

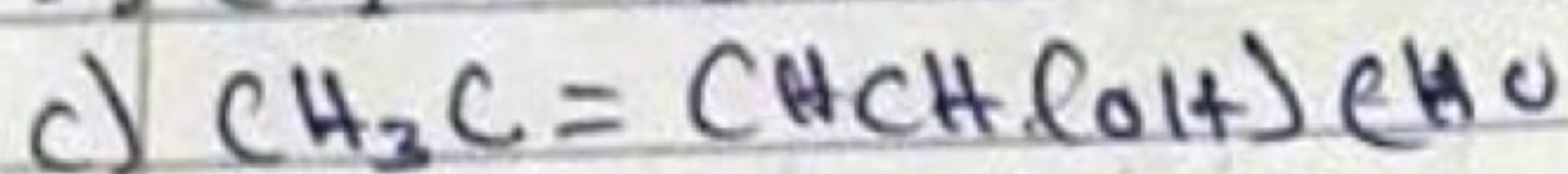
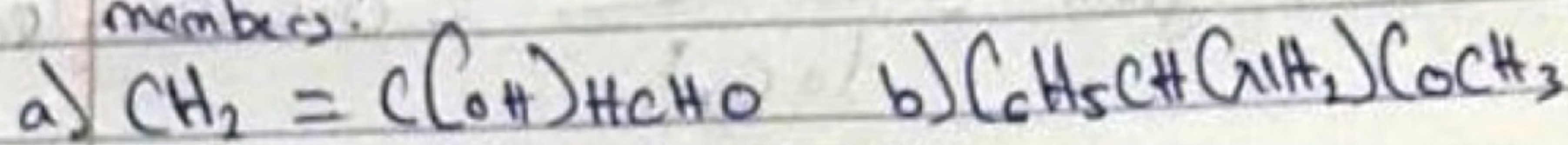
Stephen Helen Ebiarede

Nursing

19/MH302/112

CHEM 102 Assignment

1) Name the functional groups present in each of the following molecules?



Answer

Molecules	Functional groups
a) $\text{CH}_2 = \text{C}(\text{OH})\text{HCHO}$	- Aldehyde ($\text{C}-\text{CHO}$) - Hydroxyl group ($\text{C}-\text{OH}$)
b) $\text{C}_6\text{H}_5\text{CH}(\text{NH}_2)\text{COCH}_3$	- Carbonyl group ($\text{C}-\text{CO}$) - Amine ($\text{C}-\text{NH}_2$)
c) $\text{CH}_3\text{C} = \text{CHCH}(\text{OH})\text{CHO}$	- Hydroxyl group ($\text{C}-\text{OH}$) - Aldehyde ($\text{C}-\text{CHO}$)

2) A 0.456g sample of pure (2R,3R)-tartaric acid was diluted to 10 cm³ 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

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

where $[\alpha]$ = Specific optical rotation

α = observed rotation
 C = Concentration in g/cm^3
 l = path length (in dm)

$$\alpha = +11.0^\circ$$

$$l = 1.0 \text{ dm}$$

$$C = ?$$

$$\text{Concentration in } \text{g/cm}^3 = \frac{0.956 \text{ g}}{10 \text{ cm}^3} = 0.0956 \text{ g/cm}^3$$

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

$$[\alpha]_D^{25} = \frac{\alpha}{Cl}$$

$$[\alpha]_D^{25} = \frac{+11.0^\circ}{0.0956 \text{ g/cm}^3 \times 1.0 \text{ dm}} = +11.682^\circ \cdot \text{cm}^3 \cdot \text{dm}^{-1} \text{ or } +11.682^\circ$$

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

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

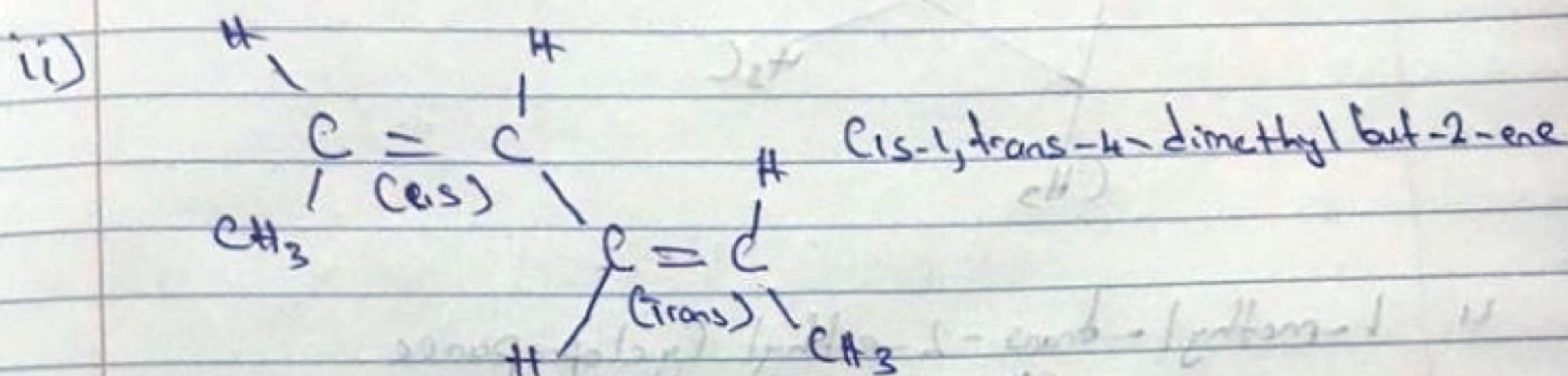
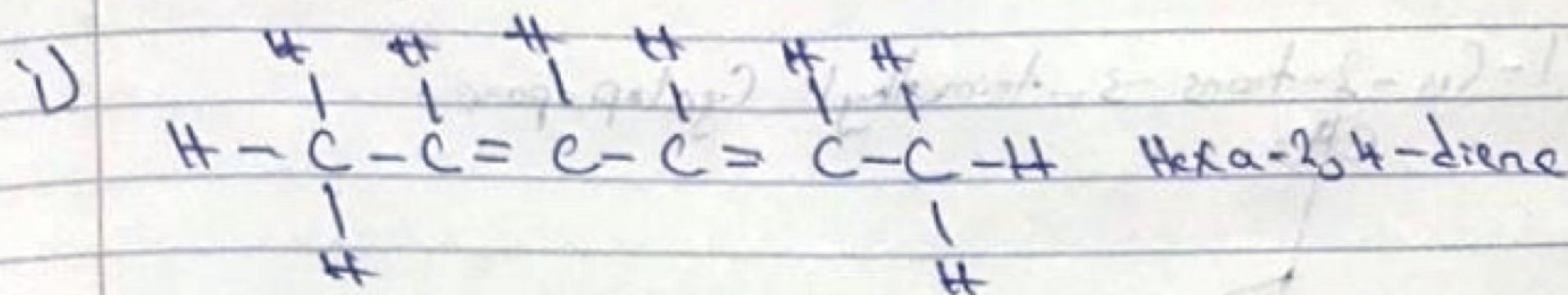
a) Hexa-2,4-diene

b) 2,3-Dimethylbut-2-ene

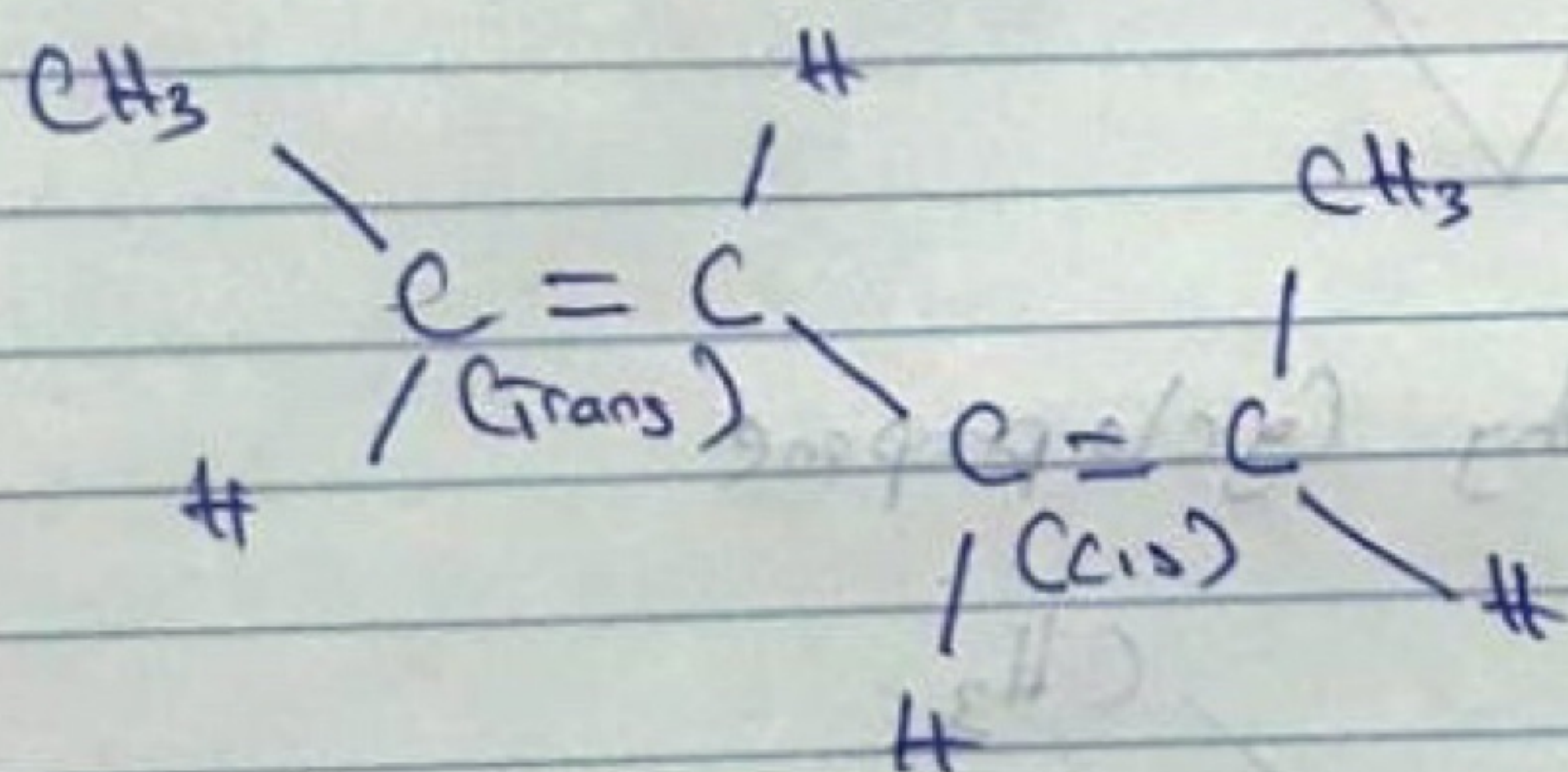
Answers

a) Hexa-2,4-diene $\text{CH}_3\text{CH}=\text{CHCH}=\text{CHCH}_3$

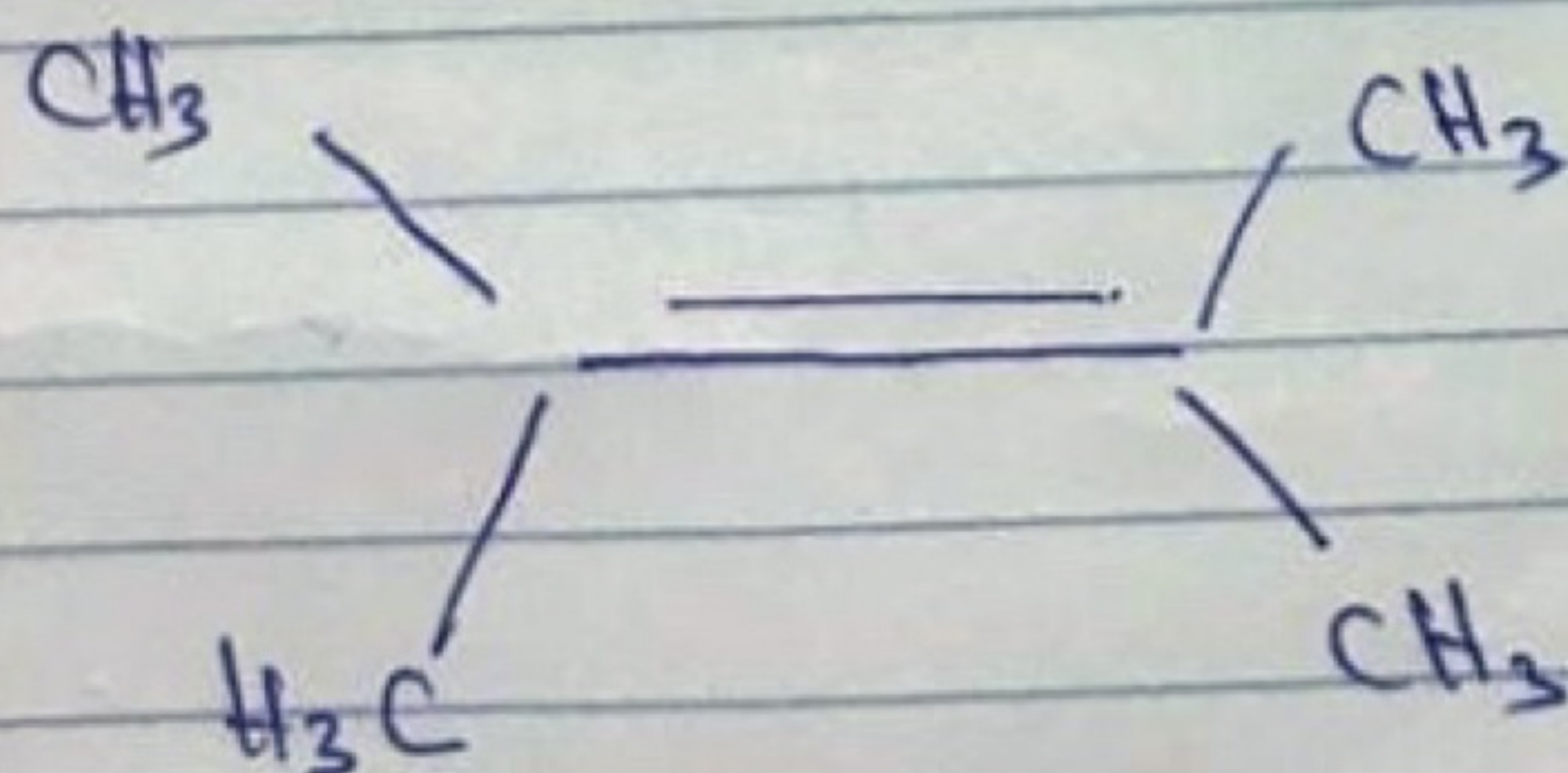
Possible geometric isomers



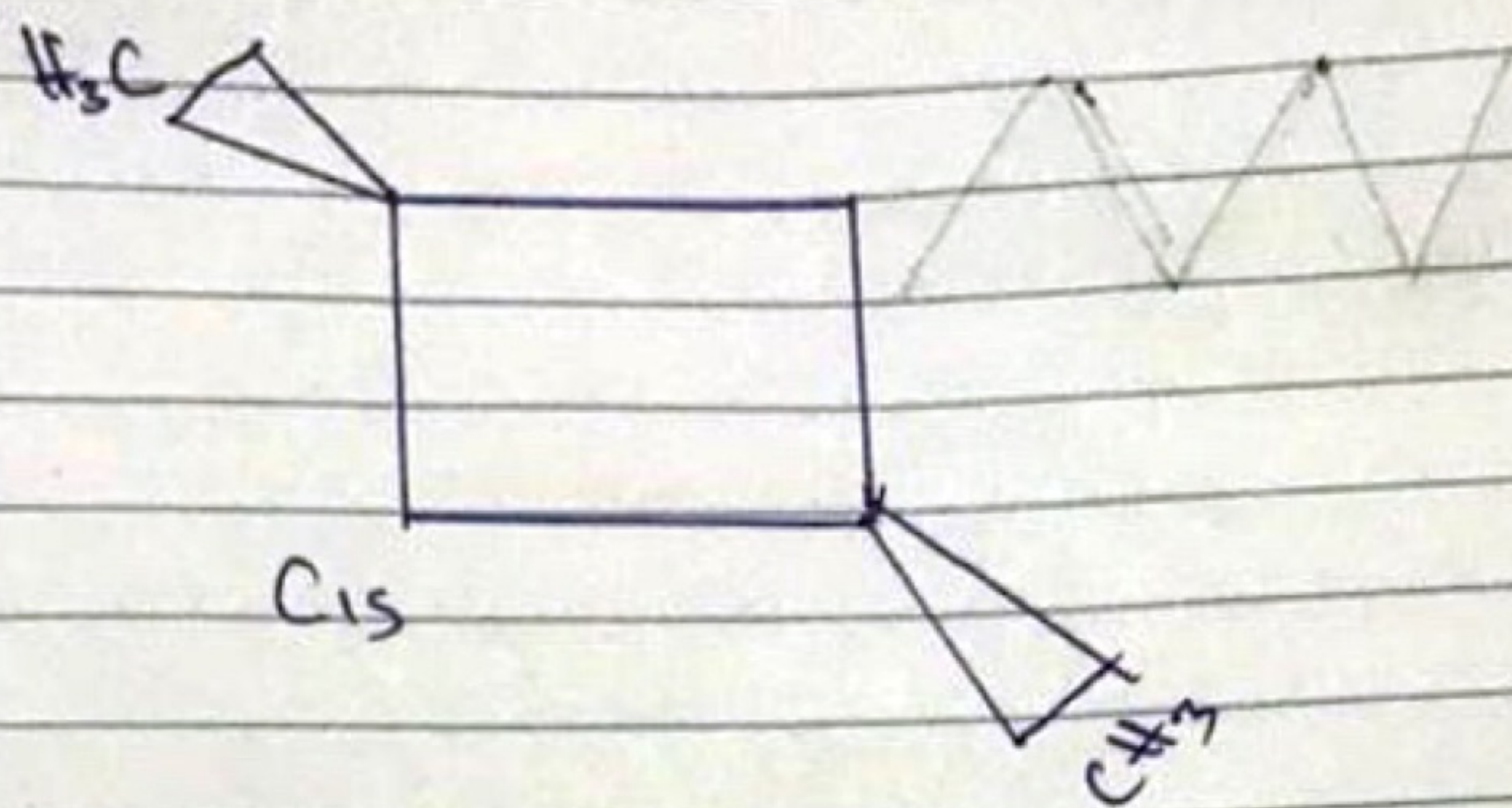
iii) Trans-1,Cis-4-dimethyl but-2-ene



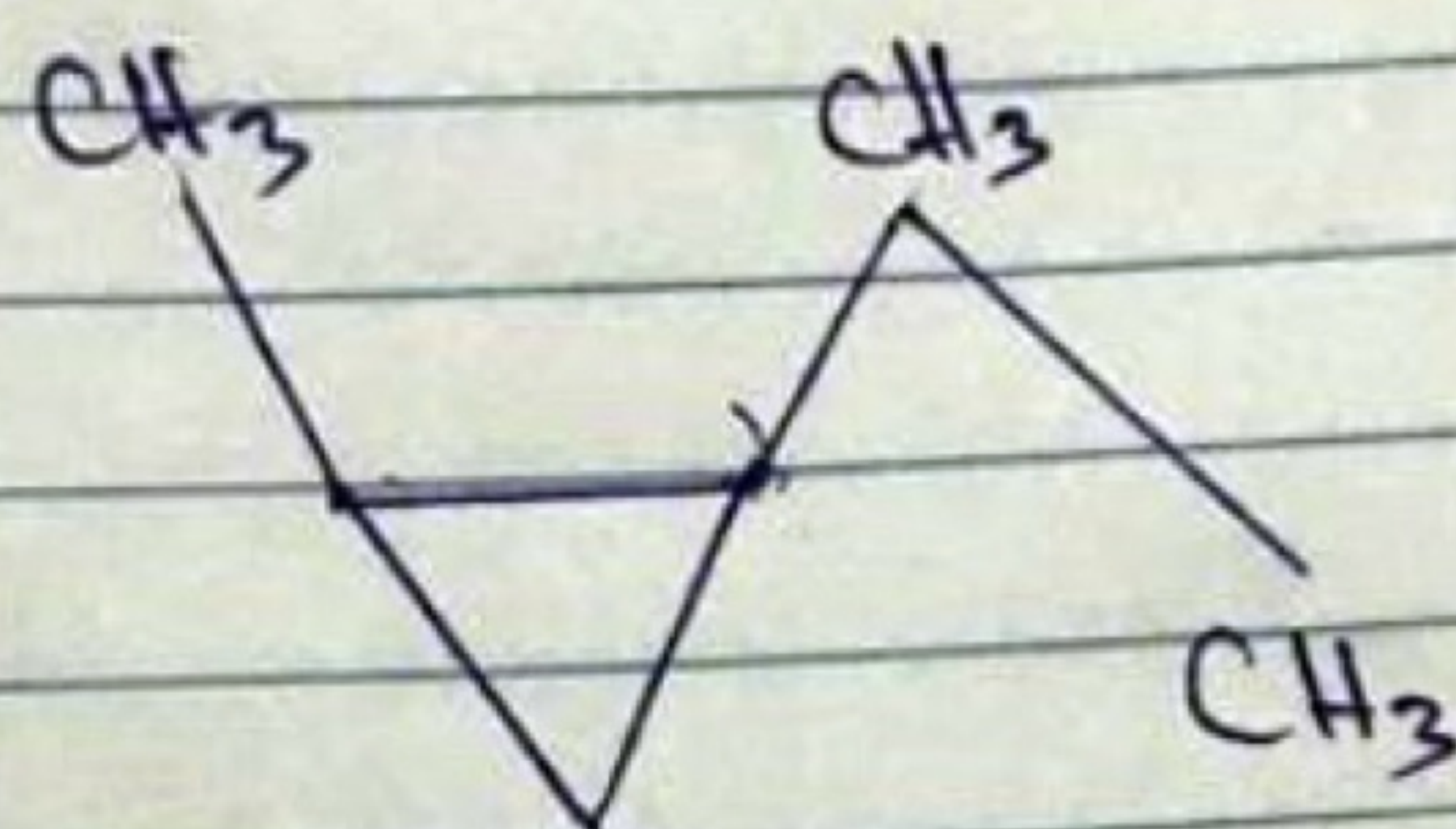
iv) 2,3-Dimethylbut-2-ene



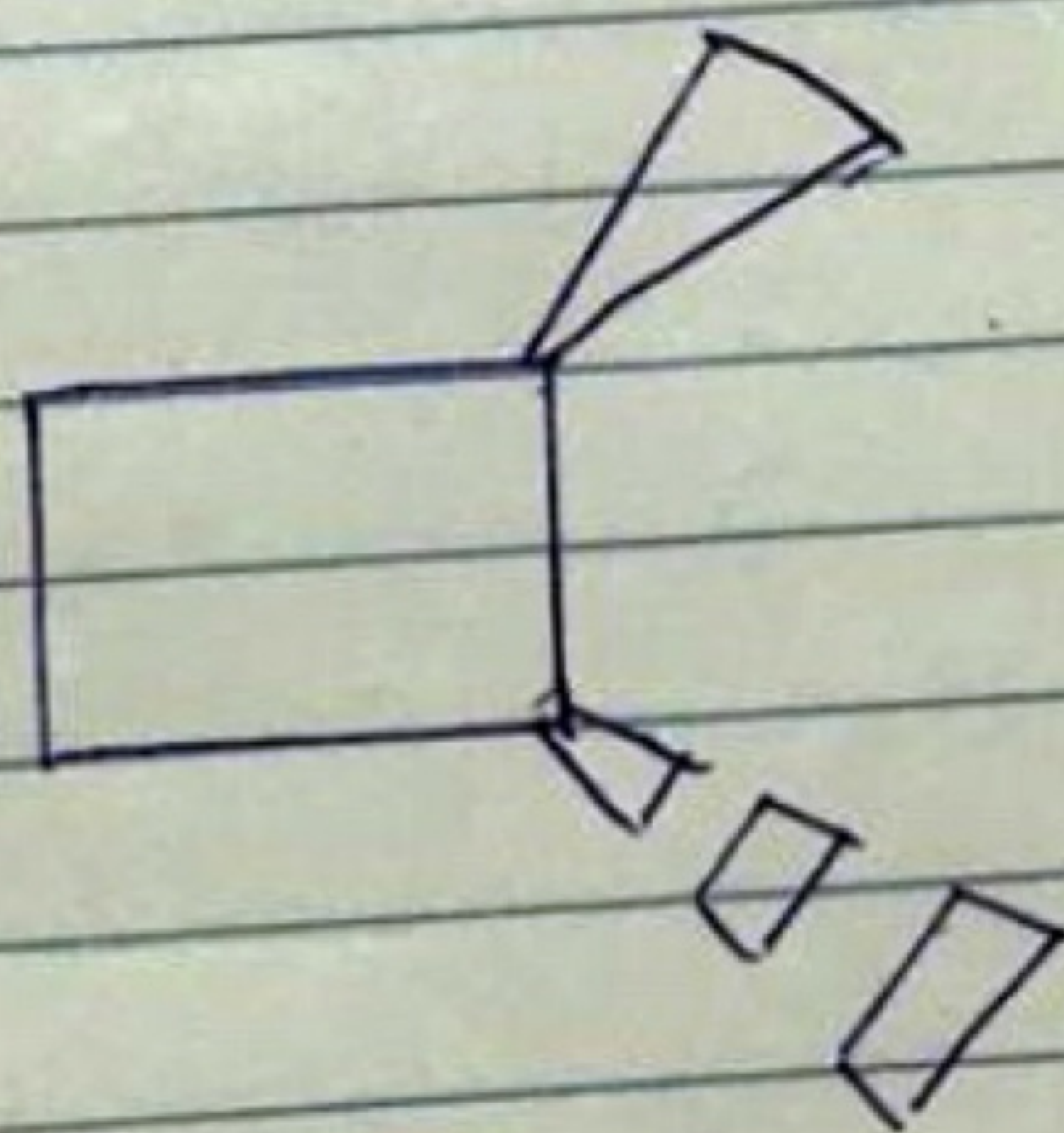
Possible geometric isomers



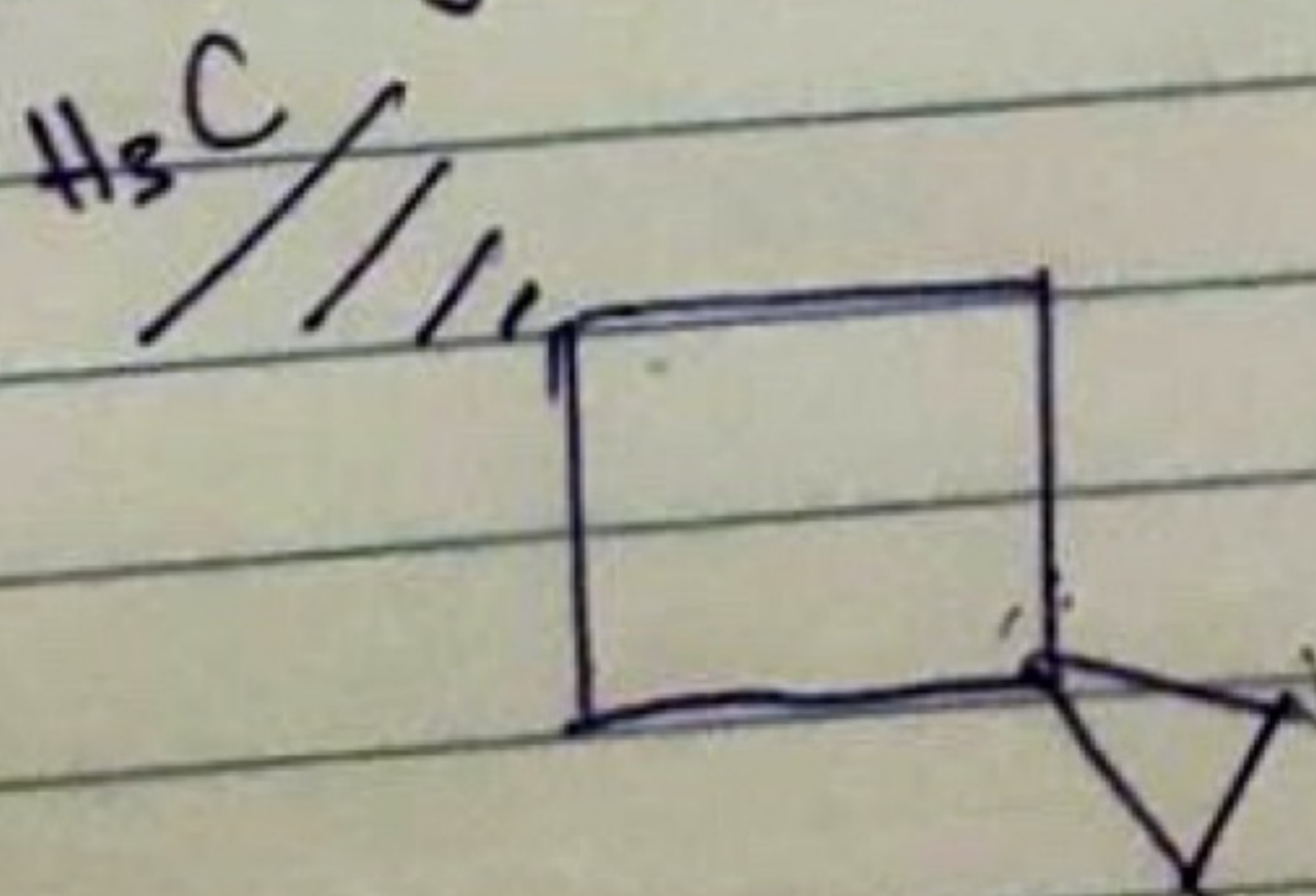
v Cyclo - 1-methyl - 2-ethyl Cyclopropane



v Trans - 1,2-dimethyl Cyclobutane

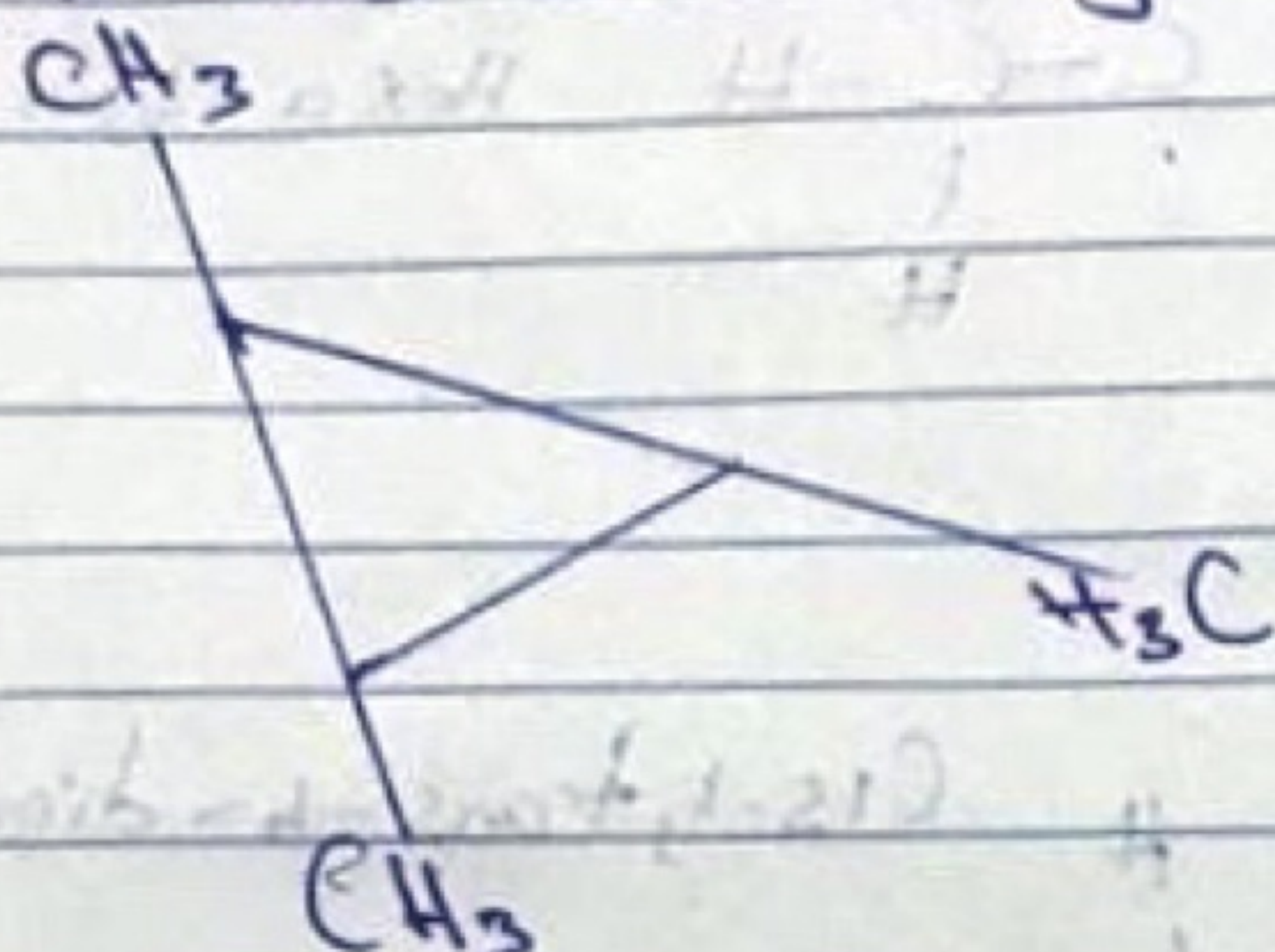


v Trans - 1,3-dimethyl Cyclobutane

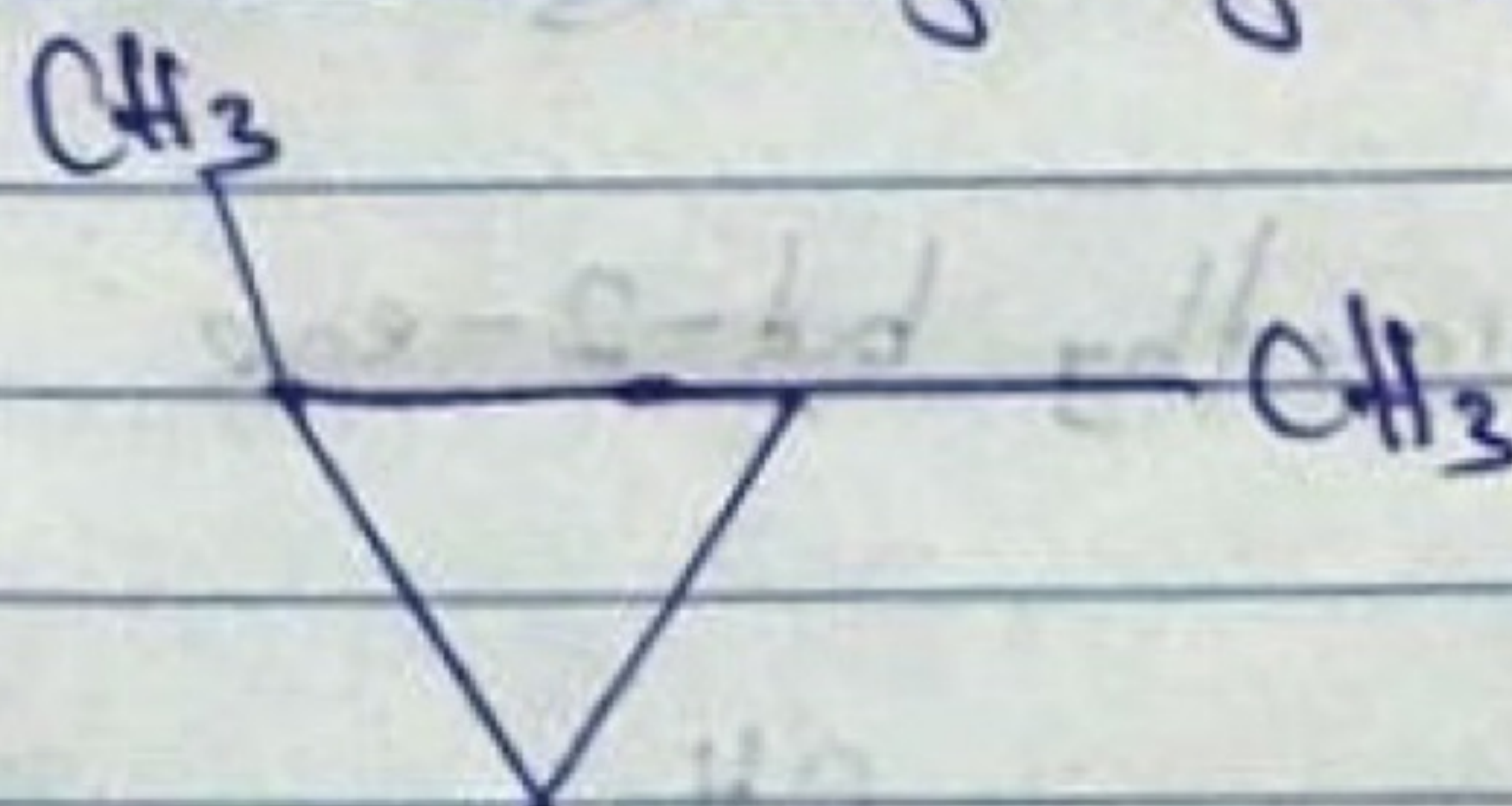


Possible Geometric Isomers

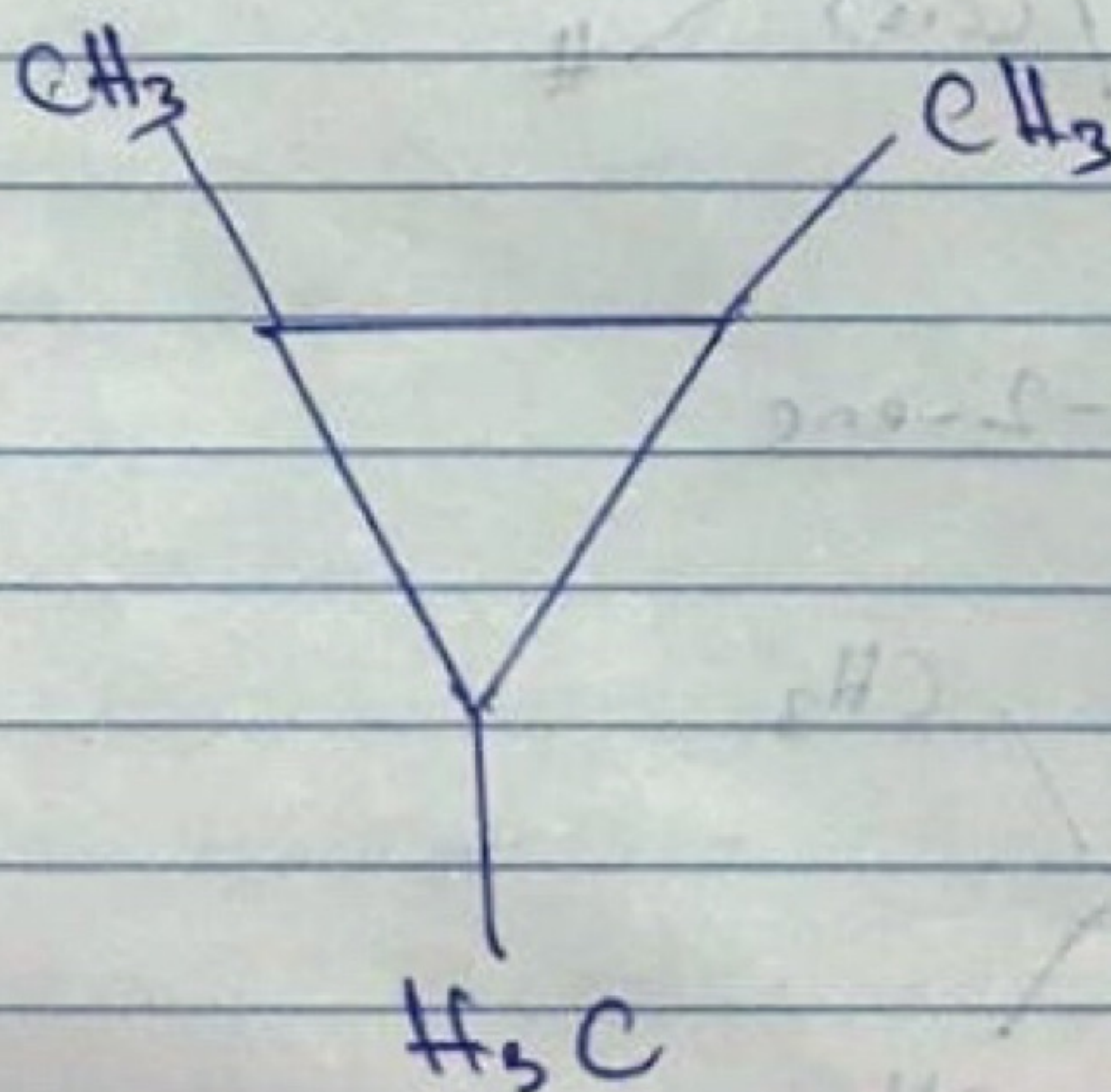
i) 1-Cis-2-trans-3-trimethyl Cyclopropane



ii) 1-methyl-1-trans-2-ethyl Cyclopropane



iii) Cis-1,2,3-trimethyl Cyclopropane



iv) Cis-1,3-dimethyl Cyclobutane

VIII Trans-2-hexene

