ADDITION REACTIONS

ORGANIC REACTIONS

Recall: 5 Types of Reactions

1. Condensation Reactions
2. Addition Reactions
3. Substitution Reactions
4. Elimination Reactions
5. Oxidation Reactions

ADDITION REACTIONS

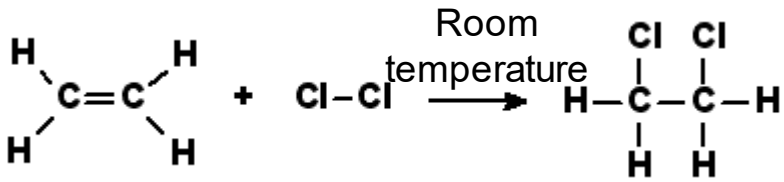
2. Addition Reactions

These reactions involve a double bond becoming a single bond by the addition of two groups of atoms.

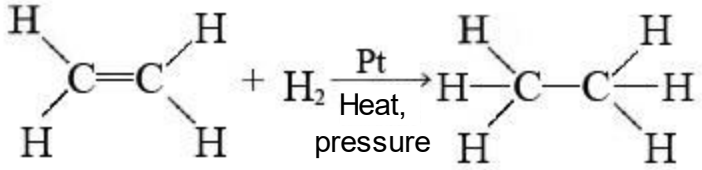
$$H_2C{=}CH_2 + XY \rightarrow H_2XC{-}CYH_2$$

ADDITION REACTIONS

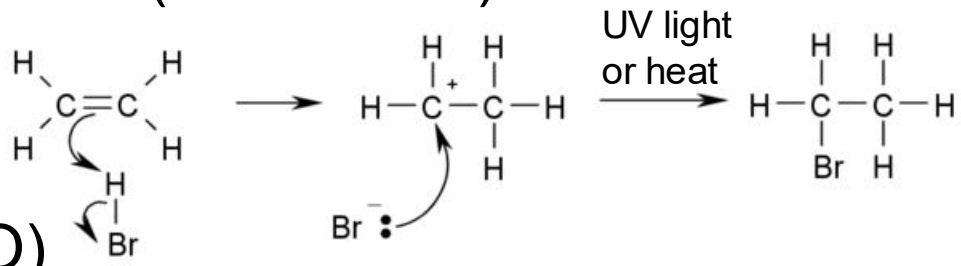
a) Halogenation (Br_2 or Cl_2)



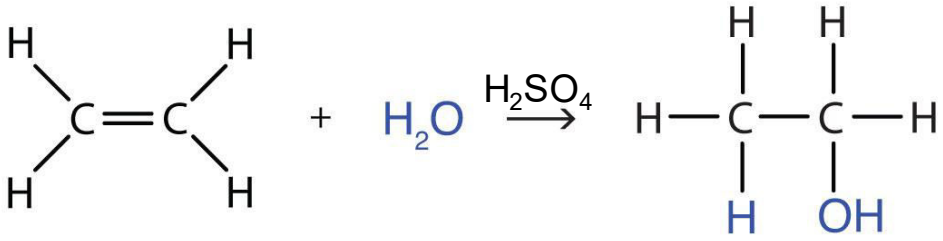
b) Hydrogenation (H_2)



c) Hydrohalogenation (HBr or HCl)



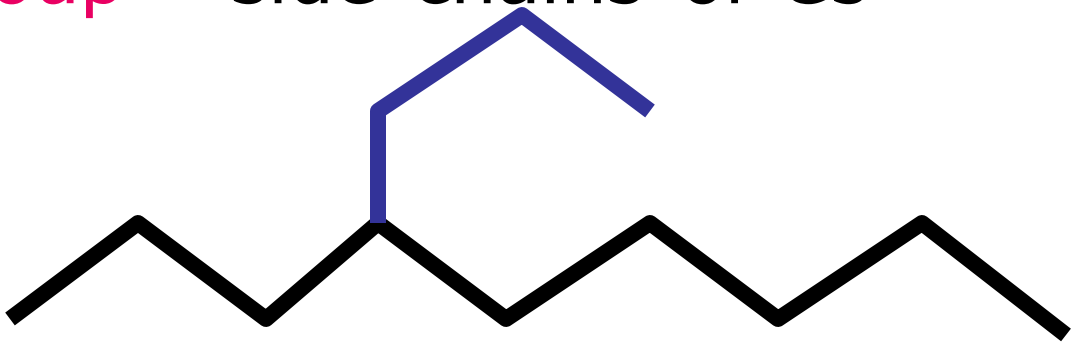
d) Hydration (H_2O)



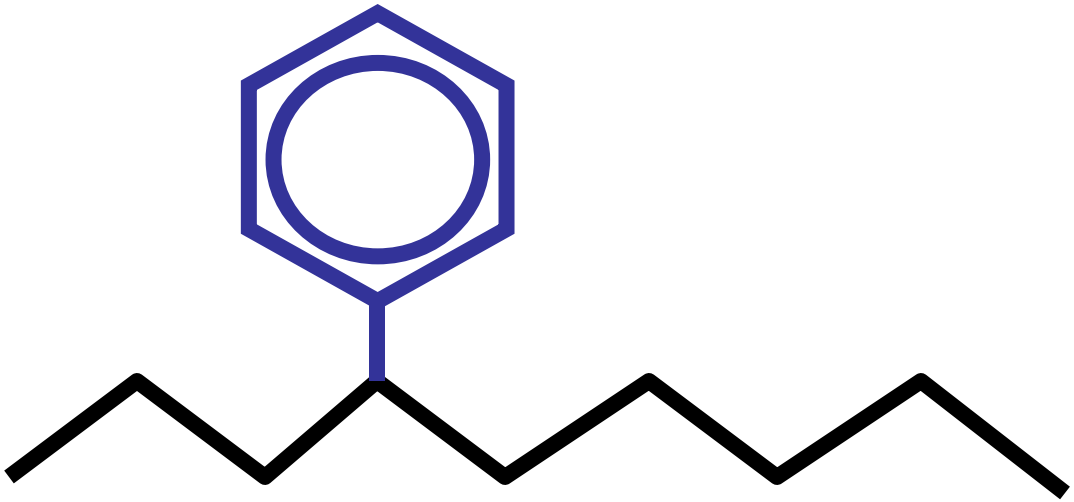
ADDITION REACTIONS

More Vocabulary

alkyl group – side-chains of Cs



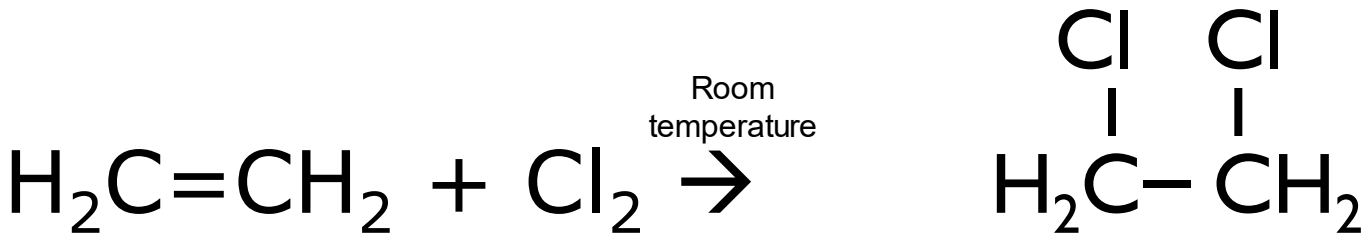
aryl group – side-chains of phenyl

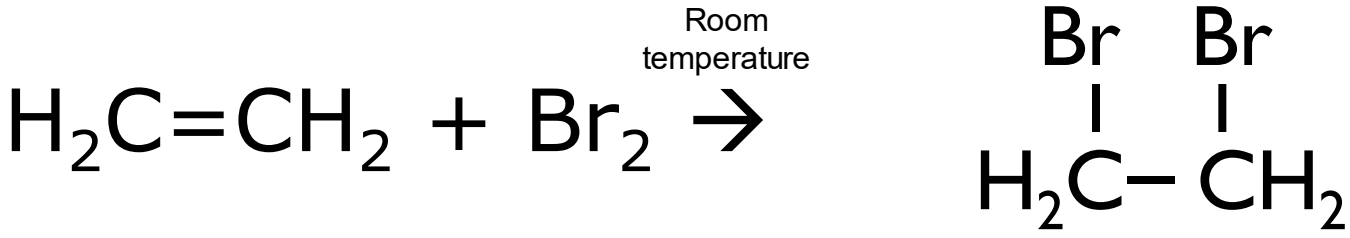


ADDITION REACTIONS

a) Halogenation

Each C across the double bond receives a halogen atom.





ADDITION REACTIONS

a) Halogenation

Halogenation results in the formation of an _____.

ADDITION REACTIONS

b) Hydrogenation

Similar to halogenation, except each C receives an H.

$$H_2C{=}CH_2 + H_2 \xrightarrow[\text{Heat, Pressure}]{\text{Pt}} H_3C{-}CH_3$$

$$HC{\equiv}CH + 2\ H_2 \xrightarrow[\text{Heat, Pressure}]{\text{Pt}} H_3C{-}CH_3$$

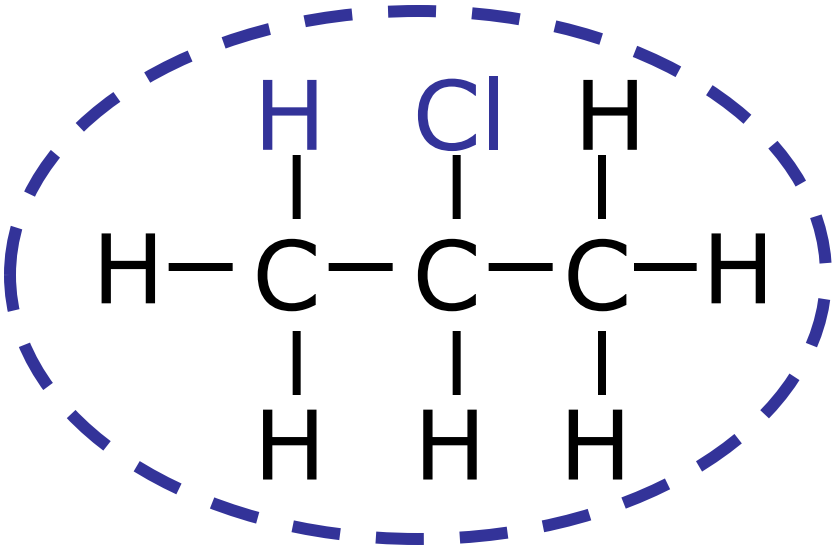
$$HCOH + H_2 \xrightarrow[\text{Heat, Pressure}]{\text{Catalyst}} CH_3OH$$

ADDITION REACTIONS

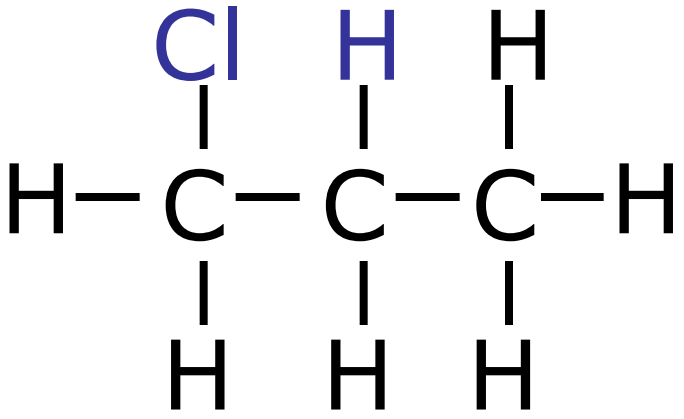
c) Hydrohalogenation

HBr or HCl is added across a double bond.

$$H_2C{=}CHCH_3 + HCl \xrightarrow[\text{or heat}]{\text{UV light}}$$



or



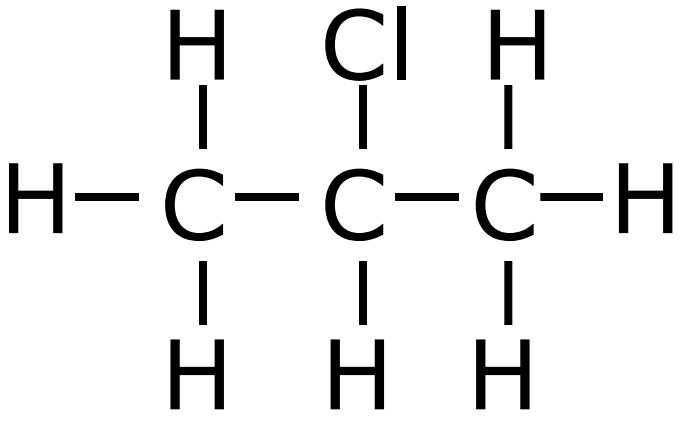
Which one is the main product?

ADDITION REACTIONS

Markovnikov Rule

The H atom goes on the C that already contains the greatest number of H's.

$$H_2C{=}CHCH_3 + HCl \xrightarrow[\text{or heat}]{\text{UV light}}$$



ADDITION REACTIONS

c) Hydrohalogenation

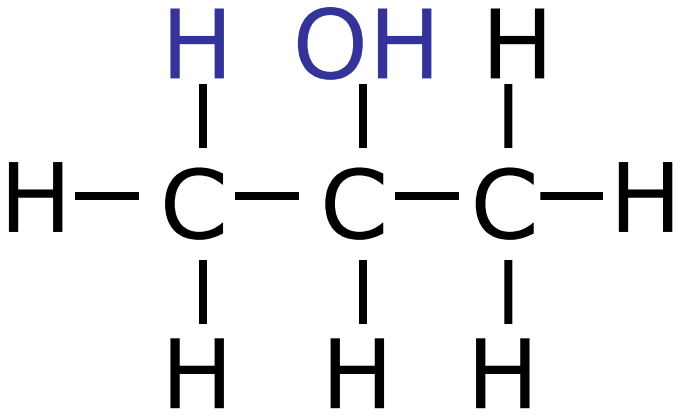
Hydrohalogenation results in the formation of an

ADDITION REACTIONS

d) Hydration

This method of addition also follows the Markovnikov rule.

$$HCH{=}CH\text{-}CH_3 + H_2O \xrightarrow{H_2SO_4}$$



ADDITION REACTIONS

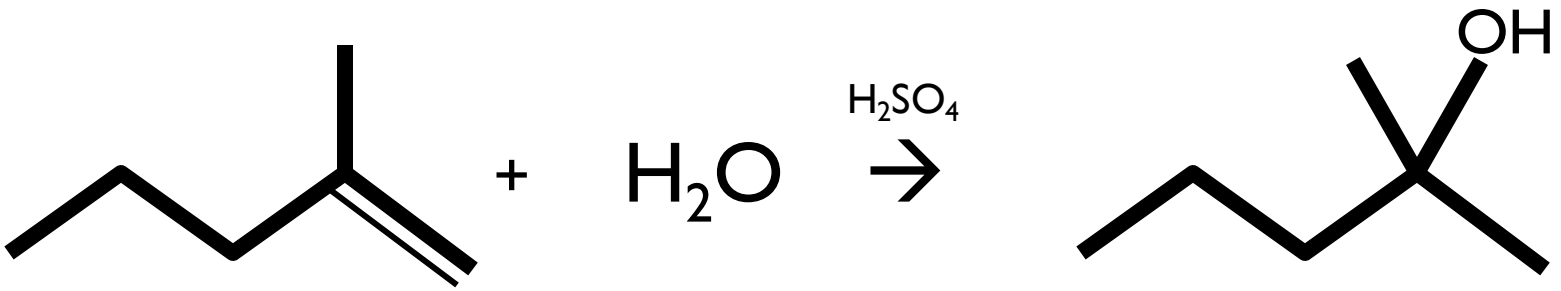
d) Hydration

Hydration reactions result in the formation of

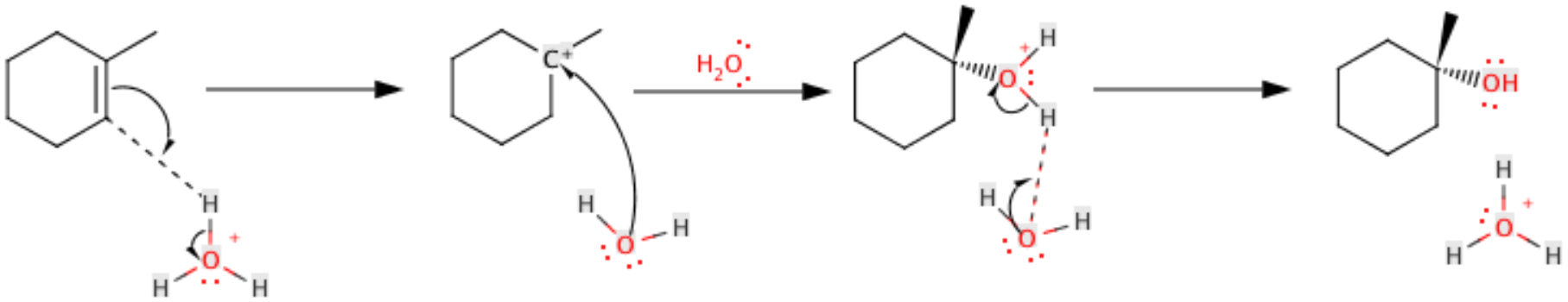
ADDITION REACTIONS

Example #1

a) $CH_3CH_2CH_2C(CH_3)=CH_2 + H_2O \rightarrow$



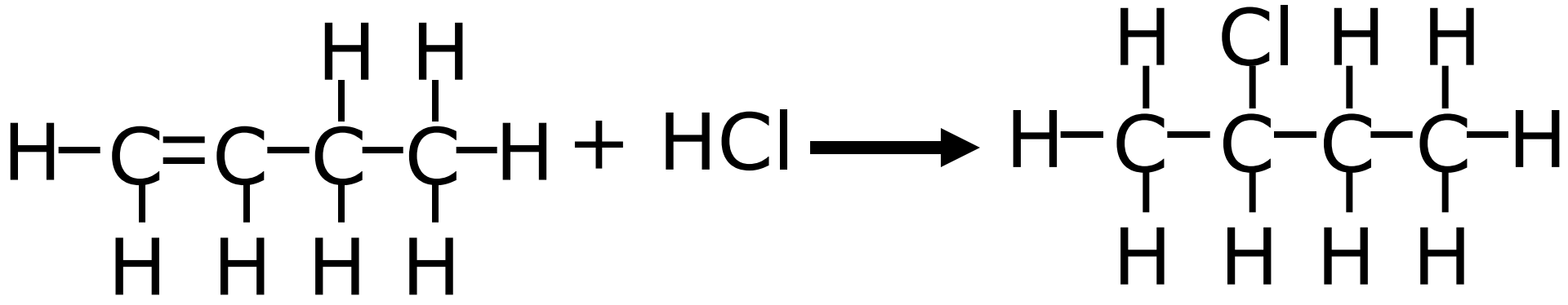
Here is the mechanism:



ADDITION REACTIONS

Example #1

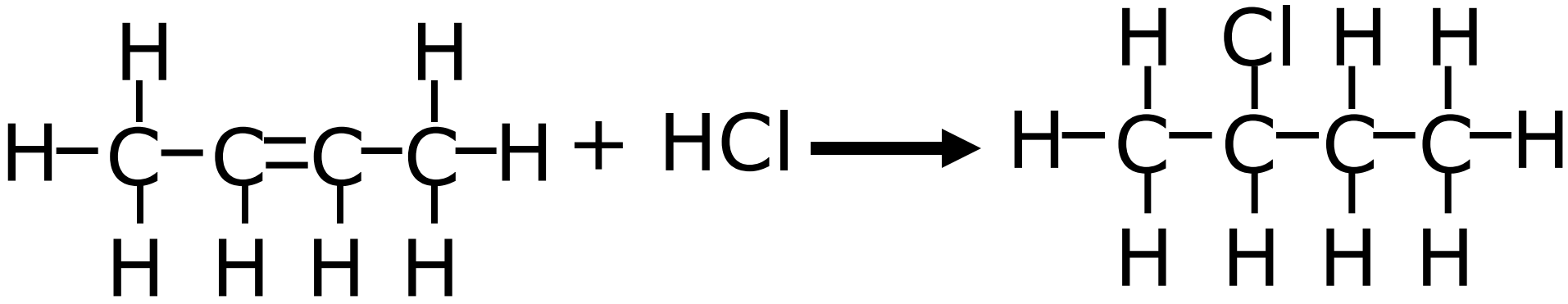
b) Draw structural diagrams to represent an addition reaction of an alkene to produce 2-chlorobutane.



ADDITION REACTIONS

Example #1

b) Draw structural diagrams to represent an addition reaction of an alkene to produce 2-chlorobutane.



This works as well

ADDITION REACTIONS

Homework

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