19/MHS01/397

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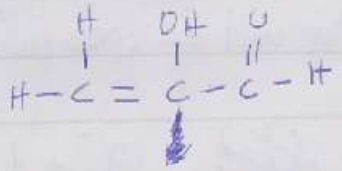
DEPARTMENT: MEDICINE AND SURGERY
COURSE TITLE: General chemistry II

Stereochemistry and Functional Group Assignment.

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

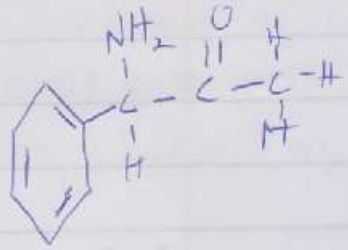
Answer:

(i) $CH_2 = C(OH)HCHO$: The structural formular is



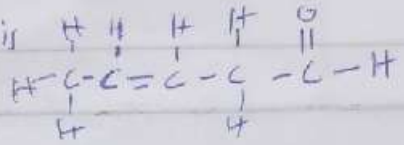
Functional groups present
- Double bond chain ($>C=C<$). Alkene
- Hydroxyl group ($-OH$) ~~alcohol~~
- Carbonyl group ($-CHO$) alkanal
- ~~Single bond chain ($-C-H$)~~.

(ii) $C_6H_5CH(NH_2)COCH_3$: The structural formular is



Functional groups present
- Amine group ($-NH_2$)
- Single bond chain ($-C-H$)
- Phenyl group (C_6H_5)
- Carbonyl group ($-COR$) - Ketone

(iii) $CH_3C=CHCH(OH)CHO$: The structural formular is



Functional groups present
- Double bond ($C=C$)
- Hydroxyl group ($-OH$)
- Carbonyl group ($-CHO$) (as in alkanal)

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

Solution

Recall that; The specific rotation is given by:

$$\text{specific rotation, } \alpha_{\lambda}^{T} = \frac{\alpha}{c \times l}$$

where; T = temperature in °C ; λ = wavelength of light used for the observation; α = observed rotation in degree; c = concentration of optically active solute in g/cm^3 $\left(c = \frac{mass}{volume}\right)$; l = path length in dm.

The unit of specific rotation is: $(°g^{-1}cm^3\,dm^{-1})$ or simply in degrees (°).

~~$\alpha_{\lambda}^{T} = ?$~~, $\alpha_{\lambda}^{T} = ?$, $\alpha = +1.0°$, $c = \frac{mass}{volume}$ where; mass = 0.856g ~~and volum is 10~~

$l = 1.0\,dm$ volume = $10\,cm^3$

$$\therefore \text{Specific rotation, } \alpha_{\lambda}^{T} = \frac{1}{\frac{0.856}{10} \times 1} = \frac{1}{0.0856}$$

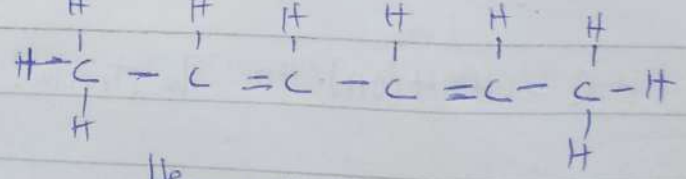
$$= 11.682°$$

$\therefore$ The specific rotation = 11.682°.

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

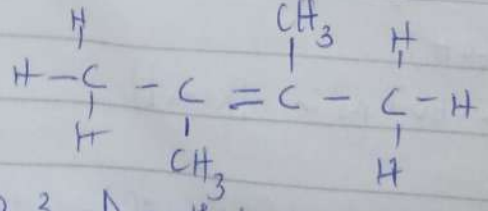
Solution.

(i) Hexa-2,4-diene :-



Hexa-2,4-diene.

(ii) 2,3-Dimethylbut-2-ene :-



2,3-Dimethylbut-2-ene.