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DEPARTMENT : MBBS
MATRIC NUMBER : 19/MHS01/320
COURSE : CHEM 102

ASSIGNMENT

1. Name the functional groups present in each of the following molecules

i) $CH_2=C(OH)HCHO$ ii) $C_6H_5CH(NH_2)COCH_3$ iii) $CH_3C=CHCH(OH)CHO$

Answer

	Molecules	Functional groups
i	$CH_2=C(OH)HCHO$	- Aldehyde (-CHO) - Hydroxyl group (-OH)
ii	$C_6H_5CH(NH_2)COCH_3$	- Carbonyl group (-CO) - Amine ($-NH_2$)
iii	$CH_3C=CHCH(OH)CHO$	- Hydroxyl group (-OH) - Aldehyde (-CHO)

2. A 0.856g sample of pure (2R, 3R)-tatrtaric acid was diluted to $10cm^3$ with water and placed in a 1.0dm polarimeter tube. The observed rotation at 20°C was +1.0°. Calculate the specific rotation of (2R, 3R)-tatrtaric acid.

Solution

$$[\alpha] = \frac{\alpha}{cl}$$

where $[\alpha]$ = specific optical rotation
α = observed rotation
c = concentration in g/cm^3
l = pathlength (in dm)

$\alpha = +1.0^\circ$
$l = 1.0\ dm$
$c = ?$

Concentration in $g/cm^3 = \frac{0.856g}{10cm^3} = 0.0856 g/cm^3$

Specific rotation = $\frac{\text{observed rotation (degrees)}}{\text{(Concentration in } g/cm^3) \times \text{(path length of sample cell in dm)}}$

$$[\alpha]_\lambda^T = \frac{\alpha}{cl}$$

$$[\alpha]_\lambda^T = \frac{+1.0^\circ}{0.0856 g/cm^3 \times 1.0 dm} = +11.682^\circ g^{-1} cm^3 dm^{-1} \text{ or } +11.682^\circ //$$

∴ The specific rotation of (2R, 3R)-tartaric acid is $+11.682^\circ g^{-1} cm^3 dm^{-1}$ or $+11.682^\circ$

3 Draw the possible geometric isomers (where possible) for each of the following compounds:

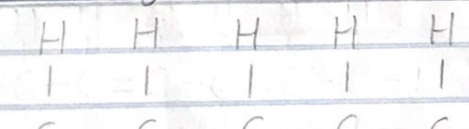
i) Hexa-2,4-diene ii) 2,3-Dimethylbut-2-ene.

Answers

i Hexa-2,4-diene [$CH_3CH=CHCH=CHCH_3$]

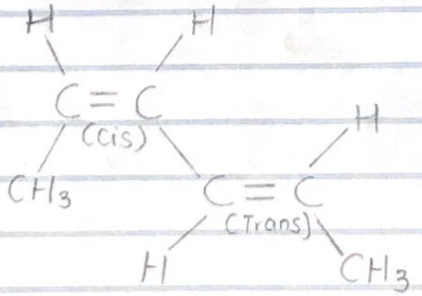
Possible geometric isomers

I



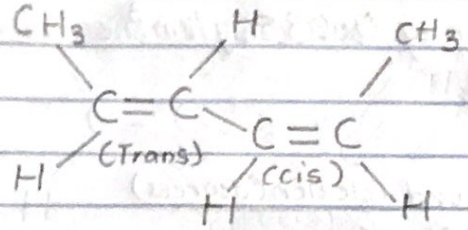
∴ Hexa-2,4-diene

II

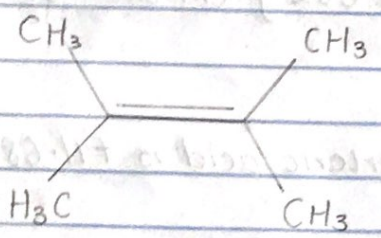


∴ Cis-1, trans-4-dimethyl but-2-ene

III Trans-1, cis-4-dimethyl but-2-ene

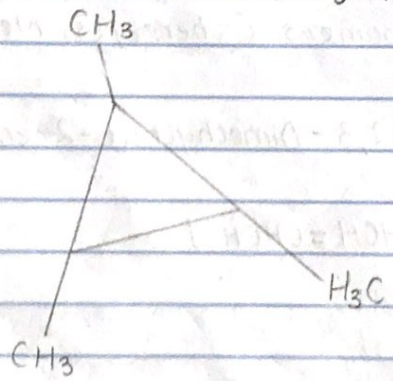


ii) 2,3-Dimethyl but-2-ene

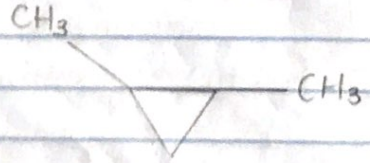


Possible Geometric Isomers

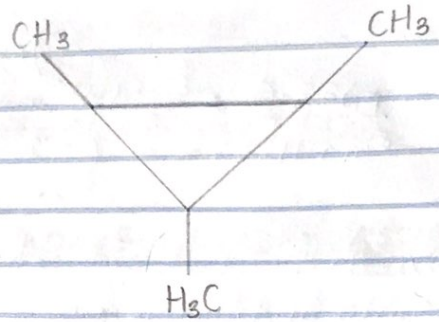
I 1-cis-2-trans-3-trimethyl cyclopropane



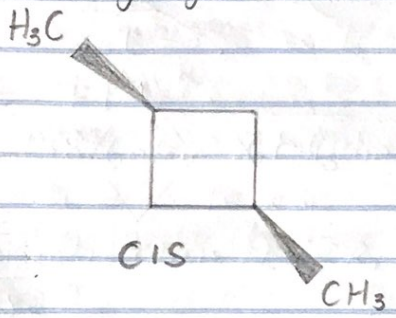
II 1-methyl-trans-2-ethyl cyclopropane



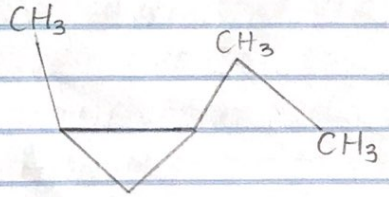
III cis-1,2,3-trimethyl cyclopropane



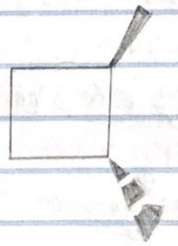
IV Cis-1,3-dimethyl cyclobutane



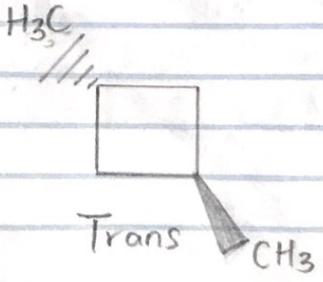
V Cis-1-methyl-2-ethyl cyclopropane



VI Trans-1,2-dimethyl cyclobutane



VII Trans-1,3-dimethyl cyclobutane



viii Trans - 2- hexene