

Organic Chemistry 4

Alkenes: The first member of this homologous series is ethene.

Manufacturing of Alkenes: One of the way of having alkenes is by fractional distillation another is by cracking of alkanes.

Cracking of petroleum:

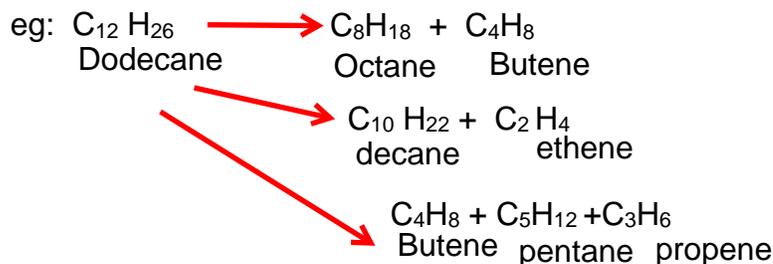
Large less useful hydrocarbons are broken to form a mixture of smaller hydrocarbons by heat which are more useful.

Conditions:

High temperature :around 500
Catalyst Zeolite (Al_2O_3 and SiO_2)

Large alkanes broken down in to smaller alkanes and alkene / smaller alkanes and hydrogen.

Larger hydrocarbons are not as useful as they are harder to ignite so small chain hydrocarbons are in high demand. Cracking of hydrocarbon must produce alkene which is used in manufacturing of plastics.



PRACTICAL

Cracking an alkane

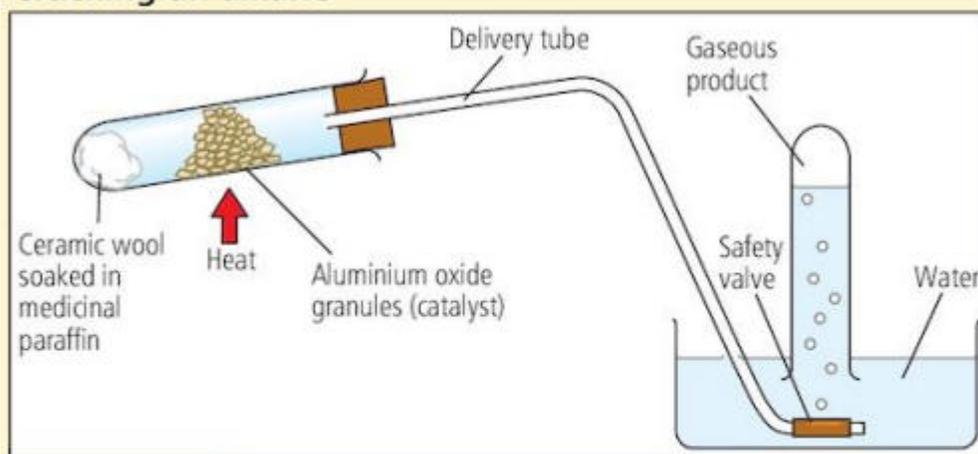
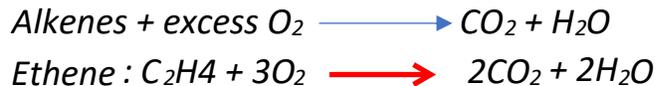


Figure 18.2.2 Aluminium oxide catalyses the cracking of alkanes

- 1 You can use medicinal paraffin as your alkane. You heat the aluminium oxide catalyst strongly and then heat the paraffin. The paraffin vapour passes over the aluminium oxide which is kept hot.
- 2 You collect the gases from the cracking in the test tube. You can tell if the gas contains alkenes by carrying out the bromine water test (see Topic 18.3).

Reaction of alkenes:

1) Combustion in excess oxygen



2) **Addition Reaction** Main feature of addition reaction is that only one product form.

Addition of Hydrogen :

Reaction conditions

1 **Temperature: 200 °C**

2 **Ni catalyst**



2) *Addition of steam to the alkenes to produce alcohol*

Reaction Conditions

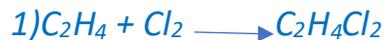
1) **Phosphoric (V) acid catalyst H_3PO_4**

2) **300 °C**

3) **60 atmospheric pressure**



3) *Addition of halogen to alkenes*



Bromine can be used to distinguish between alkanes and alkenes. The addition of bromine to an alkene is called bromination.