Total No. of Printed Pages—8

2 SEM TDC CHMH (CBCS) C 3

2022

(June/July)

CHEMISTRY

(Core)

Paper : C–3

(Organic Chemistry)

Full Marks : 53

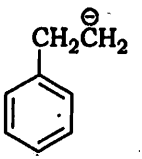
Pass Marks : 21

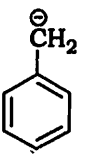
Time : 3 hours

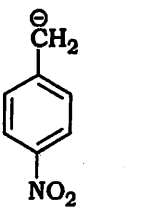
The figures in the margin indicate full marks for the questions

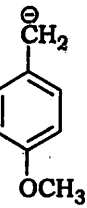
1. Choose the correct answer from the following : 1×5=5

(a) Which is the most stable carbanion among the following?

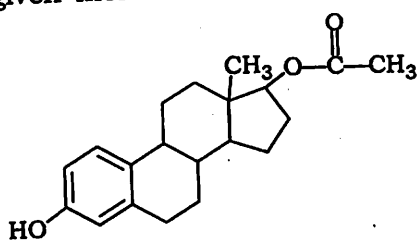
(i) 

(ii) 

(iii) 

(iv) 

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



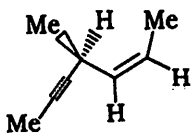
(i) 1

(ii) 5

(iii) 3

(iv) 10

(c) Hydrogenation of the following compound in the presence of poisoned palladium catalyst gives



(i) an optically active compound

(ii) an optically inactive compound

(iii) a racemic mixture

(iv) a diastereomeric mixture

(Continued)

(d) The IUPAC name of the following compound

is

(i) neononane

(ii) tetraethyl carbon

(iii) 2-ethyl pentane

(iv) 3,3-diethyl pentane

(e) The hybridization of C atoms in C—C single bond of

$$H—C\equiv C—\underset{H}{C}=CH_2$$

is

(i) $sp^3–sp^3$ *(ii)* $sp^2–sp^3$

(iii) $sp–sp^2$ *(iv)* $sp^3–sp$

UNIT—I

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

(a) What do you mean by nucleophilicity and basicity?

(b) Alkyl groups attached to the benzene ring have electron releasing effect in the order

$$Me- > MeCH_2- > Me_2CH- > Me_3C-$$

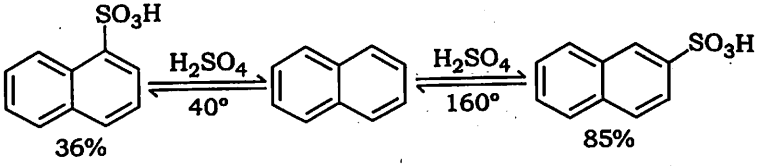
Explain this observation.

(c) Select soft and hard acids and bases from the following :

$$\overset{\oplus}{H},\ I_2,\ H_2O,\ \overset{\ominus}{R}$$

Or

Identify the following reactions as kinetically controlled and thermodynamically controlled :

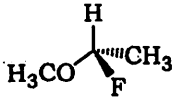


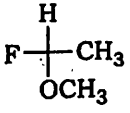
Draw the energy profile diagram for the above reactions.

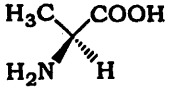
UNIT—II

3. Answer the following questions : 2×6=12

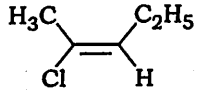
(a) Specify the following stereoisomers as *R* and *S* (any *two*) : 1×2=2

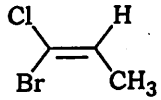
(i) 

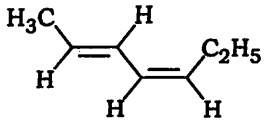
(ii) 

(iii) 

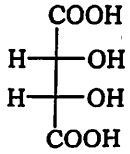
(b) Specify the following geometrical isomers as *E* and *Z* (any *two*) : 1×2=2

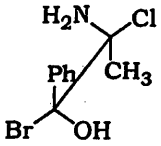
(i) 

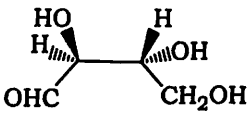
(ii) 

(iii) 

(c) Interconvert the following projections as directed (any *two*) : 1×2=2

(i)  Fischer to Sawhorse

(ii)  Sawhorse to Newman to Fischer

(iii)  To Fischer projection

(d) Draw all the possible stereoisomers of tartaric acid

$$HO_2C(HO)HC—CH(OH)CO_2H$$

(e) Draw and give the stereochemical designation for the geometrical isomers of 2,4-heptadiene.

(f) Active 2-benzoyl propanoic acid undergoes racemization when treated with $NaOC_2H_5$ in ethanol. Explain.

UNIT—III

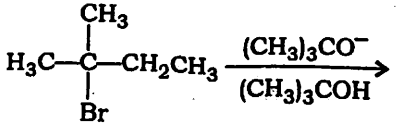
4. Answer the following questions :

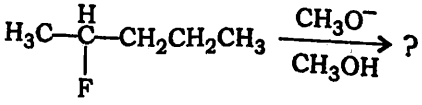
(a) Prepare *n*-pentane with the help of Corey-House synthesis. 2

(b) An alkane has a molecular mass of 72. It forms only one monosubstituted product on chlorination in the presence of sunlight. Suggest a structure for the alkane. 1

(c) Addition of bromine in CCl_4 to *cis*-2-butene gives (±)-2,3-dibromobutane while that for *trans*-2-butene gives *meso*-2,3-dibromobutane. Explain this with mechanism. 3

(d) Write the product(s) of the following elimination reactions : 1½×2=3

(i) 

(ii) 

(Continued)

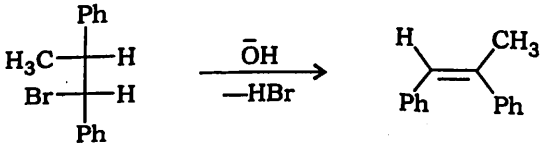
(e) "Markownikov's addition reaction is a regioselective reaction." Justify the statement. 2

(f) What do you mean by stereoselective and stereospecific reactions? Explain by giving examples of each. 2+1=3

(g) Write the mechanism of 1,4-addition of Br_2 to 1,3-butadiene. 2

Or

What is the stereoelectronic requirement of an *E*2 process? Why *erythro*-1-bromo-1,2-diphenylpropane on base induced dehydrobromination yields *cis*-1,2-diphenylpropane exclusively?



erythro-1-bromo-1,2-diphenylpropane

cis-1,2-diphenylpropene

UNIT—IV

5. (a) Explain why Baeyer strain theory is not applicable to higher ring compounds. 2

(b) Draw the chair- and boat-conformation of cyclohexane in Newman projection. 2

Or

Explain why equatorial methylcyclohexane is more stable than axial methylcyclohexane.

(c) Discuss the factors responsible for the stability of a conformation. 2

(d) Draw the energy profile diagram for the conformations of *n*-butane. 2

UNIT—V

6. *(a)* Which of the following compounds are aromatic, anti-aromatic and non-aromatic? 2

(i) 

(ii) 

(iii) 

(iv) 

(b) Write the mechanism of Friedel-Crafts alkylation of benzene. 2

(c) Discuss the directing influence of $-OCH_3$ group towards the electrophilic aromatic substitution reactions. 2

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