)

d) The boiling points of methanol and cyclohexane are 64.7°C and 68.9°C , respectively. But if same amount of two solvents are kept on hot water bath it is found that n-hexane evaporates readily but not methanol. Explain this phenomenon.

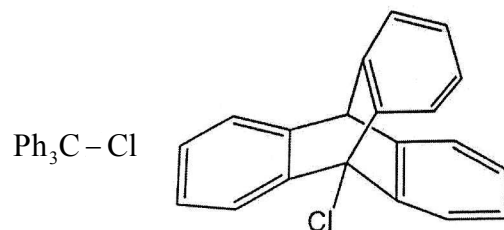
e) Comment on the stereogenicity and chirotopicity of the indicated centers of the following molecules.



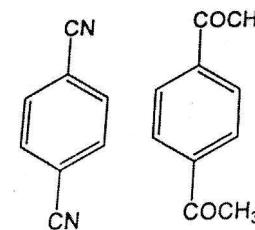
f) Identify the following species as aromatic / non-aromatic / antiaromatic / homoaromatic.



g) Triphenylmethyl chloride ionizes readily in liquid SO_2 but the other organochloride does not. why?



h) Among the following two compounds which one has higher dipole moment and why?



3. Answer any **two** of the following: $5 \times 2 = 10$

a) i) Explain the following observations with proper explanations:

A) Melting point of cis-stilbene is -5°C , whereas in case of trans-stilbene, it is $+124^\circ\text{C}$.

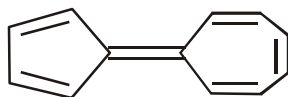
B) Arrange the following alkenes in order of their increasing stability: Isobutene, 1-butene, cis-2-Butene and trans-2-Butene.

ii) Give examples for each of the following:

A) Homogenic bond formation

B) Heterolytic bond fission $3+2$

- b) i) Explain the following observation:
Optically pure $\text{CH}_3\text{COCH}(\text{Ph})\text{CH}_3$ undergoes racemization upon treatment with alkali.
- ii) Resolve racemic 2-butanol.
- iii) Define pseudoasymmetry. $2+2+1=5$
- c) i) Explain Steric Inhibition of resonance with a suitable example.
- ii) Explain why the following molecule exhibits high dipole moment?



- iii) Give a method for the generation of carbocation. $2+2+1=5$
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