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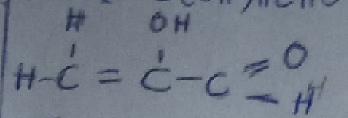
Department: Mechatronics Engineering
Matric No: 19/ENG05/061
Date: 16/05/2020
Course Code: CHEM 102

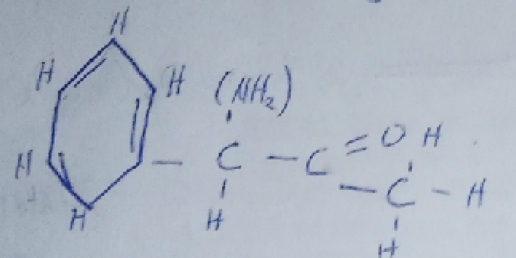
1. Name the functional groups present in each of the following molecules

i) $CH_2=C(OH)HCHO$



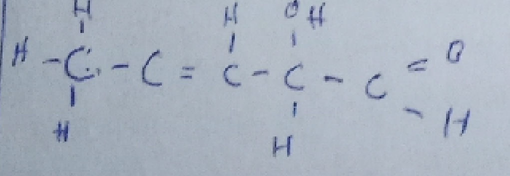
Functional groups
- Double bond (Alkene (=))
- Hydroxyl group (-OH-)
- Carbonyl group (Aldehyde/Alkanol (CHO))

ii) $C_6H_5CH(NH_2)COCH_3$



Functional groups
- Amine $(-NH_2)$
- Alkanone / Ketone (C=O, -R)
- Phenyl Group (C_6H_5)

iii) $CH_3C=CHCH(OH)CHO$



Functional groups
- Double bond (Alkene (=))
- Hydroxyl group (-OH)
- Carbonyl group (Alkanal / Aldehyde) (C=O, -H)

2) A 0.85 g 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.

Recall $[\alpha]_{\lambda}^{T} = \frac{\alpha}{l c}$

where l = length of sample tube

c = mass/volume (g/dm) or (g/mol)

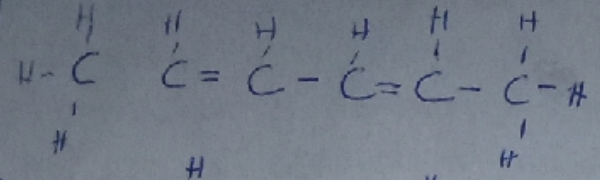
α = Observed rotation

$$S_r = \frac{1.0}{1.0 \times \left(\frac{0.85 g}{10}\right)}$$

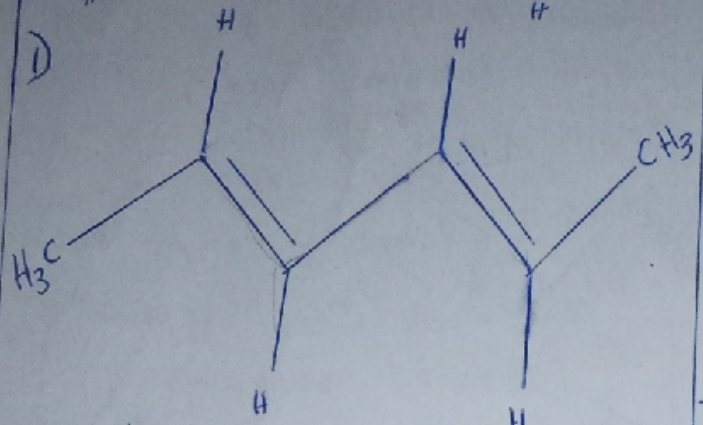
$$S_r = 11.68$$

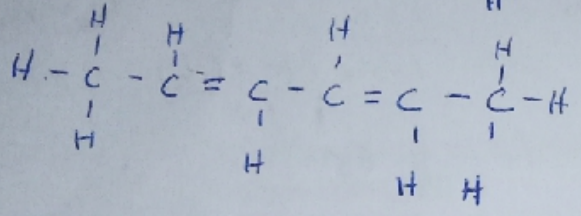
3. Draw the possible geometric isomers for each of the following compounds

I) Hexa-2,4-diene:



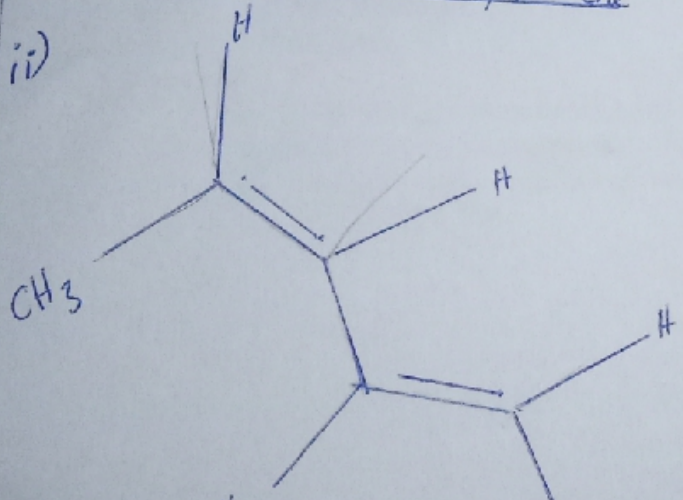
i)

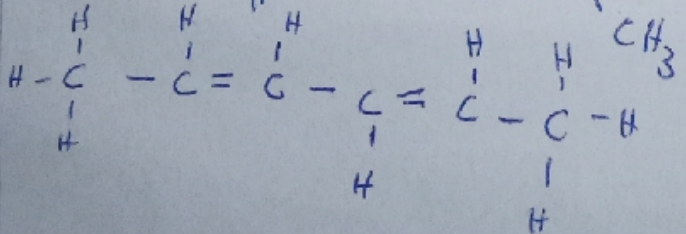




Trans, trans - hexa-2,4-diene

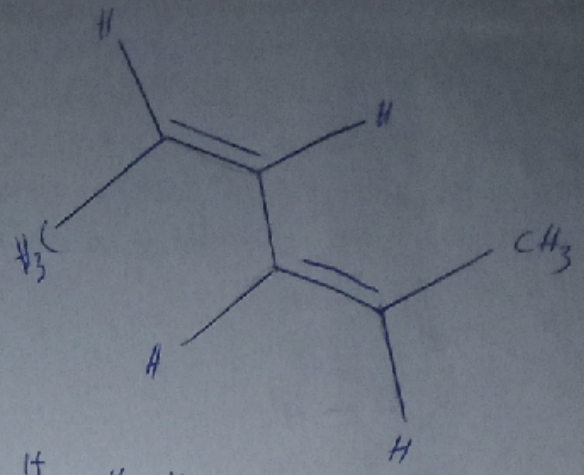
ii)

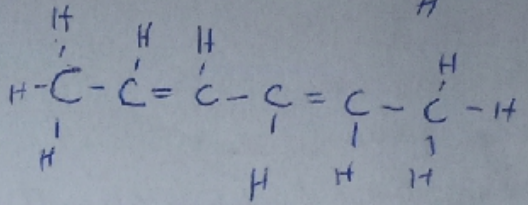




Cis, Trans - hexa-2,4-diene

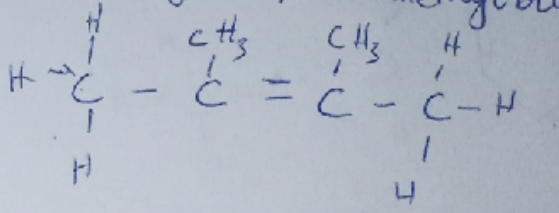
iii)





Cis, cis - hexa-2,4-diene.

II) ~~Dimethyl~~ 2, 3-Dimethylbut-2-ene



(No isomer)

The atoms or groups attached to the double bonded carbon atom must be different. Geometrical isomers are not possible if one or both the doubly bonded carbon atoms carry similar constituents. This is because in such cases, the two possible configurations are identical. This is the reason 2,3-Dimethylbut-2-ene do not show geometrice isomerism.