

The big picture

Filtering

Crystallising and distillation

Chromatography

Fractional Distillation

Crude oil

Fractional distillation of crude oil

Crude oil fractions

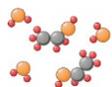
Combustion types

Cracking

Key ideas and terms

Filtering

Mixture: A substance that contains different elements, compounds and molecules that are physically mixed but not chemically bonded. Because of this mixtures are easily separated.

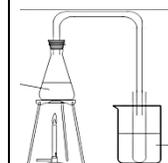


Filtration: We use filtration when we want to separate particles of insoluble solids from a solvent (liquid).



Crystallising and distilling

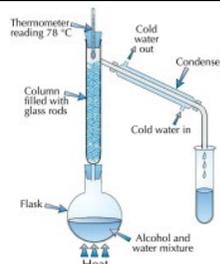
Crystallisation: Used to get a soluble solid from a liquid by slowly evaporating the liquid.



Distillation: A method to separate two liquids based on their boiling points.

Fractional distillation

Fractional distillation: As the flask gets heated the molecules evaporate and condense on cold parts of the column. The molecules with the lower boiling point will be able to get higher up the column before they condense because the top of the column is above their boiling point.



Crude oil fractions

Volatility: How easily a chemical evaporates (long hydrocarbons have lower volatility).

Flammability: How easily a chemical lights and burns (long hydrocarbons are harder to light).

Viscosity: The resistance of a liquid to flow (long hydrocarbons have high viscosity so don't flow well).

Chromatography

Soluble: A substance that dissolves e.g. salt.

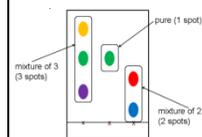
Solvent: The liquid that dissolves a chemical.

Solute: The solid that you dissolve.

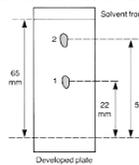
Solution: A mixture of a solid dissolved in a liquid.

Insoluble: A substance that does not dissolve.

Chromatography - separate mixtures of coloured compounds according to their solubility.



Chromatogram: The name given to the results of a chromatography experiment. The number of spots tells us the number of chemicals in the mixture.

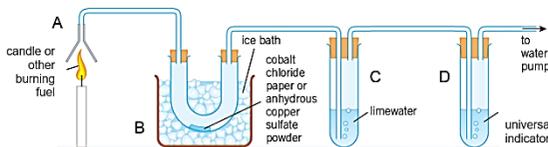


Rf value: We calculate chemicals on different

Rf = Distance moved by spot / Distance moved by solvent

this to compare chromatograms.

Combustion types



Complete combustion: Needs a good air supply. Carbon dioxide and water are produced by hydrocarbons.

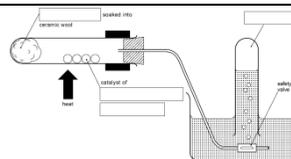
Incomplete combustion: When a fuel burns with insufficient oxygen. Produces soot (carbon) and toxic carbon monoxide.

Test for CO₂: Limewater turns cloudy.

Test for H₂O: Anhydrous copper sulfate goes from white to blue.

Cracking

Cracking: Breaks large alkane molecules into smaller more useful ones to help supply meet demand.



Steam (thermal) cracking

Heat to turn the molecules into a gas
Mix them with steam
Heat to a very high temperature

Catalytic cracking

Heat to turn the molecules into a gas
Pass over a hot powdered aluminium oxide catalyst
The molecules split open on the catalyst surface

Crude oil

Biomass: The remains of recently dead organisms.

Crude oil: A fossil fuel formed from biomass deprived of air, under pressure and heated.

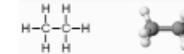
Hydrocarbon: a chemical made only of hydrogen and carbon atoms.

Alkanes: Hydrocarbon with only single covalent bonds $C-C$. Known as saturated hydrocarbons. C_nH_{2n+2}

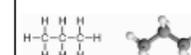
Methane (CH₄)



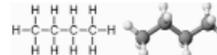
Ethane (C₂H₆)



Propane (C₃H₈)



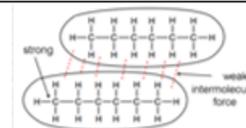
Butane (C₄H₁₀)



Homologous series: A group of chemicals with the same general formula and similar chemical properties.

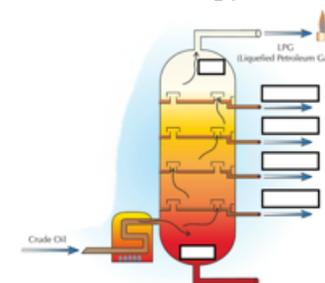
Fractional distillation of crude oil

Boiling point: The bigger the molecule, the stronger the intermolecular forces, the higher the boiling point.



Fractions: Mixtures of chemicals with similar boiling points.

Petrol
Kerosene
Diesel
Fuel Oil
Bitumen



Year 9 Separating mixtures

