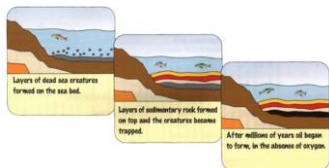


# Hydrocarbons

Crude Oil is made from the remains of living **sea creatures** decayed in mud millions of years ago



It is a **FINITE** resource

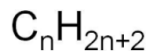
It is made of a mixture of Hydrocarbons.

Hydrocarbons are made of **Hydrogen and Carbon only**.

The main hydrocarbons in Crude Oil are **alkanes**

Alkane	Molecular formula	Structural formula
Methane	CH <sub>4</sub>	<pre>       H             H-C-H               H           </pre>
Ethane	C <sub>2</sub> H <sub>6</sub>	<pre>       H   H                 H-C-C-H                   H   H           </pre>
Propane	C <sub>3</sub> H <sub>8</sub>	<pre>       H   H   H                     H-C-C-C-H                       H   H   H           </pre>
Butane	C <sub>4</sub> H <sub>10</sub>	<pre>       H   H   H   H                         H-C-C-C-C-H                           H   H   H   H           </pre>

The general formula for an alkane is -

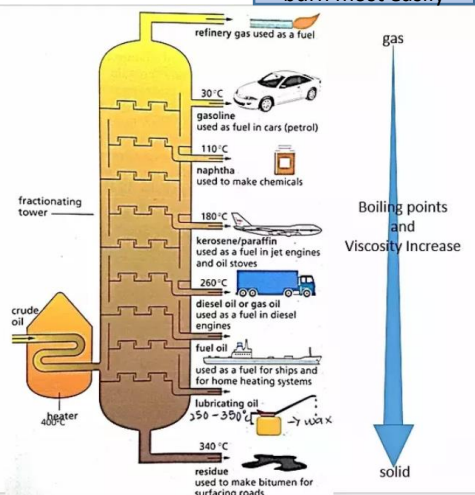


# Fractional Distillation

How do we separate the mixture of hydrocarbons to use them?

Works by **evaporation** and then **condensation**.

Smaller molecules burn most easily



1. **Heat** the crude oil to **evaporate** it.
2. The gases **rise** up the column.
3. The different fractions **condense** at **different temperatures**.

# C9 Crude Oil and Fuels

# Combustion

**Combustion (burning)** is a reaction with **oxygen**

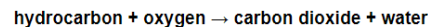
A reaction with oxygen is called '**oxidation**'

When hydrocarbons burn a lot of **energy** is released.

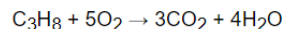
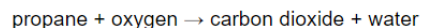
**Complete combustion** of hydrocarbons the only products are **carbon dioxide and water**

Complete combustion only happens if there is plenty of oxygen

General equation



Complete combustion of propane

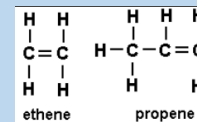


# Cracking

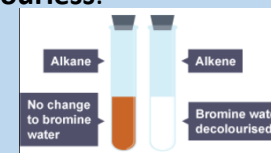
The larger molecules from fractional distillation are less useful. We can break them down into smaller, more useful molecules.

Cracking produces a mixture of **alkanes and alkenes**.

**Alkenes** have some **double bonds**.

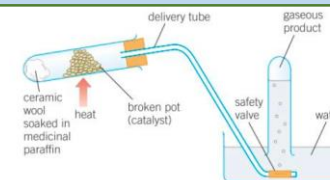


They turn **bromine water** **colourless**.



They are used to make **polymers**.

The apparatus for cracking



Catalytic cracking – catalyst and 500°C

Steam cracking – steam and 850°C