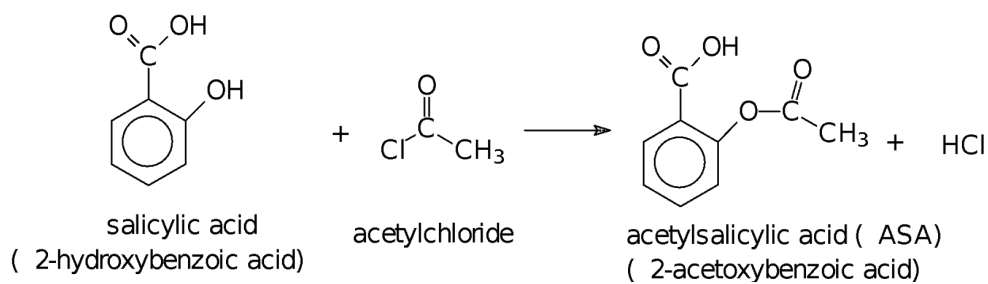


ORGANIC REACTIONS I

Organic compounds form the basic building blocks of life. Understanding the reactions they undergo is essential for an understanding of biological chemistry (biochemistry). Organic chemists are also able to create or synthesize new compounds with unique and useful properties using chemical reactions.

One famous example is the synthesis of acetylsalicylic acid (ASA), commonly called aspirin. People have known since ancient times that an extract of willow bark can reduce pain and inflammation. Chemists eventually identified the active compound as salicylic acid (2-hydroxybenzoic acid). However this substance causes several undesirable side-effects such as stomach irritation and nausea. However a French chemist, Charles Gerhardt, synthesized a new compound, acetylsalicylic acid, in 1853. This new compound had fewer side-effects than natural salicylic acid and was marketed by the German company Bayer in 1899 under the trade name Aspirin™. Up until the marketing of acetaminophen (Tylenol™) in 1956, Aspirin was the most common treatment for mild to moderate pain.



TYPES OF ORGANIC REACTIONS

REACTIONS OF ALKANES

Alkanes are generally unreactive but do undergo some characteristic reactions.

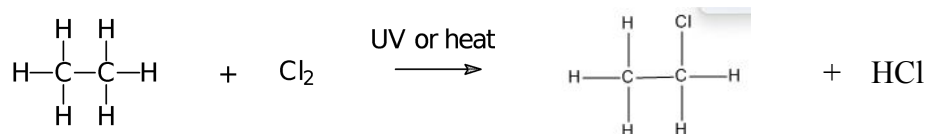
1) COMBUSTION

This is the complete oxidation of a hydrocarbon.

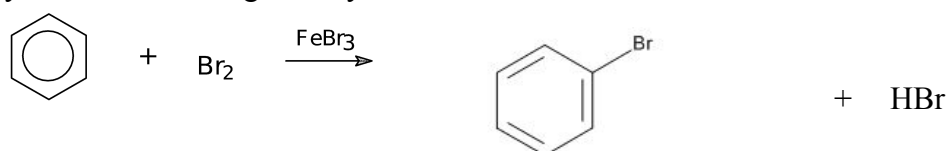


2) SUBSTITUTION

This is the replacement (substitution) of hydrogen for a halogen atom.

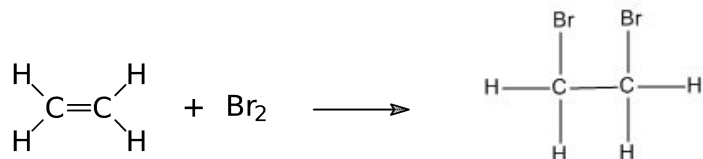


Aromatic hydrocarbons undergo a very similar reaction.



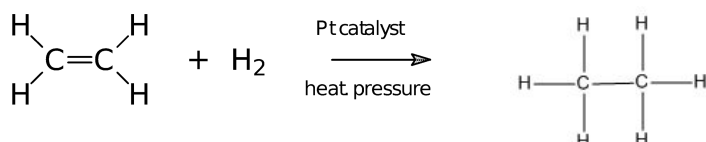
3) a) ADDITION WITH Br₂ or Cl₂

The unsaturated hydrocarbons are much more reactive due to the presence of the double or triple bonds.

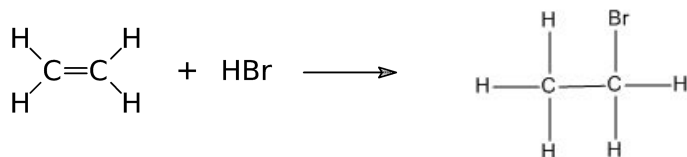


During the reaction, the red colour of bromine disappears as it reacts. Since alkanes do not react with halogens at room temperature, this can be used as a test for the presence of unsaturated hydrocarbons.

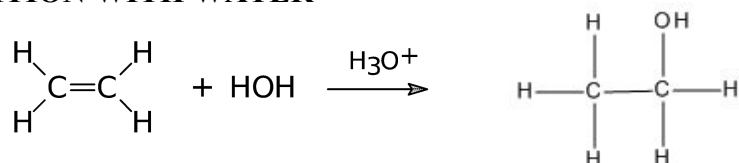
b) ADDITION OF HYDROGEN (HYDROGENATION)



c) ADDITION WITH HCl or HBr

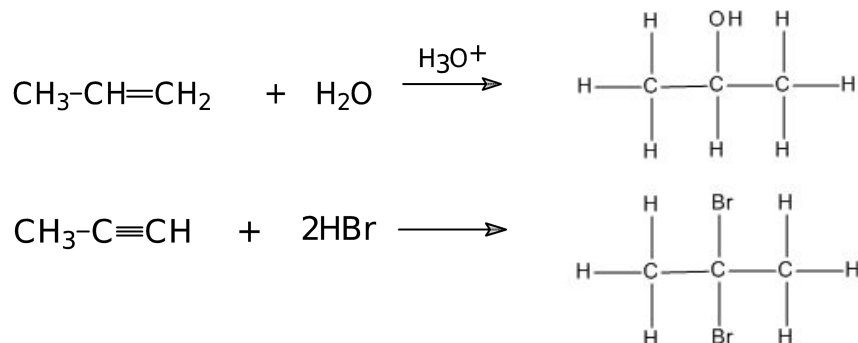


d) ADDITION WITH WATER



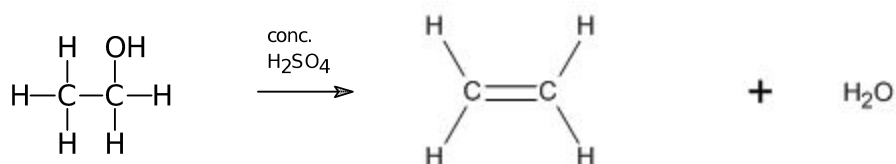
Markovnikov's Rule

If the more than one product is possible, the more electronegative atom will end up on the carbon atom of the double bond that has the fewer hydrogens. This rule is known as Markovnikov's Rule.



4) ELIMINATION REACTIONS

The addition reaction of an alkene and water can be made to go in reverse. This is also called a dehydration reaction.

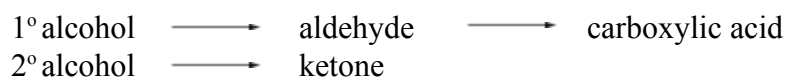


5) MILD OXIDATION REACTIONS

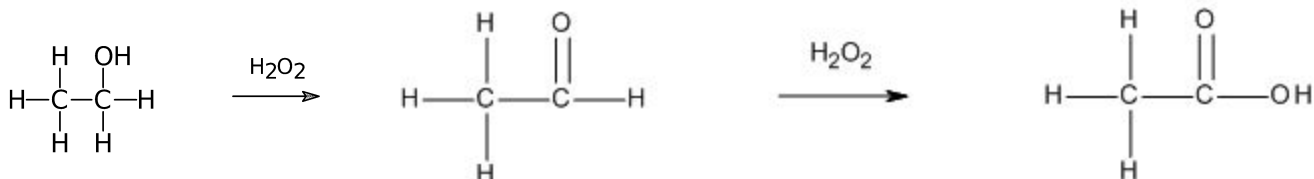
Complete oxidation of an organic compound forms carbon dioxide and water (Reaction 1).

However a controlled oxidation of an alcohol can be used to create other functional groups.

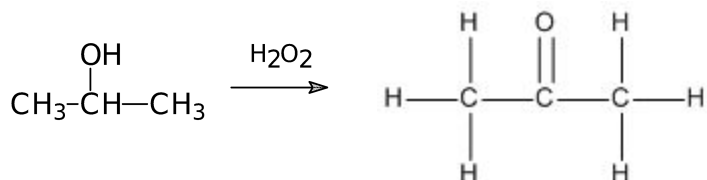
Using oxidizing agents such as KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$ or H_2O_2 , the following sequence of reactions is possible:



a) Primary alcohols



b) Secondary Alcohols



c) Tertiary Alcohols

