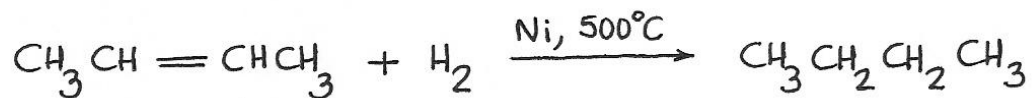
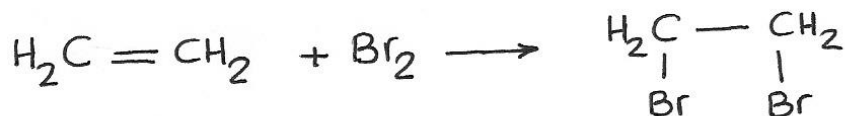


Types of Organic Reactions

Addition of H_2
(HYDROGENATION)



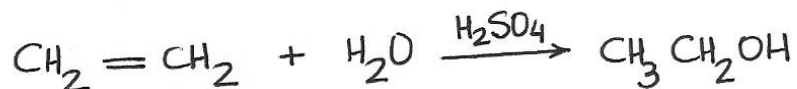
Addition of Br_2
(HALOGENATION)



Addition of hydrogen halides
(HYDROHALOGENATION)



Addition of water
(HYDRATION)



Addition Reactions

In an addition reaction, two molecules add together. Addition reactions are typical of unsaturated compounds.

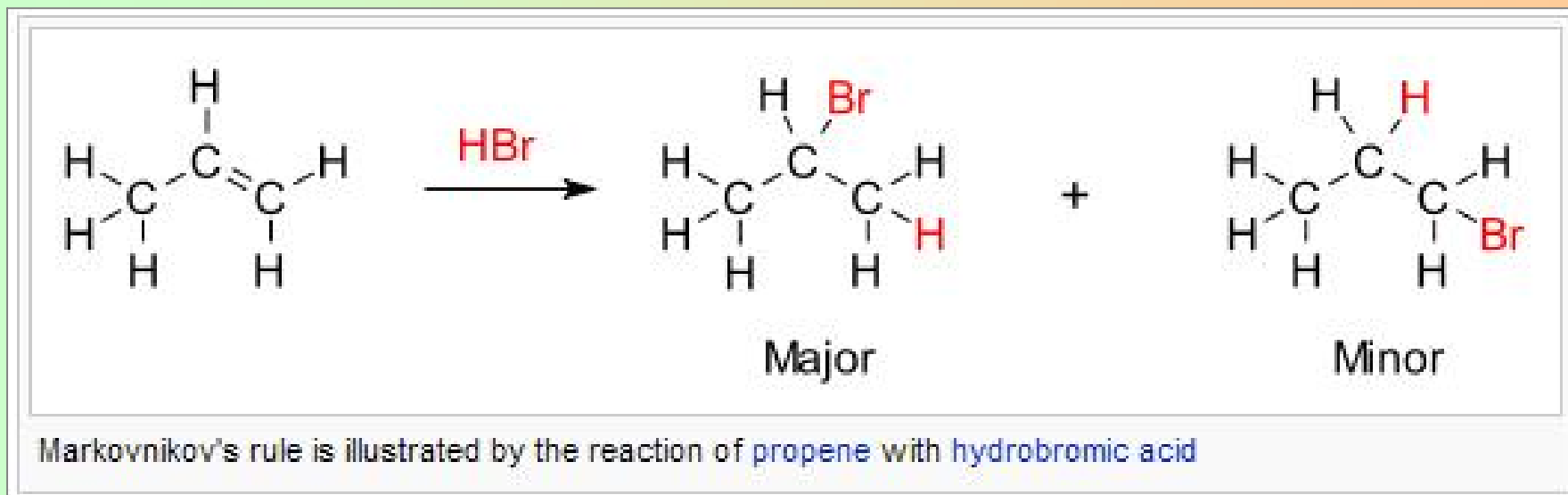
The most common reactants added to organic compounds are:

- hydrogen
- halogens
- hydrohalogens
- water

Types of Organic Reactions

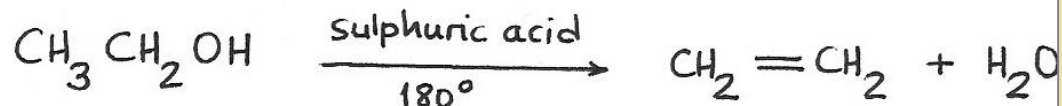
Addition Reactions: Markovnikov's rule

If an alkene is not symmetrical about its double bond, two different products could result. The product that is predominant can be predicted by Markovnikov's rule: "the dominant product is the one that has the hydrogen atom attached to the carbon atom that had more hydrogen atoms at the start"



Types of Organic Reactions

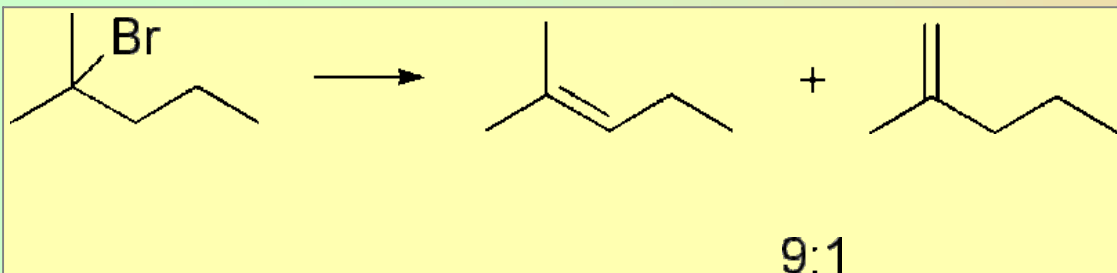
Elimination of water
(DEHYDRATION)



Elimination Reactions

An elimination reaction is a type of organic reaction in which two substituents are removed from a molecule.

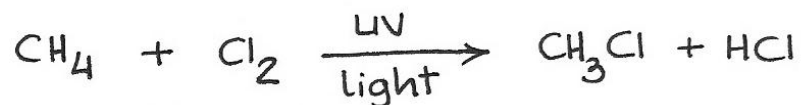
Zaitsev's rule is a rule that states that if more than one alkene can be formed by an elimination reaction, the compound that has a more highly substituted C=C double bond is preferred.



http://upload.wikimedia.org/wikipedia/commons/thumb/4/40/Zaitsev%27s_rule.png/800px-Zaitsev%27s_rule.png

Types of Organic Reactions

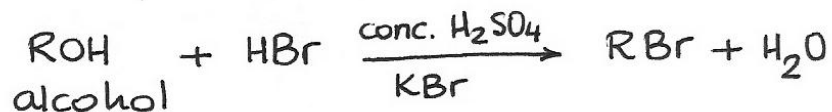
Replacement of hydrogen with chlorine or bromine
(CHLORINATION / BROMINATION)



Replacement of a halogen with a hydroxide ion
(HYDROLYSIS)



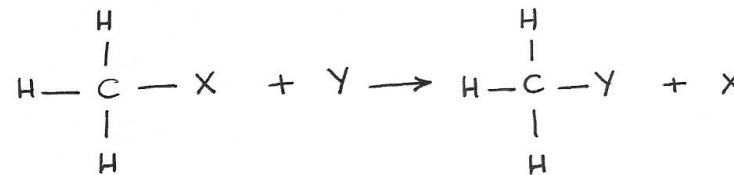
Substitution by HBr



Substitution Reactions

In a substitution reaction an atom or group (X) in a molecule is replaced by another (Y).

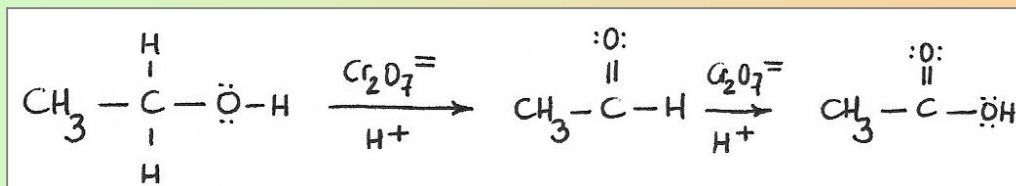
Substitution reactions are typical of saturated compounds.



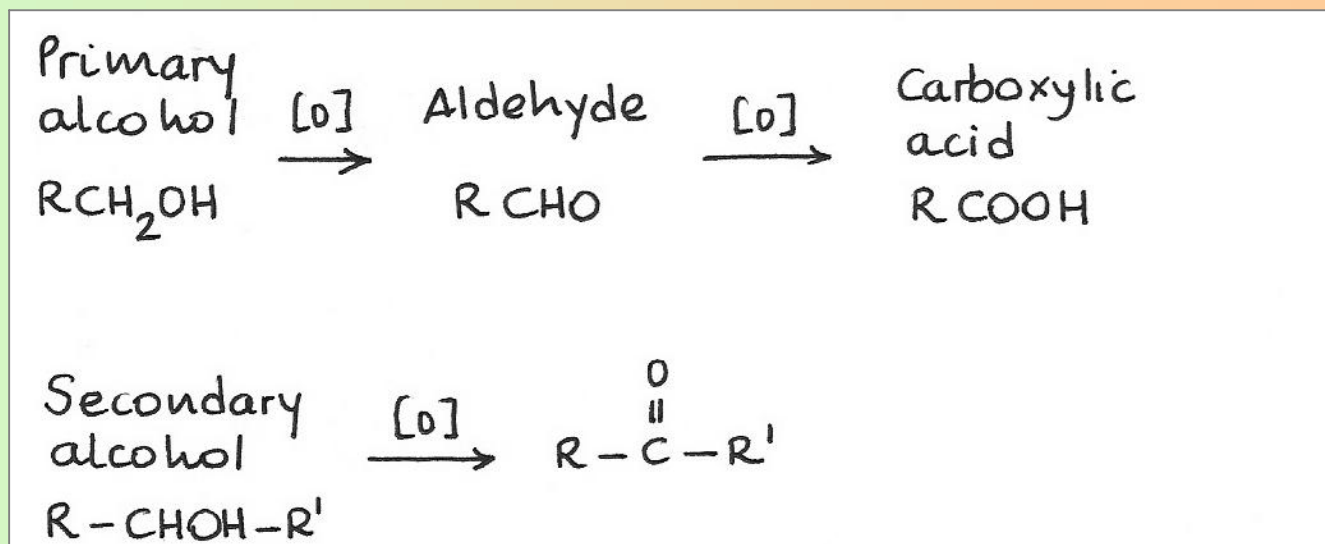
Types of Organic Reactions

Oxidation of organic molecules

Oxidation in organic chemistry is often carried out using potassium dichromate in acidic solution as the oxidant.



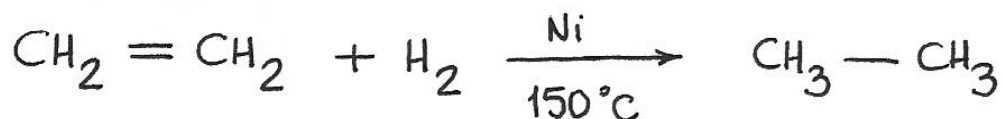
In the case of ethanol, during the first stage, hydrogen is removed from the molecule; during the second stage oxygen is added to the molecule. Secondary alcohols are oxidized to ketones. Ketones resist further oxidation.



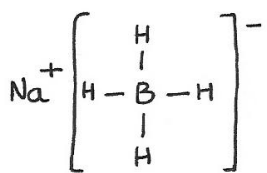
Types of Organic Reactions

Reduction of organic molecules

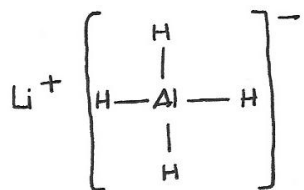
Compounds with carbon-carbon double bonds are reduced by catalytic hydrogenation.



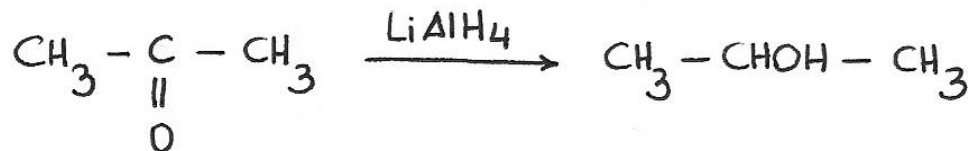
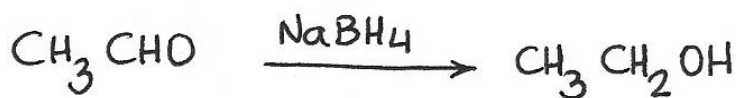
Sodium tetrahydroborate and lithium tetrahydroaluminate are commonly used for reducing carbonyl compounds.



Sodium
tetrahydroborate



lithium
tetrahydroaluminate

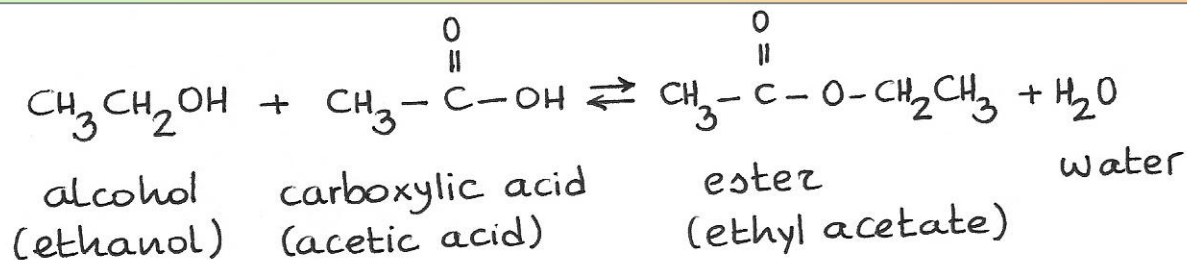


Types of Organic Reactions

Condensation Reactions

Condensation reactions happen when two molecules react together to form a larger molecule (with the elimination of a small molecule such as water).

The formation of an ester (esterification) is an example of this type of reaction.



Ester hydrolysis

The process of the previous example can be reversed by a reaction called ester hydrolysis: esters are hydrolysed to alcohols and carboxylic acids. A much higher yield is given when a base is used in the process as a catalyst.