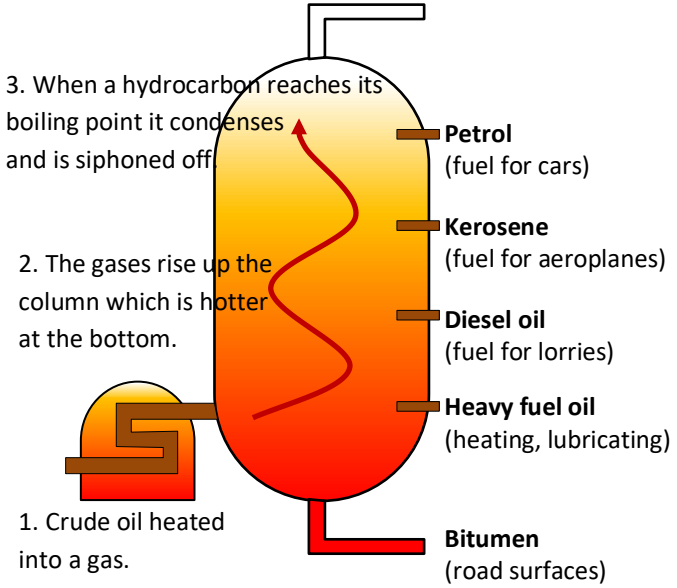
# C9: Hydrocarbons

**Hydrocarbons** contain **only hydrogen** and **carbon**.

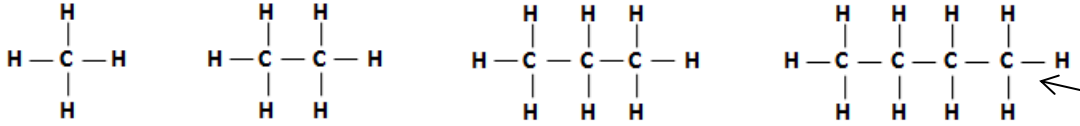
## Fractional Distillation

Crude oil is a fossil fuel made over millions of years from the remains of plants and animals. It is a mixture of hydrocarbons that can be separated.




## Alkanes ($C_nH_{2n+2}$)

– saturated hydrocarbons. Are a homologous series (they react in similar ways)



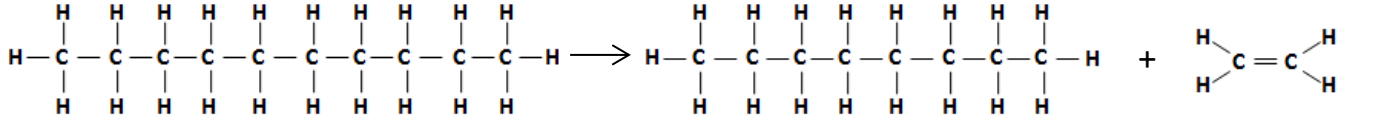
| Methane | Ethane | Propane | Butane |
|---|---|---|---|
| $CH_4$ | $C_2H_6$ | $C_3H_8$ | $C_4H_{10}$ |

These are the displayed formula

## Cracking

There is a **high demand** for shorter chain alkanes, but they are in **short supply**. Long chain hydrocarbons can be broken down into smaller chain alkanes and alkenes by a process called cracking.

Cracking is a **thermal decomposition** reaction. The hydrocarbon is **vapourised** and passed over a **catalyst** (hot powdered aluminium). This splits the long chains apart (**catalytic cracking**). Cracking can also be done with steam at very high temperatures (**steam cracking**).



Decane (10 carbon atoms) → Octane (8 carbon atoms) + Ethene (2 carbon atoms)

## Uses of Crude Oil

The products from crude oil are examples of **organic** compounds.

**Fuel** – most vehicles uses fuels that come from crude oil.

**Feedstock** – the petrochemical industry uses some hydrocarbons as a feedstock to make new compounds (polymers, lubricants, solvents and detergents).

## Properties of Hydrocarbons

As the hydrocarbon chain gets smaller it becomes:

- more flammable
- more runny (less viscous)
- lower boiling point

## Complete combustion

– plenty of oxygen is present:

hydrocarbon + oxygen → carbon dioxide + water

Alkanes combust completely in air so release lots of energy. This makes them good fuels.

## Alkenes

Contain a C = C double bond. Are **more reactive** than alkanes.

Can be tested for with **bromine water** (orange) which will go colourless in the presence of an alkene. It will stay orange in an alkane.