

Particles

I should already know:

- Particles.
- Some names of elements.
- How heat can travel.

I will learn:

Identify solids, liquids and gases and use the particle model to compare properties.

Discuss changes of state in terms of particles and energy.

Compare different models for the movement of particles.

Apply ideas on pressure to explain different observations.

Describe the structure of an atom and state why they are electronically neutral.

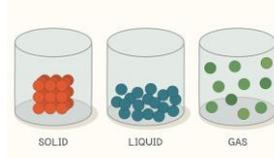
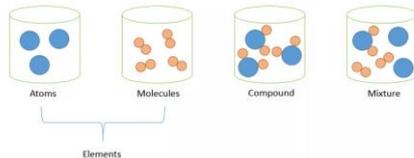
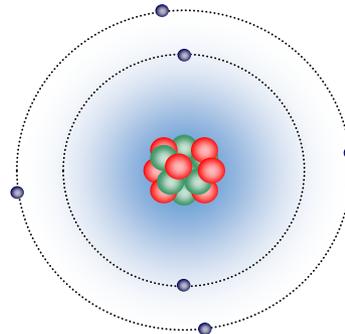
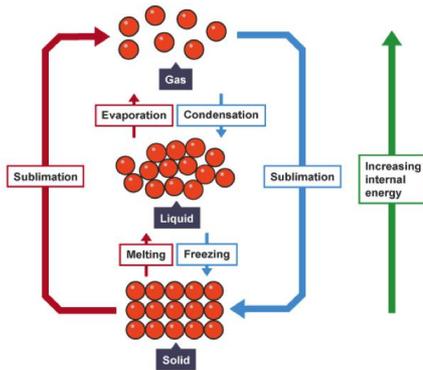
Define elements, compounds and mixtures.

This will help in the future:

Careers involving particles and atomic structure.

Key Words

States of matter	Gas, liquid, solid
Particle	A tiny portion of matter
Atom	Tiny particles all things are made of; contains neutrons, protons and electrons
Molecule	Two or more atoms bonded together
Element	A substance that only contains one type of atom
Compound	Atoms from two or more different elements chemically bonded together
Mixture	A substance made up of two or more different substances NOT chemically bonded together
Condensation	A gas turning into a liquid
Boiling point	The temperature at which a liquid turns into a gas
Evaporation	A liquid turning into a gas
Melting point	The temperature at which a solid turns into a liquid
Diffusion	The movement of particles from an area of high concentration to an area of low concentration
Osmosis	The movement of water particles from a dilute to a concentrated solution through a partially permeable membrane
Active transport	The movement of particles from an area of low concentration to an area of high concentration using energy
Density	The amount of mass per volume of a substance
Pressure	The amount of force exerted over an area; units: N/m ² or Pascals

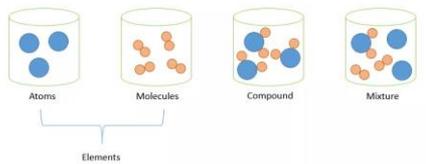


Greater Depth Challenge

- How many electrons does each shell hold?
- What other particle models are there?

Further Reading

BBC Bitesize, Educake.



Elements:
Each element is given its own chemical symbol (look up the periodic table!) e.g H for hydrogen, O for oxygen.

Every chemical symbol starts with a capital letter, with the second letter written in lower case e.g. **Mg** is the symbol for magnesium (not MG, mg, mG)

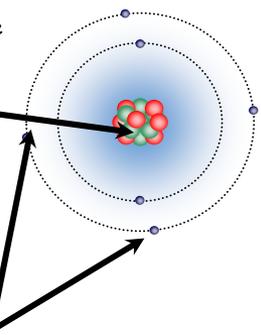
	Element – Contains just ONE type of atom.
	Compound – Contains two or more types of atoms that are chemically bonded together .
	Mixture – Contains two or more types of atoms that are mixed together and NOT chemically bonded.

Compound	Symbol
Calcium carbonate	CaCO ₃
Carbon dioxide	CO ₂
Copper sulphate	CuSO ₄
Glucose	C ₆ H ₁₂ O ₆
Hydrochloric acid	HCl
Sodium bicarbonate (baking soda)	NaHCO ₃
Sodium chloride (table salt)	NaCl
Sodium hydroxide	NaOH
Water	H ₂ O

Protons, neutrons and electrons are NOT evenly distributed in an atom.

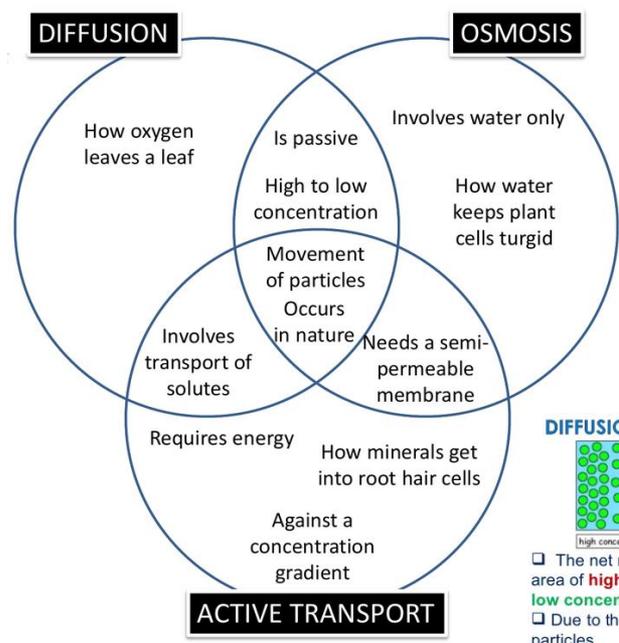
The protons and neutrons exist in a dense core at the centre of the atom. This is called the **nucleus**.

Particle	Charge	Mass (in atomic units)
Proton	1+	1
Neutron	0	1
Electron	1-	Very Small

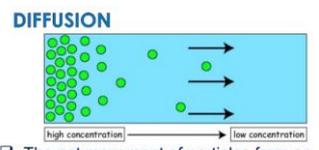


Atoms are considered **electronically neutral** as they always have the same number of protons and electrons. For example, a Lithium atom has 3 protons so it must have 3 electrons.
The positive charges must balance the negative charges.

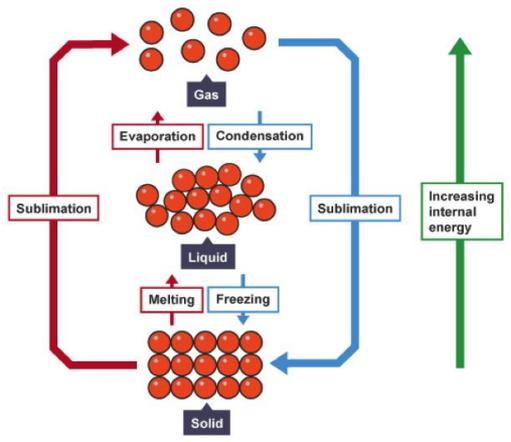
The electrons are spread out around the edge of the atom. They orbit the nucleus in layers called **shells**.



Transport of particles
These methods of transport are most commonly linked with the movement of substances in and out of cells. They will continually be referenced within Biology units of learning.
Temperature and concentration are two main factors that can affect the rate of movement (how fast the process happens).



- The net movement of particles from an area of **high concentration** to an area of **low concentration**
- Due to the **random** movement of particles
- A **passive** process which means that **no energy** is needed



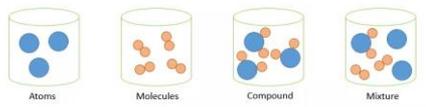
Keyword	Particles
Freezing	Lose energy, only vibrate on the spot. Bonds form
Melting	Get more energy, move faster. Bonds begin to break. Particles move out of regular pattern
Evaporating	Get more energy, move faster. Bonds begin to break
Condensing	Lose energy, move slower. Bonds begin to form

When drawing solids, liquids and gases...
Solids must touch the particles they are next to. They do not overlap and are in a regular order.

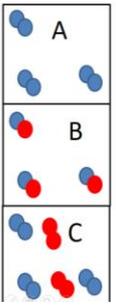
Liquids do not overlap and still touch the particles next to them but are not in a regular order.

Gases do not overlap, do not touch each other and are not in a regular order.

SOLID	LIQUID	GAS
<ul style="list-style-type: none"> ● rigid ● fixed shape ● fixed volume cannot be squashed	<ul style="list-style-type: none"> ● not rigid ● no fixed shape ● fixed volume cannot be squashed	<ul style="list-style-type: none"> ● not rigid ● no fixed shape ● no fixed volume can be squashed



Elements

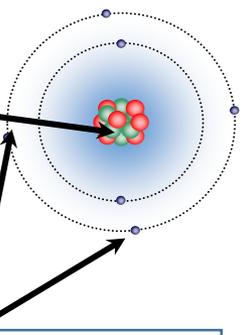


Compound	Symbol
Calcium carbonate	
Carbon dioxide	
Copper sulphate	
Glucose	
Hydrochloric acid	
Sodium bicarbonate (baking soda)	
Sodium chloride (table salt)	
Sodium hydroxide	
Water	

Protons, neutrons and electrons are NOT evenly distributed in an atom.

The protons and neutrons exist in a dense core at the centre of the atom. This is called the **nucleus**.

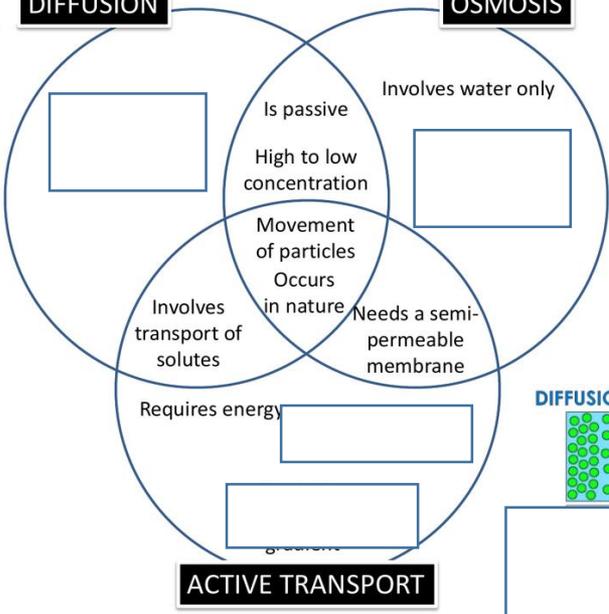
Particle	Charge	Mass (in atomic units)
Proton		
Neutron		
Electron		



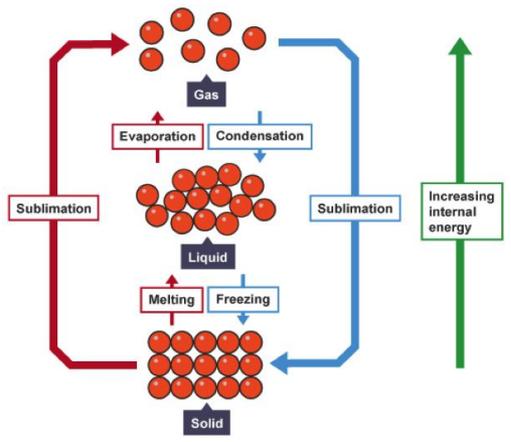
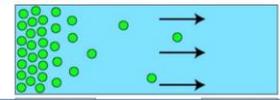
DIFFUSION

OSMOSIS

Transport of particles



DIFFUSION



Keyword	Particles
Freezing	
Melting	
Evaporating	
Condensing	

When drawing solids, liquids and gases...



solid	liquid	gas
<ul style="list-style-type: none"> rigid fixed shape fixed volume 	<ul style="list-style-type: none"> not rigid no fixed shape fixed volume 	<ul style="list-style-type: none"> not rigid no fixed shape no fixed volume
cannot be squashed	cannot be squashed	can be squashed

Scientific equipment

	Name Bunsen burner	Use Heating by burning a gas		Name Stopwatch	Use To measure time
				Tongs	To hold hot things (not test tubes)
	Conical flask	To measure volume of liquids		Thermometer	To measure temperature
	Beaker	To hold, pour and heat liquids		Safety Goggles	To protect your eyes
	Measuring cylinder	To measure precise volume of liquid		Tripod	To hold a beaker above a Bunsen burner
	Evaporating basin	To heat and evaporate liquids		Gauze	Used to support a beaker

Risk assessment

Hazard / Chemical	Risks	Control measures	Emergency measures

Hazard – something that has the potential to cause harm to a person, property or environment.

Risk – is the chance or probability of the hazard causing harm or damage to people, property or the environment.

Control measures – minimises the risk of the hazard causing harm.

Drawing equipment

When drawing scientific equipment it must be drawn in 2D and not 3D.

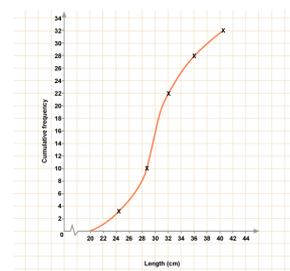
Equipment diagrams should be drawn as part of the method for the experiment.

	Test tube	
	Beaker	
	Conical flask	
	Round bottom flask	
	Measuring cylinder	
	Tripod	
	Gauze mat	
	Bunsen burner	
	Evaporating dish	
	Filter funnel (with filter paper)	

Hazard symbols

			
Flammable	Corrosive	Toxic	Explosive
			
Harmful to environment	Serious health hazard	Oxidising	Harmful

Graphs

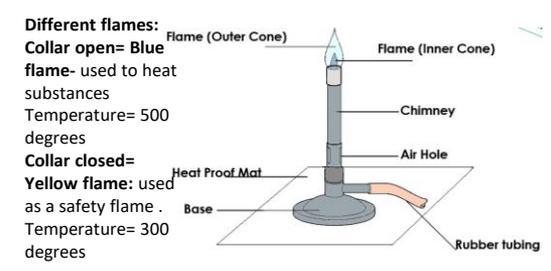


- Rules for a graph**
- Title
 - Size
 - Appropriate scale
 - Labelled axis
 - Plot points accurately
 - Line of best fit

When describing graphs make sure you...

- Identifying if it's an increasing or decreasing trend.
- Support your chosen trend with evidence from the graph.
- Give a reason or opinion for the observed trend.

Bunsen burner



Calculation

Formula
Numbers
Answer
Unit

- Write the formula you are using.
- Substitute in the known numbers.
- Calculate the answer.
- Add units if appropriate.