

Chemistry 2.5

Organic Chemistry

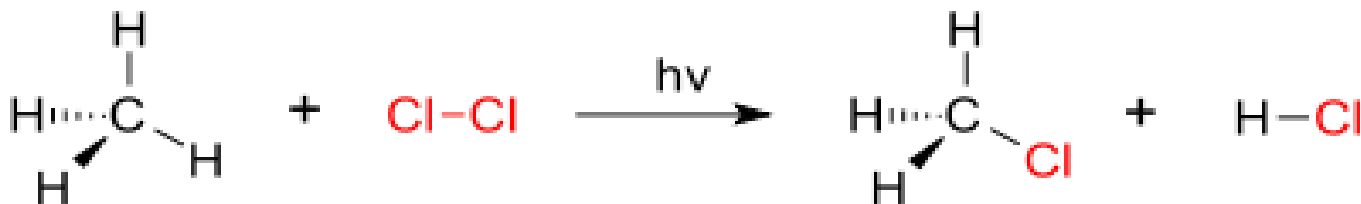
Alkane and Alkene reactions

Alkane

- It is chemically unreactive
- As there are no active functional group
- The only organic reaction that it involves is
 - Substitution

Substitution reaction

- Reaction substituting hydrogen with halogen in an alkane.



- X = halogen
- X₂ can be F₂, Cl₂, Br₂ and I₂
- Br₂ is orange solution, when the reaction occurs, Br₂ from orange to colourless
- The reaction carries on until all halogen is used up
- This is a **slow reaction** and **requires UV (sunlight)**

Alkene

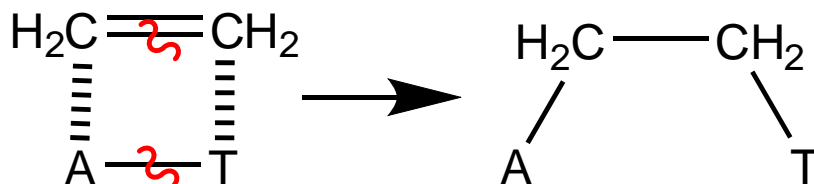
- Are classified as **unsaturated**
 - *Compounds contain C-C **double** or **triple** bonds.*
- There are two main reactions for alkene
 - Addition reactions
 - Oxidation

Addition reactions

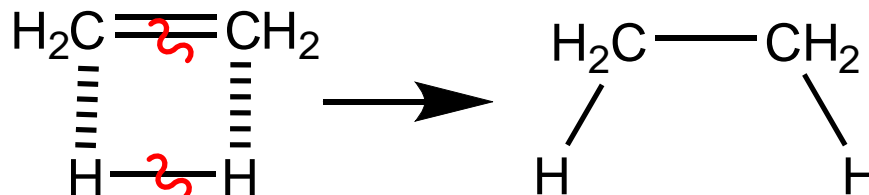
- Addition reactions are reactions in which one small molecule **adds** to the molecule by **breaking of double bond** forming a **single product**.
- Small molecules can be
 - H-H = Hydrogenation
 - X-X = Halogenation
 - H-OH = Hydration (requires H⁺ as catalysis)
 - H-X

X = halogen (group 17). F Cl Br I

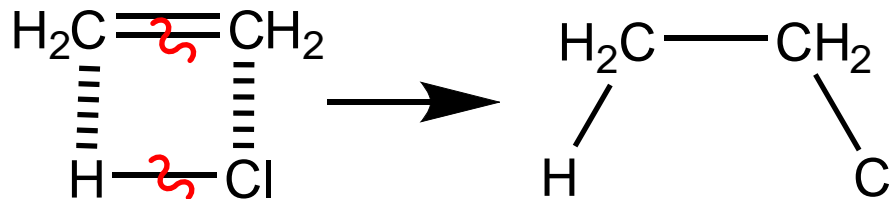
Example



- A and T can be the same
 - Hydrogen or Halogen

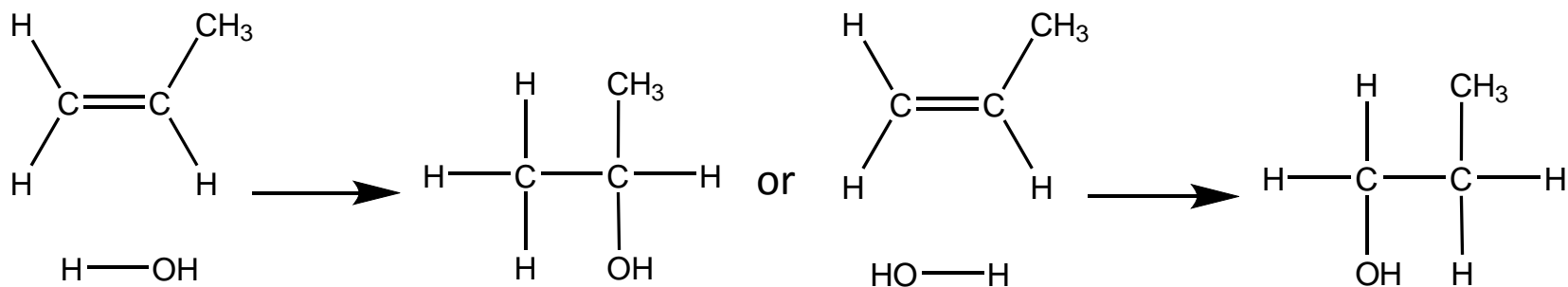


- Or A can be a hydrogen while T is a halogen or OH
 - H-Cl or H-Br or H₂O



Addition of H-X (or H-OH)

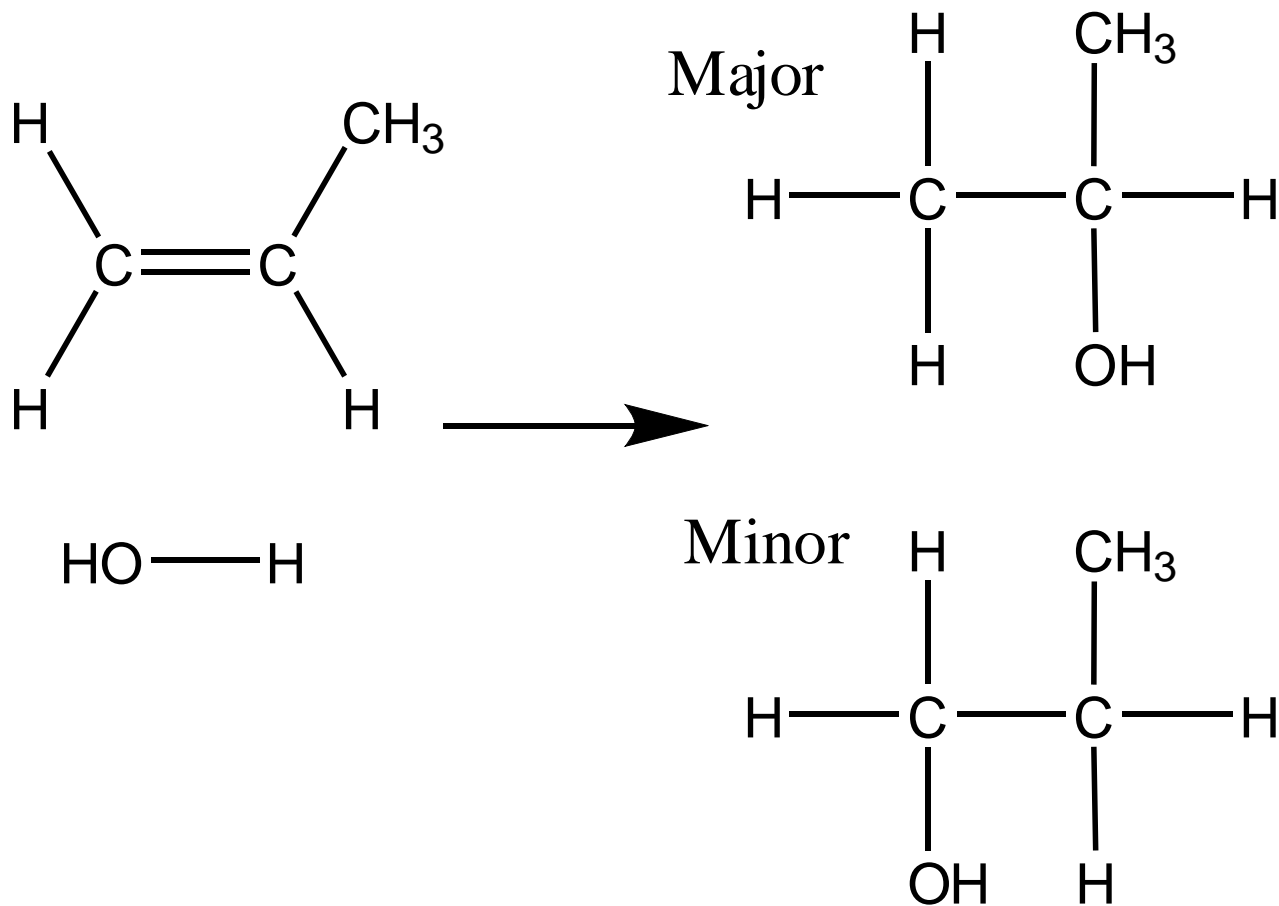
- The addition of H-X (or H-OH) to an **unsymmetrical alkene** such as propene is more complicated because **two products** are possible.



The Markovnikov's rule

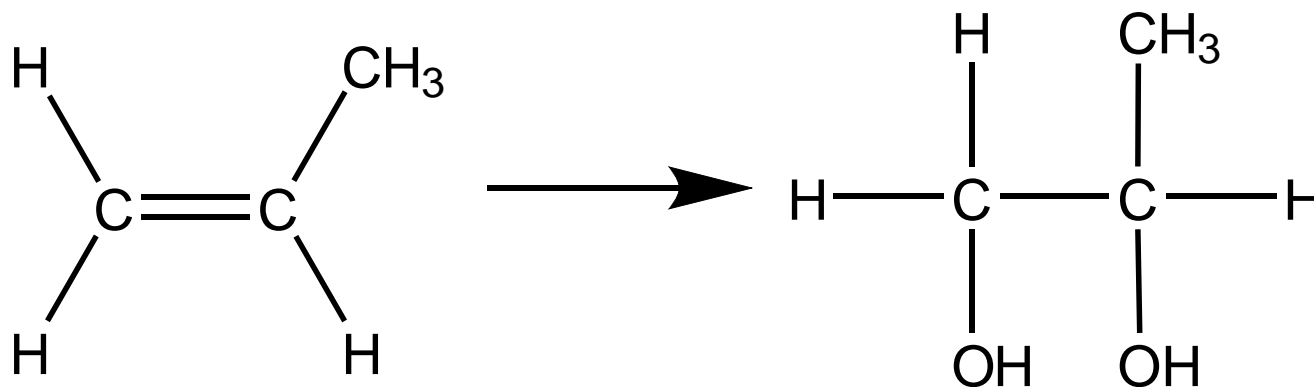
- Hydrogen rich gets richer
 - In an unsymmetrical addition reactions, hydrogen prefer to be added on the carbon which contains more hydrogen forming the **major product**
 - The other possibility will be the **minor product**

Example of M. rule



Oxidation

- Alkene also undergoes oxidation with oxidant such as KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$
- The double bond is broken and replaced by two hydroxyl (-OH alcohol) group



Polymerization

- A polymer is made up of thousands of small molecules (called monomers) covalently bonded together.
- This process (of joining together) is called polymerization.
- Two types
 - Addition polymerization
 - Condensation (Yr 13)

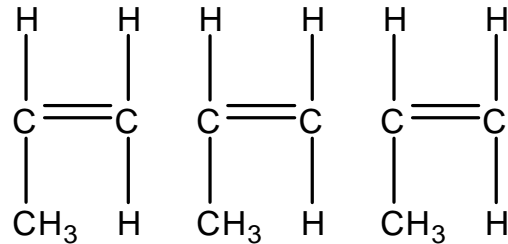
Additional polymer

- Additional polymerisation is where reactant **monomer** molecules link together in a simple chain **polymer**.
- This process usually requires a catalyst.
- To draw the polymer, it is easier to redraw the alkene in a “H” shape where the double bond is the horizontal line of the “H”.

Example

- Polypropylene is a polymer made out of monomer propene.
- Draw three repeating unit of polypropylene

1. Draw three propene in “H” shape



2. Break the double bonds and join them together

