



Downloaded from eduresourceza.com

IMPORTANT ORGANIC REACTIONS



Presentation created by S. Schlosz

Downloaded from eduresourceza.com

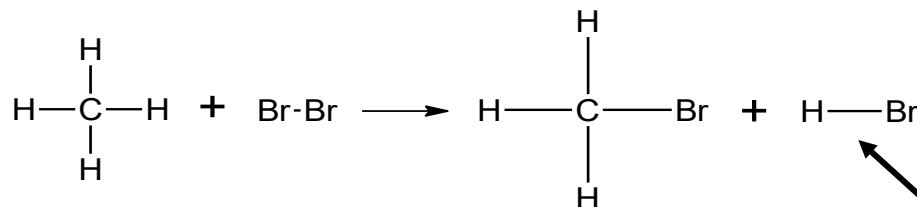
Information by N. Solomons, K. Dilraj & S. Schlosz

What must you be able to do?

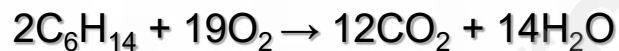
- identify the types of reactions that hydrocarbons undergo.
- explain what happens during each type of reaction.
- compare the reactivity of different hydrocarbons.

Reactions of Alkanes:

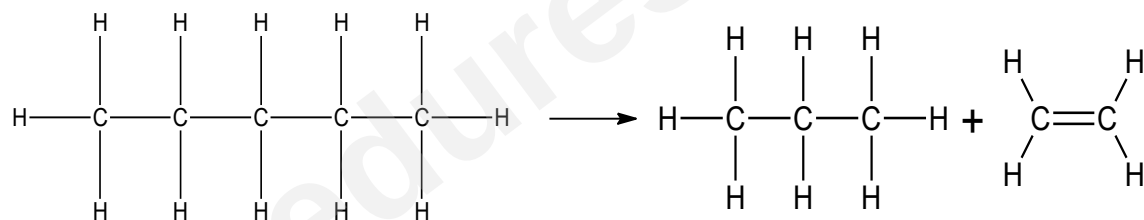
Downloaded from eduresourceza.com



Conditions: Heat OR sunlight; Reactants: alkane + X₂ (Br, Cl, I, F)
Process = **halogenation**; Products = haloalkane + hydrogen halide



Alkane + oxygen → carbon dioxide + water + **energy**



Conditions: Heat and high pressure OR heat and catalyst
Process = **cracking** Products = alkene(s) + alkane(s)

HALOGEN (as found in the periodic table) Normally diatomic

HALIDE (the state Halogen after it received an electron bonding)

F (F₂) Fluorine

F⁻ (Fluoride)

Cl (Cl₂) Chlorine

Cl⁻ (Chloride)

Br (Br₂) Bromine

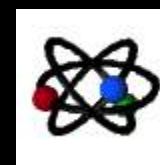
Br⁻ (Bromide)

I (I₂) Iodine

I⁻ (Iodide)

ELIMINATION

Alkane becomes alkene(s) and alkane(s) with shorter chain



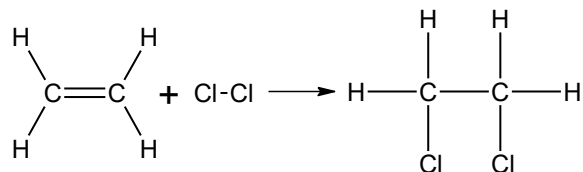
Downloaded from eduresourceza.com

REACTIONS OF ALKENES

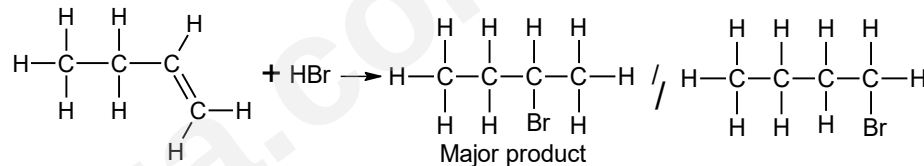
Downloaded from eduresourceza.com

NOTE:

Only **minor product** shown. This is the **CIS** structure.
The **major product** will have the **TRANS** structure [Cl on opposite sides of the different Carbons]



Process = **halogenation**
Product = haloalkane



No water present; Process = **hydrohalogenation** Product = haloalkane

Major product: H atom attaches to the C atom already having the greater number of H atoms

NOTE:

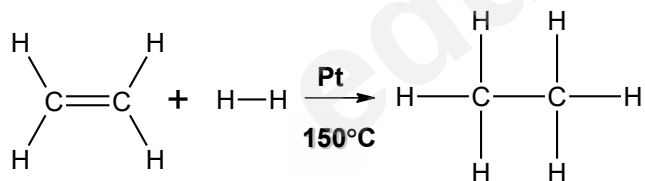
This is **Markovnikov's Rule** for ADDITION Reactions.

ADDITION

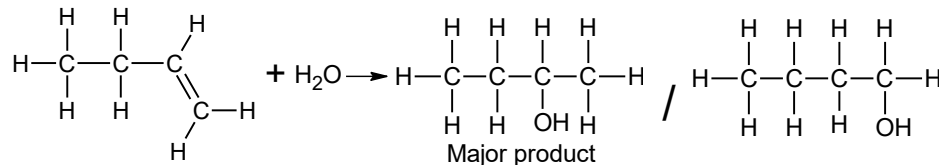
Alkene becomes alkane, alcohol or haloalkane

NOTE:

The **acid** must be **dilute** H_2SO_4 or H_3PO_4 . Cannot use HNO_3 & HCl as they produce gases.



Pt, Pd or Ni as catalyst
Process = **hydrogenation**; product = alkane

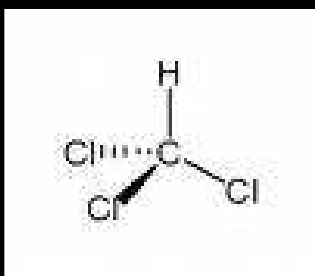


In presence of excess H_2O and acid as catalyst
Process = **hydration**; product = alcohol

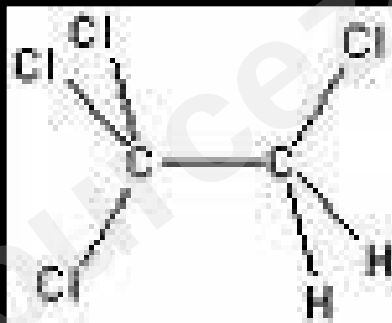
Major product: H atom attaches to the C atom already having the greater number of H atoms

Downloaded from eduresourceza.com

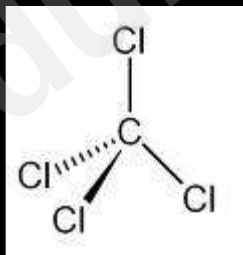
Haloalkanes are important compounds that are used as **anesthetics** (trichloromethane), **solvents** and **dry cleaning agents**.



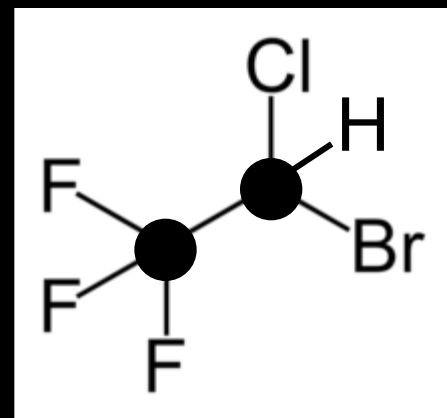
Trichloromethane
(chloroform)



Tetrachloroethane



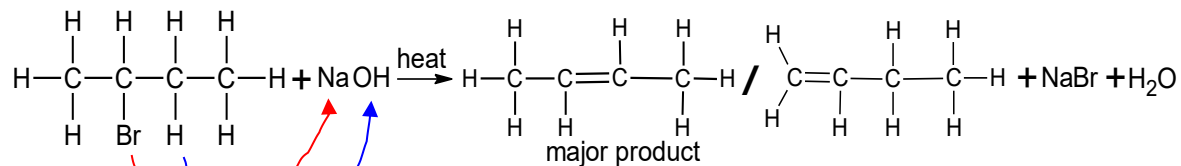
Tetrachloromethane
(Carbon tetrachloride)



Halo-ethane

Haloalkanes undergo:

Downloaded from eduresourceza.com



- Conditions: **concentrated strong base** (NaOH, KOH, LiOH), **heat**
- Process = **dehydrohalogenation**; Products = **alkene + NaBr + H₂O**
- Major product: The one where the H atom is removed from the C atom with the least number of H atoms (most substituted double bond forms i.e. double bond with most alkyl groups forms)

ELIMINATION

Haloalkane becomes alkene

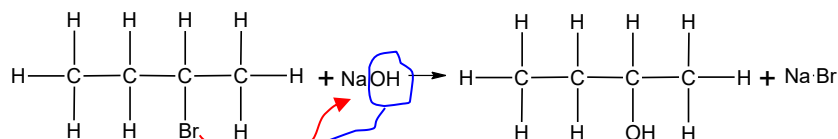
NOTE:

This is **VASILY SAYTZEFF's Rule** for ELIMINATION Reactions.

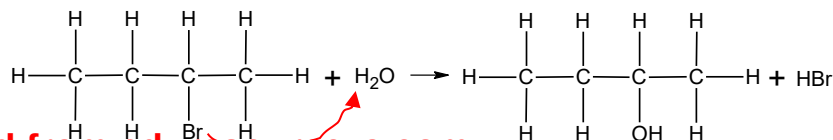
REACTIONS OF HALOALKANES

SUBSTITUTION

Haloalkane becomes alcohol



Conditions: **Dilute strong base** (NaOH, KOH, LiOH), **mild heat**
Substitution - **hydrolysis**; Products = alcohol + NaBr (KBr or LiBr)



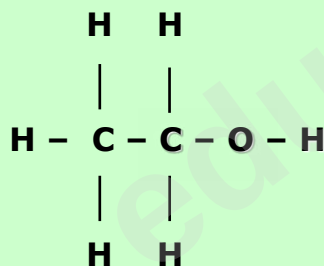
Conditions: Add water, mild heat
Substitution - **hydrolysis**; Products = alcohol + HBr

Downloaded from eduresourceza.com

ALCOHOLS

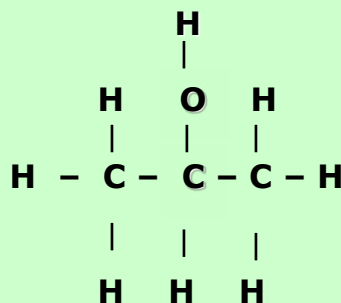
Primary Alcohols

The **O-H** group is attached to a Carbon which is attached to **1 other Carbon**



Secondary Alcohols

The **O-H** group is attached to a Carbon which is attached to **2 other Carbons**



Tertiary Alcohols

The **O-H** group is attached to a Carbon which is attached to **3 other Carbons**

