

## [DEPTH OF BIOLOGY]

### Reaction of Cyclopropane & cyclobutane:

- Cycloalkane resembles alkanes in chemical behaviour like alkanes  $\rightarrow$  cycloalkanes have  $sp^3$  Hybrid carbon atom with  $C-C$  &  $C-H$   $\sigma$  bonds.

$\Rightarrow$  Lower cycloalkanes like cyclopropane & cyclobutane undergo ring opening reaction & give addition products unlike alkanes.

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$\Rightarrow$  So, cycloalkane & cyclobutane undergo 2 types of reaction.

### ① Substitution Reaction

- free radical substitution like alkanes.

### ② Addition Reaction:

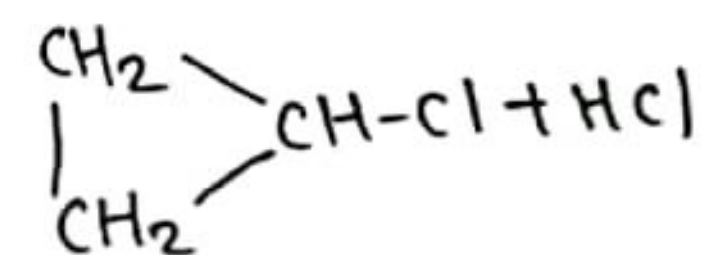
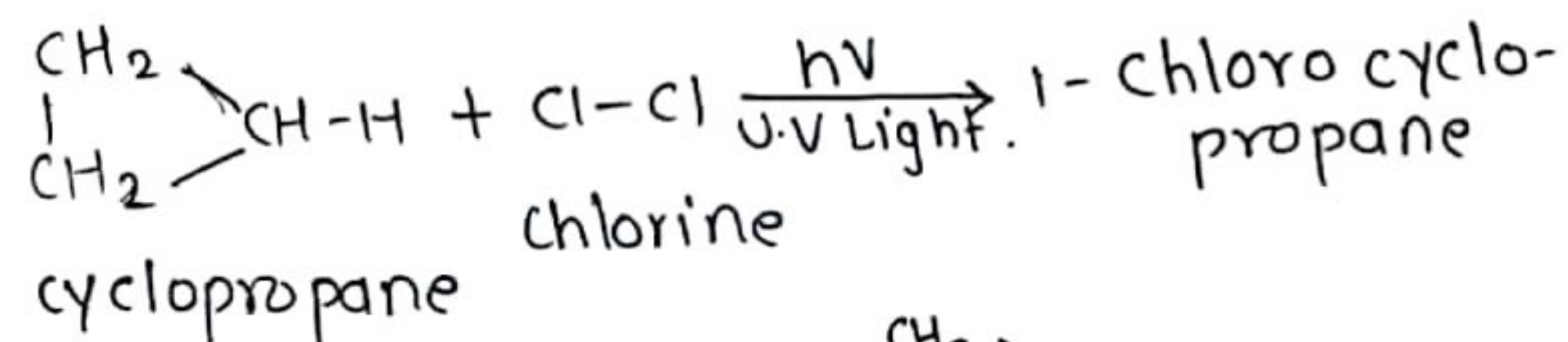
- Ring opening unlike alkane.

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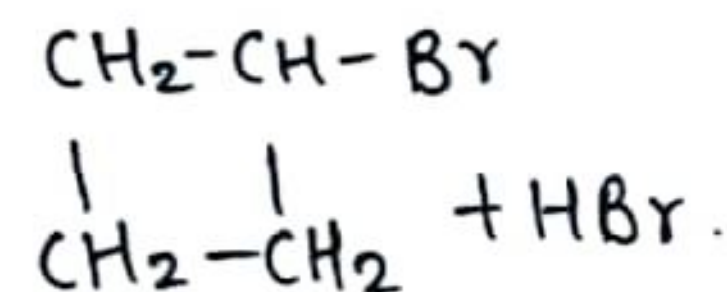
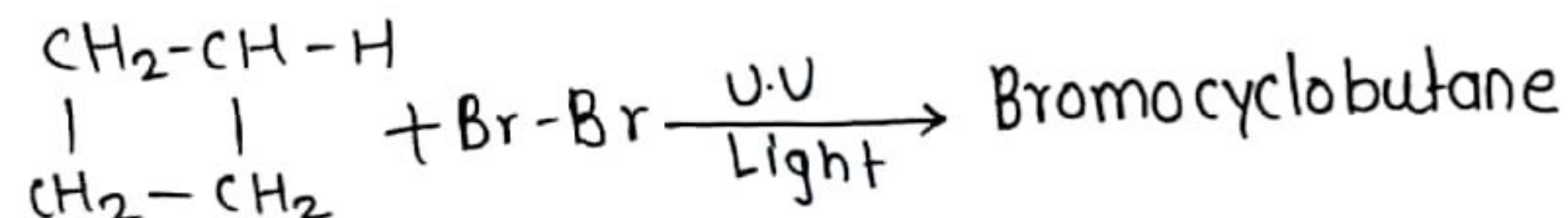
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### ① Substitution Reaction:

- cyclopropane & cyclobutane undergo free radical substitution reactions as like alkanes in the presence of Halogen in UV-Light.



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### ② Addition Reaction:

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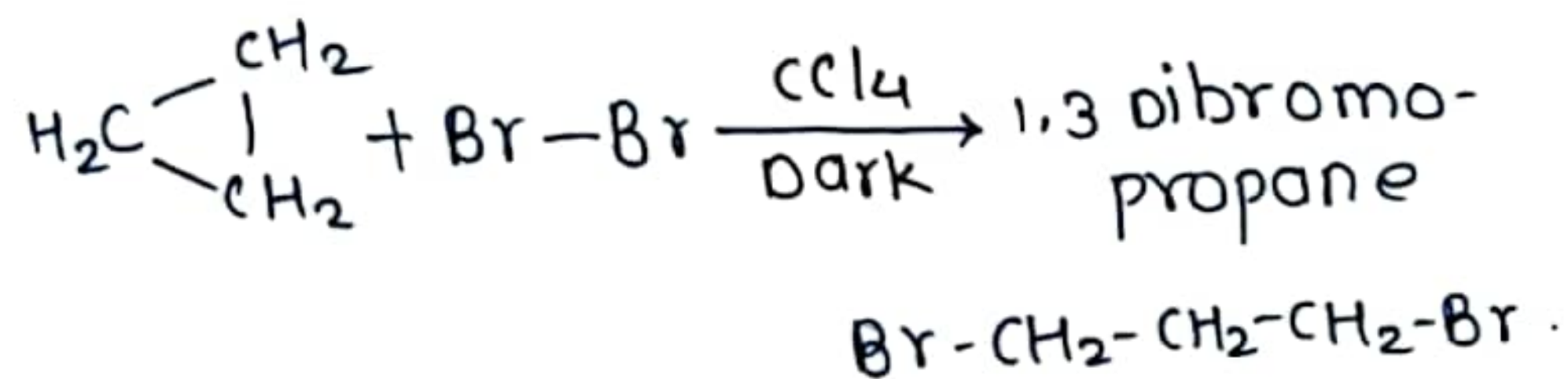


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- Cyclopropane & cyclobutane undergo certain addition reaction due to low stabilities than higher cycloalkanes. These addition destroys ring system & yield open chain addition products.
- Most of the reaction shown by only cyclopropane. [DEPTH OF BIOLOGY]

#### ① Addition of Halogen:

- cyclopropane react with  $\text{Cl}_2$  or  $\text{Br}_2$  in dark  $\text{CCl}_4$  to give addition products.



- cyclobutane  $\Rightarrow$  Higher cycloalkane do not give such rxn.

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#### ② Addition of $\text{HBr}$ & $\text{HI} \Rightarrow$

- cyclopropane react with conc.  $\text{HBr}$  (or)  $\text{HI}$  to yield 1-Bromopropane (or) 1-Iodopropane respt.



[DEPTH OF BIOLOGY] 1-Bromopropane  
cyclobutane & Higher cycloalkanes do not give such reaction.

$\Rightarrow$  cyclobutane with  $\text{H}-\text{I}$  may give 1-Iodobutane at specific conditions

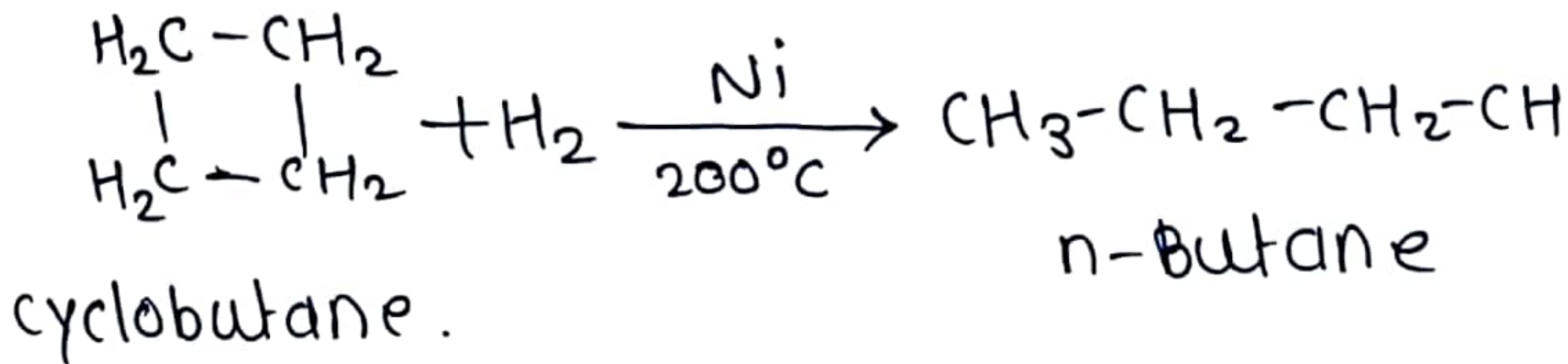
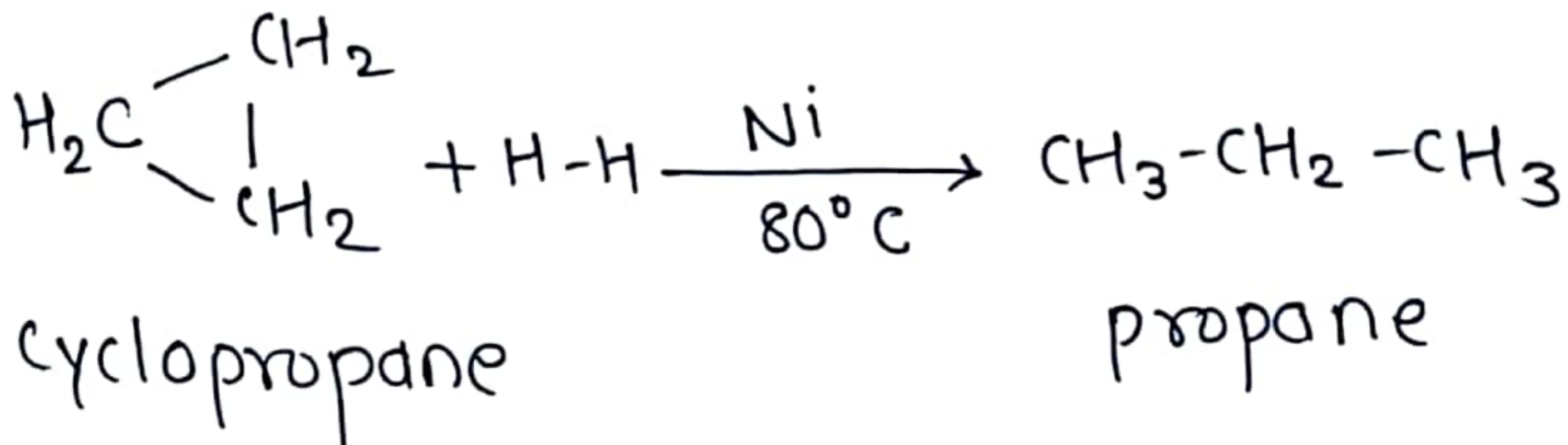
#### ③ Addition of Hydrogen:

- cyclopropane react with Hydrogen in the presence of  $\text{Ni}$  catalyst to give propane cyclobutane also undergo hydrogenation in  $\text{Ni}$  catalyst but at higher temp. to give n-butane.

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# Same Addition reaction shown by cyclopropane with  $\text{H}_2\text{SO}_4$  &  $\text{C}_6\text{H}_6$ .

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