

Cambridge IGCSE Chemistry

Topic 14: Organic chemistry

Alkenes

Notes



Describe the manufacture of alkenes and of hydrogen by cracking

- Hydrocarbons can be cracked to produce smaller, more useful molecules. This process involved heating the hydrocarbons to vaporise them.
- The vapours are:
 - Either passed over a hot catalyst (silica or alumina)
 - Mixed with steam and heated to a very high temperature (temperature in the range of 600-700°C) so that thermal decomposition reactions can occur.
- The products of cracking include shorter chain alkanes and alkenes (or hydrogen)

(Extended only) Describe the properties of alkenes in terms of addition reactions with bromine, hydrogen and steam

- Generally:
 - Addition reactions
 - Involves the removal of C=C double bond
 - C=C is very reactive and can easily react to form –C-C–
- reaction with bromine:
 - alkene + bromine → dibromoalkane
 - E.g. Ethene + bromine → 1,2-dibromoethane
- reaction with steam:
 - alkene + steam → alcohol
 - E.g. Ethene + steam → ethanol
- reaction with hydrogen:
 - alkene + hydrogen → alkane
 - E.g. Ethene + hydrogen → ethane

Distinguish between saturated and unsaturated hydrocarbons: from molecular structures, by reaction with aqueous bromine

- From molecular structures:
 - Unsaturated = contain one or more C=C double bonds e.g. alkenes
 - Saturated = contain no C=C double bonds e.g. alkanes
- By reaction with aqueous bromine:
 - Unsaturated hydrocarbons react with bromine in an addition reaction, decolourising it (orange to colourless) – shown above with the example of ethene reacting with bromine
 - Saturated hydrocarbons do not react with bromine and therefore the solution will remain orange





Describe the formation of poly(ethene) as an example of addition polymerisation of monomer units

- Alkenes can be used to make polymers such as poly(ethene) by addition polymerisation. In this reaction, many small molecules (monomers) join together to create very large molecules (polymers).
- The repeat unit has the same atoms as the monomer because no other molecule is formed in the reaction

