**Electrophilic Addition Reaction:**

Strong acid acts like electrophile (lack of electron) can be HCl, HBr, HI or HF, or even H2SO4, H3PO4, HNO3

Alkene (double bond organic compound) acts like nucleophile (electron rich)

R group normally means CH chain or CH3 or any other CHs etc..

What if there is R instead of H:









**Migration:**



Migration will only happen if there is an improvement (from secondary to tertiary).

What if adding strong acid (does not has to be HCl/HBr) and H2O or ROH (alcohol) electron rich element:



Same rule (as well as migration rule), however, Cl or Br will compete with OH or OR, so in generally, only add few drops of strong acid.

**What if there are two double bond in the alkene (known as diene)**



1. Isolated diene react as “normal” alkenes
2. Conjugated diene: complicated
3. Cumulated diene : not consider

**Conjugated diene:**

At high temperature (can be vary, but need to heat), Thermo Product was formed.

Thermo Product means, the most substituted alkene. (Ie .RRC=CRR is more substituted than HHC=CHH)

At low temperature (<0 degree can be vary, but need to be cold), Kinetic Product was formed.

Kinetic Product means, the least substituted alkene.

It will follow the same rule as mention above: (ie: tertiary is more preferable compare to secondary)

For example:



**What if there is more double bond (only consider: conjugated alkene)**

Can be consider as: even there is a tertiary spot, if there is a resonance appears, the priority would be resonance conjugated.

**Halogenation**

Similar to electrophile addition

Br2 or Cl2 can be Electrophile or Nucleophile

Dissolve in CH2Cl2 or CH2Br2

Opposite side

If there is H2O, Alcohol or NaX. (X: Cl, F, I, Br) electron rich element



Same rule as previous examples (ie. primary will not form, secondary might be minor product)

**Reduction Reaction**

 H is adding at the same side

Using Hg will not have any migration, but will have the same rule as electrophile addition



Using BH3 will not have any migration, however, it is primary prefer (backwards as electrophile addition)



**Addition of peroxyacid**



**Triple bond:**











Using Hg is the same as above, it will not have any migration



Using BH3 is the same as above, it will prefer primary

All the triple bond reactions will have the same rule as above.

**Reduction Reaction**









R’ group can’t be bulky

Organic Chemistry 241 is done !

*Is it possible to reversely predict reactant base on product?*

*Is it possible to predict the reaction condition (acid, base or temperature etc.) base on major reactant and product?*

*For example, if a question asks how to make a certain organic compound, can our software propose reasonable reactions?*