

CD2 Energy in Chemistry

The Atmosphere and Oceans

The atmosphere is a cocktail of gases . The exact amounts of each gas vary as the amount of water vapour is variable.

Name of Gas	Amount in air %
Nitrogen	78
Oxygen	21
Argon	1

The amount of carbon dioxide in the atmosphere is tiny (0.01%).

The amounts of carbon dioxide and oxygen gas are balanced and stay the same.

Photosynthesis in plants converts carbon dioxide into oxygen.

Breathing and burning convert oxygen into carbon dioxide.

Burning a lot of fossil fuels destroys the balance by putting a lot of carbon dioxide into the atmosphere. This traps the sun's rays and will not allow them to escape, this is called the greenhouse effect. This causes the earth to become hotter and is called global warming.

Problems caused by this are more violent weather and melting ice-caps making the sea rise.

Burning fossil fuels that contain sulphur also makes the gas sulphur dioxide which dissolves in clouds and causes acid rain. Problems caused by acid rain include dissolving buildings and plant and animal life being damaged.

In prehistoric times the atmosphere was made up of carbon dioxide and ammonia.

The oceans formed by water dissolving salt from the rocks , this salt stays in the oceans because it does not evaporate when water does.

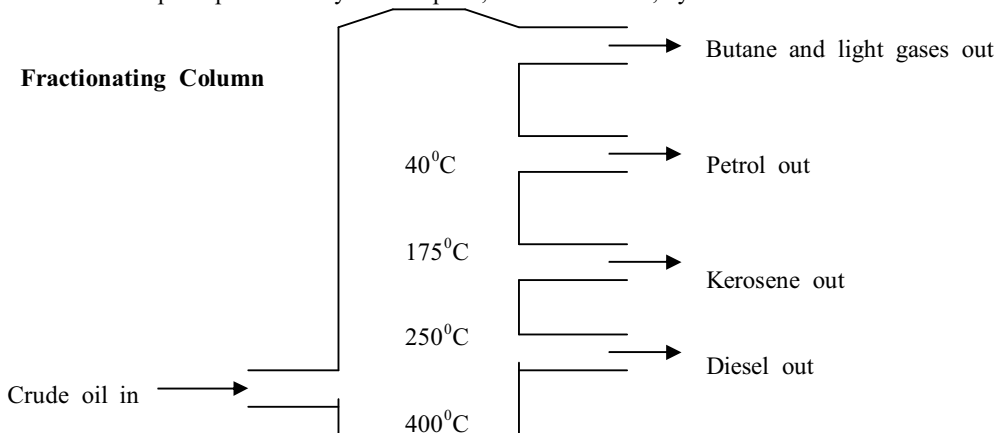
Oil

Oil is formed over millions of years by the dead bodies of marine animals decaying trapped under layers of sedimentary rocks. Rocks that allow oil to pass through them are called permeable rocks. Oil becomes trapped in pockets of rock that will not allow it to escape called non-permeable rocks.

Oil is a non-renewable fuel because it takes a very long time to form and it is being used faster than it is formed , it will eventually run out.

Oil is made up of many different substances called hydrocarbons . All hydrocarbons are made up of the elements hydrogen and carbon. They are different because there are many different lengths of carbon chain in the molecules that make up the hydrocarbons.

Crude oil is split up into many useful parts, called fractions, by fractional distillation.



Fractional Distillation

The fractions can be separated because they have different boiling points. The bigger the molecule the higher the boiling point so the lower down the column they come off. The most simple family of hydrocarbons are called alkanes.

Fuels

The fuels made from the fractional distillation of crude oil are very useful because when they are burnt they give out a lot of energy.

Petrol and diesel are burnt to power cars and lorries

Kerosene can be burnt for heating.

Butane and the light gases can be used for heating and cooking.

These hydrocarbons need oxygen to burn.

When they burn they produce carbon dioxide gas (CO_2) and water (H_2O).

If there is not much oxygen available when the fuel burns it produces carbon monoxide which is a colourless poisonous gas. This is why heaters must be regularly cleaned to avoid carbon monoxide being made.

Energy Changes

If when two chemicals react the temperature goes up then energy has been released and this is called an exothermic reaction .

If when two chemicals react the temperature falls then energy has been taken in and this is called an endothermic reaction.

If two different metals are placed in a solution which conducts electricity (an electrolyte) then electricity is made.

Eg if rods of magnesium and copper are put in lemon juice then electricity is made.

Energy is measured in Joules (J) or kilojoules (KJ). $1000\text{J}=1\text{KJ}$

To measure how much energy is made by burning a fuel it can be burnt under a measured amount of water and the change in the waters temperature is measured .

Energy given out = Amount of water X 4.2 X temperature change of water
(J) (ml) (degrees C)