



7Ea Mixtures

A **mixture** is two or more elements not bonded together.

Types of mixture

A **suspension** is a mixture of two substances that separate if not stirred. E.g. sand mixed with water.

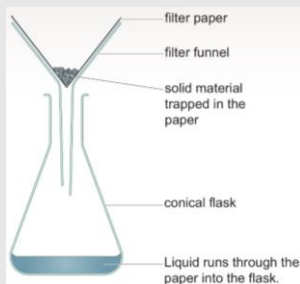
In a **colloid**, one substance is dispersed (spread out) in the other and the two substances will not separate easily. E.g. hand cream.

A **solution** is a mixture where the solid dissolves in the liquid. This makes the mixture clear or transparent. E.g. salt mixed with water.

Filtration

Filtration is a separation technique used to separate insoluble solids from liquids.

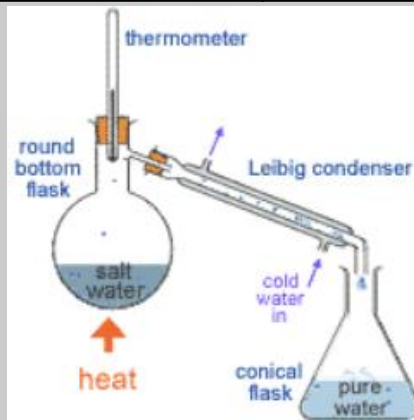
The liquid can pass through the tiny holes but anything solid is unable to pass through so is left in the filter paper



7Ee Distillation

**Distillation** is a separation technique used to separate out a solvent from a solution.

Distillation equipment



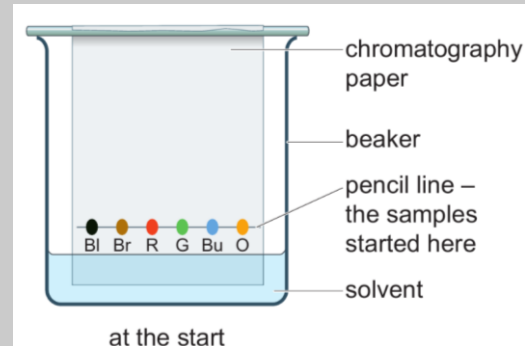
In the example above, heat is used to evaporate the water and the salt is left in the round bottom flask because it can not evaporate. The water vapour travels down into the condenser where it condenses (turns back to liquid water).

Distillation can be used for the desalination of sea water (making sea water safe to drink).

7Ed Chromatography

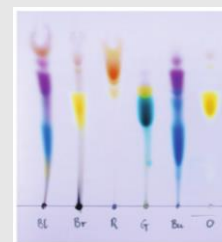
**Chromatography** is a separation technique used to separate out dissolved substances in a mixture.

Experiment



The solvent carries the soluble substances in the mixture up the paper and they separate out. The pattern this forms is called a chromatogram.

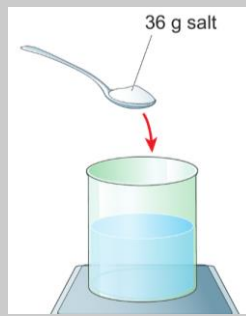
Chromatogram



7Eb Solutions

A substance that dissolves in a liquid is called a **solute**. (e.g salt)  
The liquid that the substance dissolves in is called a **solvent**. (e.g water)

A substance that dissolves is said to be **soluble**. We can measure the **solubility** by measuring how much of it can dissolve in 100g of water. A solution becomes **saturated** when no more solute will dissolve.



The solubility of a substance depends on:  
• The temperature  
• The solvent being used.

7Ec Evaporation

**Evaporation** is the process in which a liquid turns to a gas and escapes into the air (this happens at the surface of the liquid).

**Boiling** is when the liquid is turning into a gas throughout all of the liquid. The temperature at which a liquid boils is called its boiling point.



7Ga Solids, Liquids and Gases

The three main states of matter are SOLID, LIQUID and GAS.

SOLID (s)

- Fixed volume
- Fixed shape
- Cannot be compressed
- High density

LIQUID (l)

- Fixed volume
- No fixed shape (takes shape of container)
- Cannot be compressed

GAS (g)

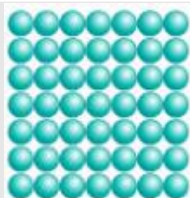
- No fixed volume
- No fixed shape
- Can be compressed
- Low density

7Gb Particles

Particles behave differently depending on which state they are found in. Changing between states is due to a difference in the **energy** the particles have.

SOLID

- Particles have the lowest energy
- Particles vibrate in fixed positions
- Particles arranged in a regular pattern



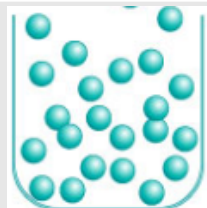
LIQUID

- Particles have mid energy
- Particles able to move within the overall space of liquid
- No fixed arrangement



GAS

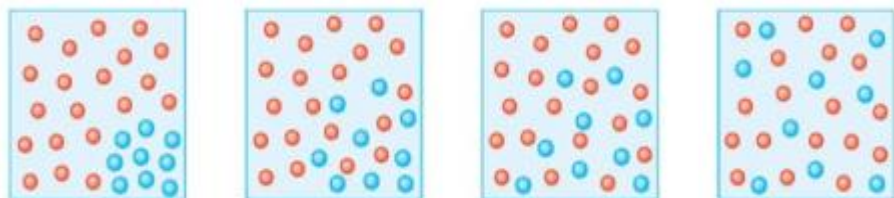
- Particles have the highest energy
- Particles free to move within entire space
- Particles fill the container they are in



Only **gases** can be **compressed** due to the space between the particles (if the space between decreases, the volume of the gas decreases).

7Gd Diffusion

Movement of particles from an area of **high concentration** to an area of **low concentration** (down a **concentration gradient**).



Examples:

- Perfume spreading through a room
- Nutrients absorbing in small intestines
- Ink bleeding on paper

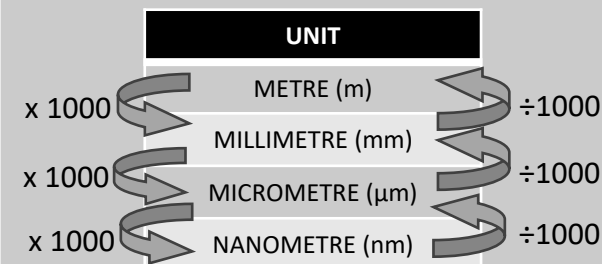
7Gc Brownian Motion

Robert Brown observed the random motion of pollen under a microscope and called this Brownian Motion.

We now know this motion is caused by the movement of air particles (gases) carrying the small particles around.

Particles of pollen are too small to see without a microscope, but still larger than the particles in air.

CONVERTING UNITS

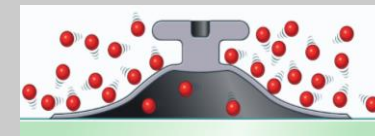


7Ge Air Pressure

The movement of air particles causes them to **collide** with surfaces. This causes air pressure.

If the air pressure on two sides of a surface is the same, the object holds its shape. If air pressure is higher on one side, that side will push against the surface.

Suction cups have fewer particles inside so air pressure forces it against the surface it sticks to.





**71a Energy from food**

Our bodies need energy, which we get from food.

A good diet should provide only the amounts of energy that a person's body needs.

A very active adult needs 16000KJ as they transfer this energy into other forms

An adult who is not very active only needs 9500KJ as they don't transfer as much energy into other forms.

Energy is measured in J (joules) or KJ (kilojoules)

**71c Fuels**

Fossil fuels are made from the remains of organisms that died millions of years ago.

**Coal**

Coal was formed from plants that were buried in mud that stopped them rotting away. More and more layers squashed them with heating from the Earth turned them into coal.

**Oil and Natural Gas**

Oil and natural gas formed from tiny animals and plants that lived in the sea. When they died they fell to the sea bed, were buried in mud and sand that squashed them, turning them into oil and gas.

These are non-renewable fuels because they cannot be replaced at the rate we use them so they will eventually be used up.

**Renewable fuels**

Renewable fuels come from a source that will never run out eg biofuels or hydrogen gas

**71b Energy Transfers and Stores**

Energy is transferred when the energy moves from one store to another.

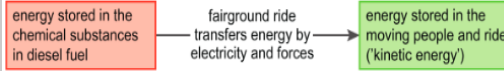
**Energy stores**

Chemical  
Thermal  
Kinetic  
Strain or elastic potential  
Gravitational potential  
Nuclear or atomic

**Energy Transfers**

Heat  
Light  
Sound  
Electricity  
Forces

The law of conservation of energy states that energy cannot be made nor destroyed; it can only be transferred and stored in different ways.



**Advantages and Disadvantages of Energy Resources**

Energy resource	Advantages	Disadvantages
fossil fuels (used to generate electricity, to power transport and for heating)	<ul style="list-style-type: none"> <li>cheap compared with other resources</li> <li>convenient to use in cars and other vehicles</li> </ul>	<ul style="list-style-type: none"> <li>release polluting gases when they burn</li> <li>non-renewable</li> </ul>
nuclear (used to generate electricity)	<ul style="list-style-type: none"> <li>no polluting gases</li> </ul>	<ul style="list-style-type: none"> <li>power stations are very expensive</li> <li>produces dangerous waste materials</li> <li>non-renewable</li> </ul>
renewable resources (mainly used to generate electricity)	<ul style="list-style-type: none"> <li>no polluting gases</li> <li>renewable</li> </ul>	<ul style="list-style-type: none"> <li>most are not available all of the time</li> </ul>

A | Some of the advantages and disadvantages of different kinds of energy resource.

**71d Other Energy Resources**

Wind turbines, hydroelectric power, waves and tides generate electricity by directly turning a turbine connected to a generator.

Solar panels and geothermal power heat water. Solar power stations also do this

Solar cells use light to produce electricity directly.

**Disadvantages of renewable energy resources**

- Cannot be used all the time (depend on the weather)
- Some resources can only be used in certain locations.

Nearly all our energy comes from store of nuclear energy in the Sun. It provides energy for plants to grow through photosynthesis.

**71e Using Resources**

Fossil fuels are making the Earth warmer because they release carbon dioxide into the atmosphere which makes the Earth warmer. This is **climate change**.

We could reduce our use of fossil fuels by walking more, insulating our houses and buy more efficient machines

**Efficiency**

Efficiency tells us how much of the energy transferred by a machine is useful. An efficient machine doesn't waste much energy.

An efficient machine uses less fossil fuels and makes electricity bills cheaper.