Total No. of Printed Pages—7

2 SEM TDC CHMH (CBCS) C 3

2024

(May)

CHEMISTRY

(Core)

Paper : C–3

(Organic Chemistry)

Full Marks : 53

Pass Marks : 21

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer from the following : 1×5=5

(a) Which of the following is the most stable carbocation?

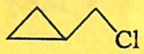
(i) $\overset{+}{C}H_3$

(ii) 

(iii) Ph_3C^+

(iv) $(CH_3)_3C^+$

(b) How many chiral carbons are present in the given molecule?



(i) 1

(ii) 2

(iii) 3

(iv) None of the above

(c) Which halogen does not react appreciably with methane in a free-radical substitution reaction?

(i) Chlorine

(ii) Bromine

(iii) Iodine

(iv) Fluorine

(d) According to Baeyer's strain theory, which is highly stable?

(i) Cyclobutane

(ii) Cyclopentane

(iii) Cyclohexane

(iv) Cyclopropane

(e) Which of the following annulenes is aromatic?

(i) [8] annulene

(ii) [10] annulene

(iii) [12] annulene

(iv) None of the above

UNIT—I

2. Answer the following questions : 2×3=6

(a) Explain the structure of ethane molecule with the help of hybridization.

(b) Define electrophilic reagent and nucleophilic reagent. Select the electrophilic and nucleophilic reagents from the following :

H_2O, BF_3, CH_3OH, SO_3

Or

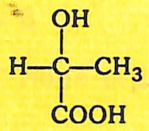
Phenol is less acidic than benzoic acid. Explain.

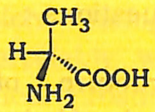
(c) What is activation energy of a reaction? Draw the energy profile diagram of two-step reactions.

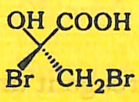
UNIT—II

3. Answer the following questions (any *six*) : 2×6=12

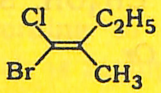
(a) Specify the following stereoisomers as *R* and *S* (any *two*) :

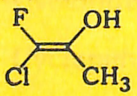
(i) 

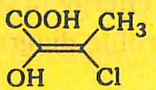
(ii) 

(iii) 

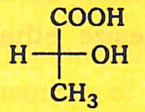
(b) Specify the following geometrical isomers as *E* and *Z* (any *two*) :

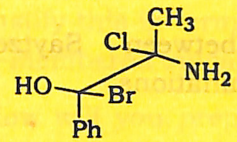
(i) 

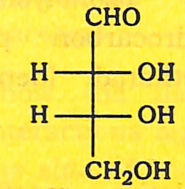
(ii) 

(iii) 

(c) Interconvert the following projections as directed (any *two*) :

(i)  (to flying wedge projection)

(ii)  (to Newman projection)

(iii)  (to Newman projection)

(d) Define the following terms :

(i) Resolution

(ii) Racemization

(e) Draw the stereoisomers of tartaric acid and mention their optical activities.

(f) Draw the *erythro-* and *threo*-isomer of 3-bromobutan-2-ol.

(g) What is Walden inversion? Explain with suitable example.

UNIT—III

4. Answer the following questions :

(a) How will you synthesize ethane from methane? 2

(b) Distinguish between Saytzeff and Hoffmann eliminations. 2

(c) On reductive ozonolysis, an unsaturated hydrocarbon produced butanone and ethanal. Identify the hydrocarbon. 2

(d) Explain the relative reactivity of ethylene, propylene and isobutylene towards electrophilic addition with HBr. 3

(e) Explain Diels-Alder reaction with suitable example. 2

(f) What happens when pent-1-yne is treated with H_2O in the presence of H_2SO_4 and $HgSO_4$ catalysts? Write down the reaction. 2

(g) What are the different states of carbene? Explain briefly. 3

Or

Acetylene is acidic in nature. Explain.

UNIT—IV

5. (a) What are the postulates of Baeyer's strain theory? 2

(b) Cyclopropane is the least stable member of cycloalkanes. How do you justify this in terms of orbital picture of 3-membered rings? 2

(c) How will you prepare cyclohexane and cyclobutane by using cycloaddition reactions? 2

(d) Show the flagpole hydrogens, their interactions and the eclipsed bonds on the side of boat conformation from an end view. 2

Or

Why is twist boat form of cyclohexane more stable than boat form?

UNIT—V

6. (a) Why is naphthalene aromatic? 2

(b) Discuss the mechanism of nitration of benzene. 2

(c) Alkylation of benzene with *n*-propyl chloride gives isopropyl benzene rather than *n*-propylbenzene. Explain. 2

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