

Biology Paper 1 - AQA Foundation Tier

Topic 1: Cell Biology	Topic 2: Organisation
<ol style="list-style-type: none">1. REQUIRED PRAC: Microscopy: calculating real length by rearranging the magnification equation.2. Describing the factors that affect the rate of diffusion.3. Comparing animal cells with bacteria cells.4. Cell differentiation.5. Specialised cells.6. Mitosis and the cell cycle.	<ol style="list-style-type: none">1. Label the organs in the digestive system.2. Describing the functions of the digestive system organs.3. REQUIRED PRAC: Food tests: Identifying the reagents for food tests and positive results. Describing safety precautions of each reagent.4. Identifying where digestive enzymes are produced.5. The structure and function of tissues in the leaf.6. Cancer.7. Components of the blood.8. Principles of organisation.
Topic 3: Infection and Response	Topic 4: Bioenergetics
<ol style="list-style-type: none">1. Identifying pathogens that cause communicable diseases.2. Symptoms, treatments and prevention of fungal diseases in plants.3. Symptoms, treatments and prevention of viral diseases in plants.4. Symptoms, treatments and prevention of protist disease.5. Symptoms, treatments and prevention of bacterial disease.6. Antibiotics7. Antibiotic resistant bacteria.	<ol style="list-style-type: none">1. Photosynthesis.2. Factors that affect the rate of photosynthesis.3. REQUIRED PRAC: Rate of photosynthesis.
<p style="text-align: center;"><u>I can do the following key skills:</u> Conversion of millimetres to micrometres. Identifying variables. Plotting bars charts. Calculating the number of cell divisions. Comparing data from a graph.</p>	

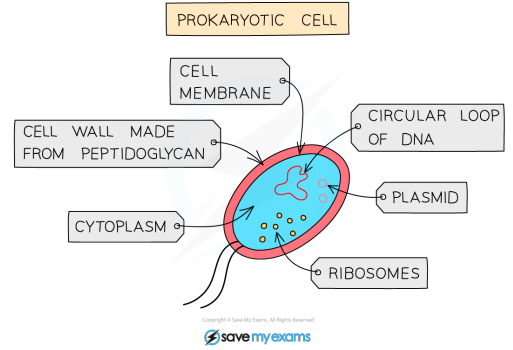
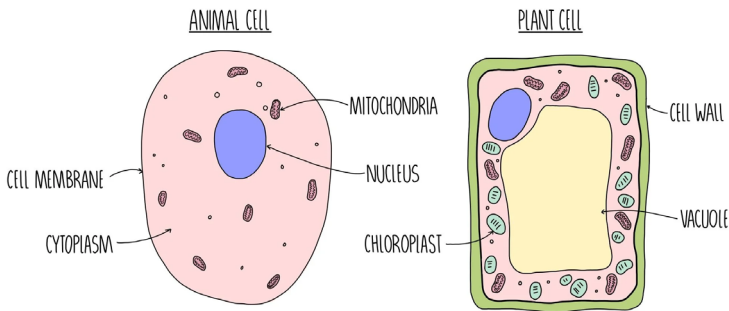
Sparx Science

To practice question, you can log into sparx science, then click independent learning.

Select biology, then select one of the topics from your list. You can adjust the level to make the questions easier or harder.

If you need help logging in, please speak to your teacher.

B1.1. Cell Biology

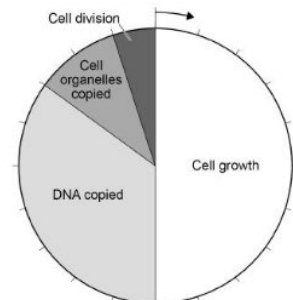
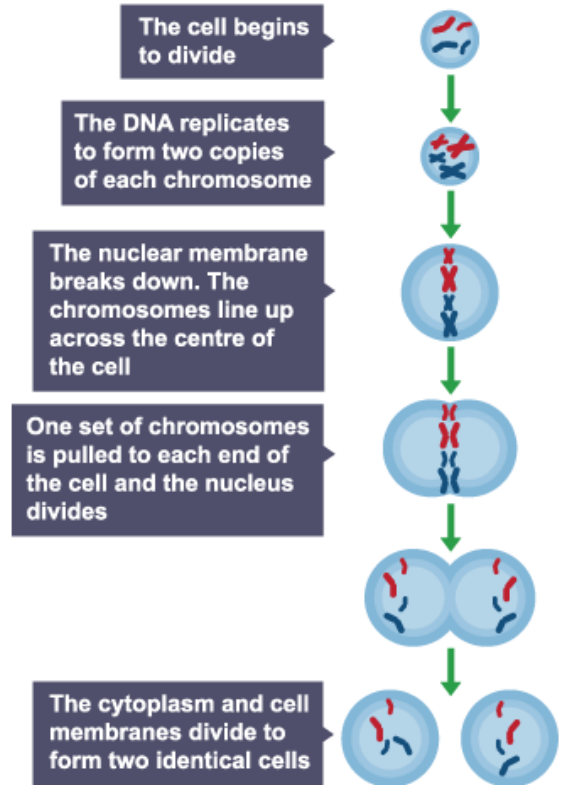


Cellular component	Function
Cell membrane	Hold the cell together, separating the inside of the cell from the environment outside, controlling what can and cannot enter or leave the cell
Cytoplasm	A jelly-like substance where many chemical reactions inside the cell happen. Surrounds sub-cellular structures
DNA	The genetic material that controls the activities of the cell
Ribosomes	The site of protein synthesis in the cell

COMPONENT	EUKARYOTES	PROKARYOTES
CELL MEMBRANE	Y	Y
CYTOPLASM	Y	Y
GENETIC MATERIAL	Y – IN A NUCLEUS	Y – IN THE CYTOPLASM
NUCLEUS	Y	N

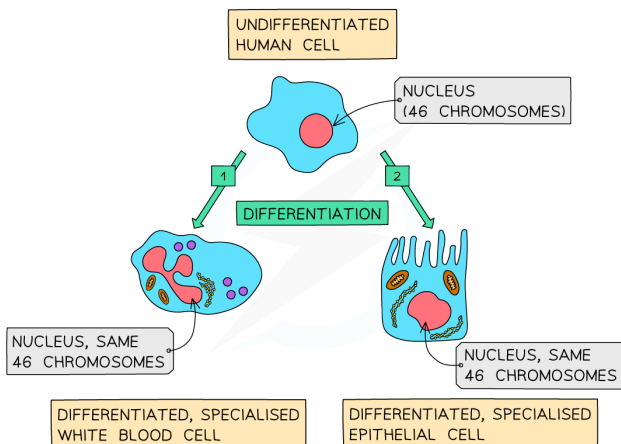
Copyright © Save My Exams. All Rights Reserved

Cell Division



Cell Differentiation

Cell differentiation is the process by which a cell changes to become specialised for a particular job in the body.

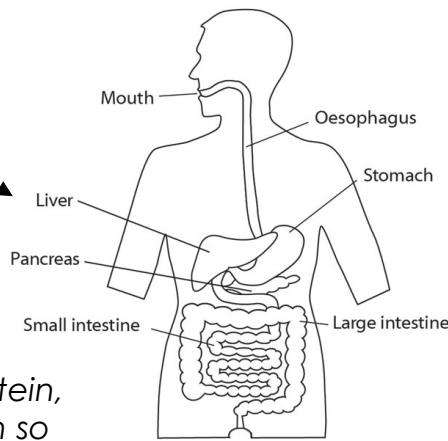


B1.2. Organisation

Digestive System

Produces bile to neutralize stomach acid and break down fats to increase their surface area

Produces bile to acid to aid digestion and kill pathogens



Nutrients such as starch, protein, fat need to be broken down so they can be absorbed into the blood via the small intestine

Food Tests

The table shows the test, and the colour changes if the food is present.

Food Test	Colour of reagent	Positive test result	Negative test result
Iodine for starch	orange-brown	blue-black	orange-brown (no change)
Benedict's for sugar	light blue	green to brick-red	light blue (no change)
Ethanol for lipid	colourless	cloudy emulsion	colourless (no change)
Biuret for protein	blue	lilac-purple	blue (no change)

Copyright © Save My Exams. All Rights Reserved

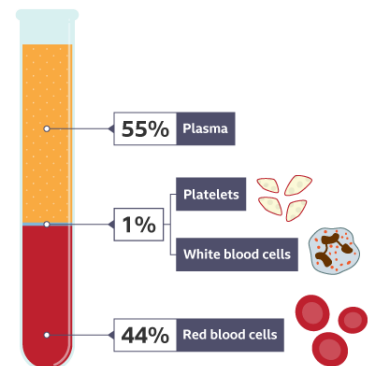
Enzymes

The table shows the enzymes you need to know for digestion.

Enzyme	Food Group	Products	Location
Protease	Protein	Amino Acids	Stomach
Lipase	Fat (lipids)	Fatty Acids & Glycerol	Small intestine
Amylase	Starch	Glucose	Mouth Small Intestine

Components of the blood

Component	Function
Red blood cell	To carry oxygen from the lungs to every cell in the rest of the body
White blood cell	To fight infection by pathogens and stop disease
Plasma	Carries the blood cells and platelets around the body
Platelet	Broken down parts of cells that form scabs



Cancer

What is cancer?

Changes within the cell, mainly genetic, leads to uncontrolled growth and division of cells. These growths are called tumours.

Benign	Malignant
Do not spread to other organs.	Spread to different organs and form secondary tumours.
Usually contained within a membrane.	Invade other organs via the blood.
These tumours are not cancerous.	These tumours are cancerous.

What factors cause cancer?

Age, diet, smoking, obesity, exercise and genetic changes/abnormalities.

B1.3. Infection & Response

Pathogens

Pathogen	Example of disease	Prevention/Treatment
Virus	HIV, TMV, Covid, Flu, Measles	Fluids and rest. You can prevent them by being vaccinated
Bacteria	Salmonella, Gonorrhoea,	Antibiotics (like penicillin) which kill bacteria only
Fungus	Rose Black Spot	Remove infected leaves to kill pathogen
Protist	Malaria (spread by mosquitos)	Destroy breeding grounds by draining water from swamps

Drug types

- Painkiller
- Antibiotics **i**

Painkillers **i** are chemicals that relieve the symptoms but do not kill the pathogens. Common examples include paracetamol and aspirin, and they can relieve a headache or a sore throat.

As the symptoms are treated, your immune system still needs to combat the pathogen.

Antibiotics

Antibiotics are substances that slow down or stop the growth of bacteria **i**. They are commonly prescribed medicines, examples include penicillin **i** and amoxicillin. These can be taken to cure the disease by killing the pathogen, but only cure bacterial diseases and **not** viral ones.

Problems with antibiotics

Commonly prescribed antibiotics are becoming less effective due to a number of reasons:

- overuse of antibiotics
- failing to complete the fully prescribed course by a doctor
- use of antibiotics in farming

These can lead to the effectiveness of antibiotics being reduced, and the incidence of **antibiotic resistance** **i** increasing. These bacteria are commonly known as superbugs.

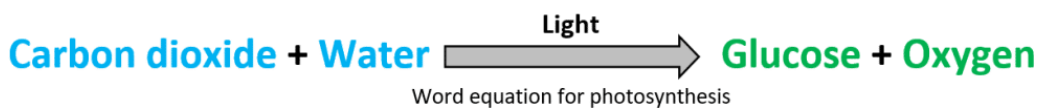
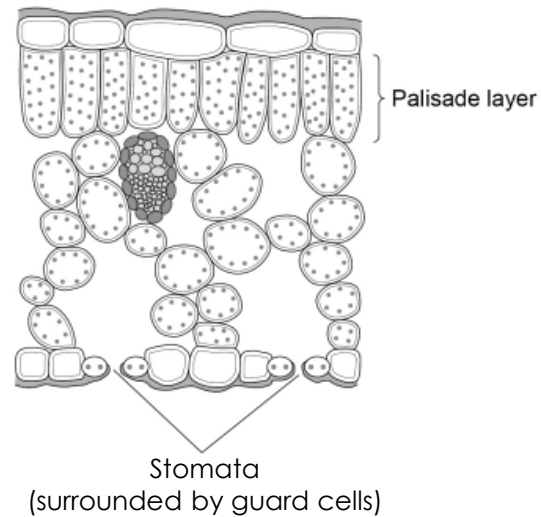
B1.4. Bioenergetics

Photosynthesis in leaves

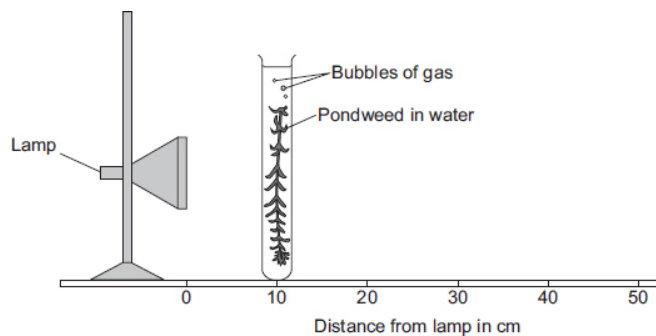
Photosynthesis takes place in leaves.

Here are some facts you need to know:

- The top of the leaf has a 'palisade' layer
- This layer contains lots of chloroplasts
- Chloroplasts do photosynthesis, they contain a green pigment called chlorophyll that traps sunlight
- CO₂ diffuses into the leaf through the stomata (holes in leaves)
- O₂ and H₂O(g) can diffuse out of the leaf through the stomata
- Diseased leaves go yellow because they have less chlorophyll.
- So, they do less photosynthesis, so they make less glucose



Investigating Photosynthesis



Pondweed can be used to determine the rate of photosynthesis.

To get the rate of photosynthesis you need to measure:

- The number of bubbles produced
- Per set amount of time
- E.g. how many bubbles per 10 seconds

Method:

1. Set up lamp 10cm away from pondweed.
2. Count the bubbles produced per minute.
3. Repeat this process moving a further 10cm away from the pond weed each time until 70cm.
4. Repeat the reading at each distance at least three times and CALCULATE A MEAN.
5. Control the temperature by leaving time between each reading.
6. Control the light colour by using the same lamp each time.

Variables

Independent (CHANGE):

distance of lamp from pondweed

Dependent

(MEASURE): Bubbles per minute

Control

(SAME):

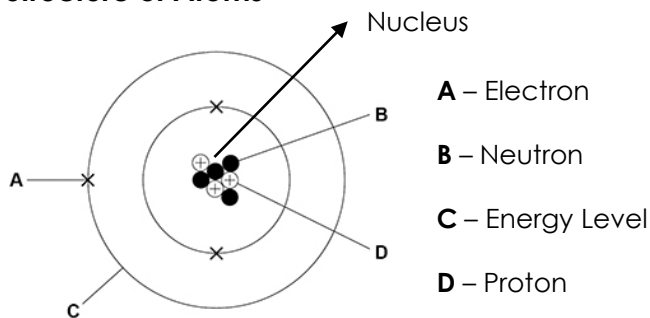
- Temperature
- Light intensity
- CO₂ concentration

Chemistry Paper 1 - AQA Foundation Tier

Topic 1: Atomic Structure and the Periodic Table	Topic 2: Bonding, Structure and Properties of Matter
<ol style="list-style-type: none">1. Group 1 elements: name and explaining trends in reactivity.2. Calculating protons, neutrons and electrons.3. Group 0 properties.	<ol style="list-style-type: none">1. Identifying states of matter from melting and boiling points.2. Changes of state.3. Drawing dot and cross diagrams of small covalent molecules.4. Giant covalent bonding: silicon dioxide, fullerene and polymers.5. Explaining why alloys are stronger than pure metals.6. Formation of ions from group numbers.7. Explaining the properties of ionic compounds.8. Explaining the properties of metals with links to bonding.
Topic 3: Quantitative Chemistry	Topic 4: Chemical Changes
<ol style="list-style-type: none">1. Writing chemical equations2. Balancing equations.3. Calculating relative formula mass.4. Calculating concentration of solutions.	<ol style="list-style-type: none">1. Reactions of acids and alkalis.2. Extraction of metals.3. <u>REQUIRED PRAC: Making salts</u>
Topic 5: Energy Changes	<u>I can do the following key skills:</u> <ol style="list-style-type: none">1. Plot data on a bar chart.2. Describe trends when given data as a bar chart.3. Reading values from apparatus.4. Calculating percentages.5. Calculating uncertainty.
<ol style="list-style-type: none">1. Endothermic and exothermic reactions.2. <u>REQUIRED PRAC: plan a method to investigate the temperature change of metals with acids,</u>	

Topic 1: Atomic Structure & the Periodic Table

Structure of Atoms



All **atoms** have an **overall neutral charge** as they have the **same** number of positive **protons** and negative **electrons**.

Important Properties for the Atom

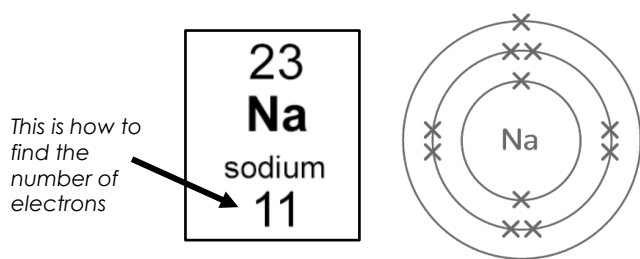
Sub-Atomic Particle	Relative Mass	Relative Charge	Order of Discovery
Proton	1	+ 1	2 nd
Neutron	1	0	3 rd
Electron	Very Small	- 1	1 st

- Protons and neutrons are found in the centre of the atom, called the **nucleus**.
- Electrons orbit the nucleus on energy levels
- Atoms has a radius of 0.1 nm
- The nucleus is 10,000 times smaller than the atom

Electron Structure

Remember the 2, 8, 8 rule.

- The first energy level can only hold 2 electrons
- The second and third energy level can only hold 8 electrons



Using the Periodic Table

Atomic Mass
Number of Protons + Neutrons

Atomic Number
Number of Protons
(Also tells you number of electrons)

To calculate neutrons:

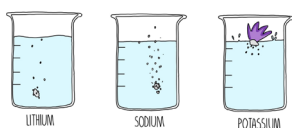
$$\text{Top number} - \text{Bottom Number}$$

So, for sodium (Na):

Proton = 11, Electron = 11, Neutron = 12

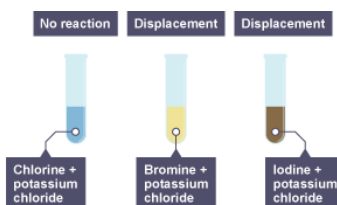
Group One

- Group one are called the **alkali metals**
- Alkali metals are soft and float on water
- They react vigorously with water producing metal hydroxides and releasing hydrogen
- The reactivity increases as you go down the group, as they are more likely to lose electrons
- As you go down the group, the melting point decreases



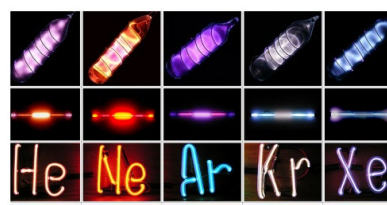
Group Seven

- Group seven are called the halogens
- Halogens are non-metals
- The reactivity decreases as you go down the group
- More reactive halogens will displace less reactive halogens



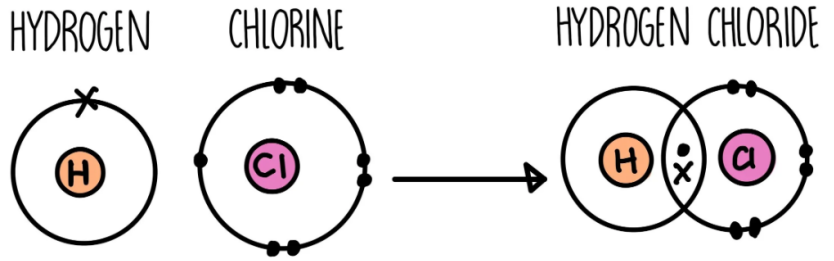
Group Zero

- Group zero are called the noble gases
- Noble gases are colourless
- They are chemically unreactive, this is also known as being inert.
- Noble gases like Argon won't form compounds because they have a full outer shell
- As you go down the group, the boiling point increases

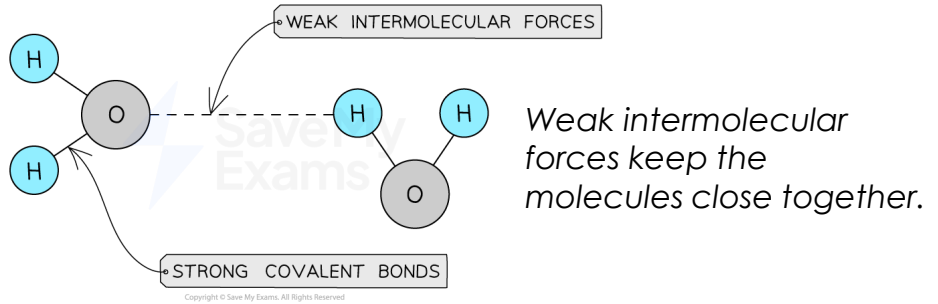


Topic 2: Bonding & Structure

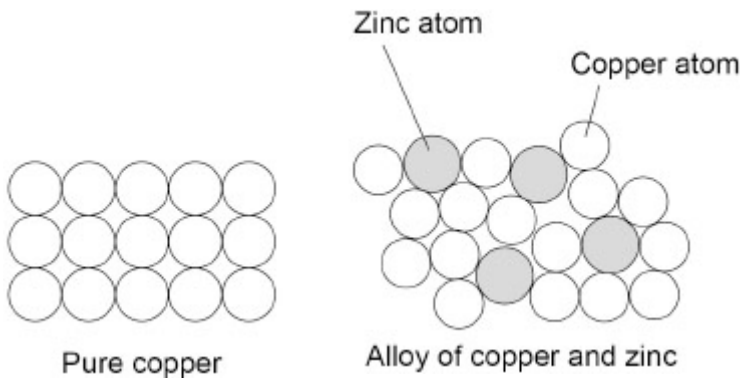
Covalent Bonds & Intermolecular forces



Strong covalent bonds hold the atoms together to make the compound/molecule



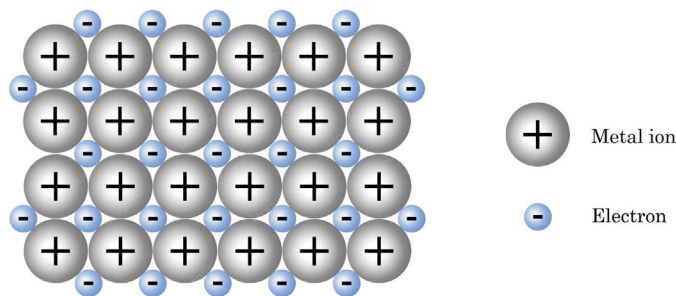
Metal Alloys



Why are alloys harder than normal metals?

- In alloys, the atoms are different sizes
- So the layers are distorted
- So they can't slide over each other

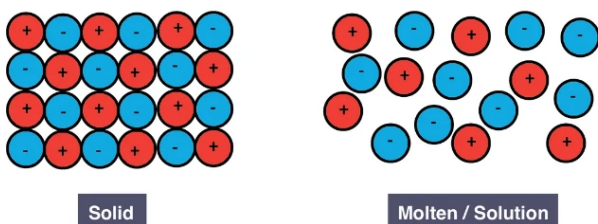
Metallic Bonding



How metals conduct electricity:

- Metals have a sea of delocalised electrons
- Which can carry charge through the metal

How Ionic Compounds Conduct Electricity



How ionic compounds conduct electricity:

- The compound needs to be molten or in solution
- So, the ions are free to move
- Allowing the charge to flow

Topic 4: Chemical Changes

pH Scale

The pH scale is a logarithmic scale used to measure the acidity or basicity of a solution. It ranges from 0 to 14:

- A pH of 7 is considered neutral (like pure water).
- A pH less than 7 indicates an acidic solution. Range 0 - 6
- A pH greater than 7 indicates a basic (alkaline) solution. Range 8 - 14

The scale reflects the concentration of hydrogen ions (H^+) in the solution, with lower pH values corresponding to higher acidity

The pH scale is logarithmic.

This means a change of $\times 10$ in concentration = change of 1 pH unit.

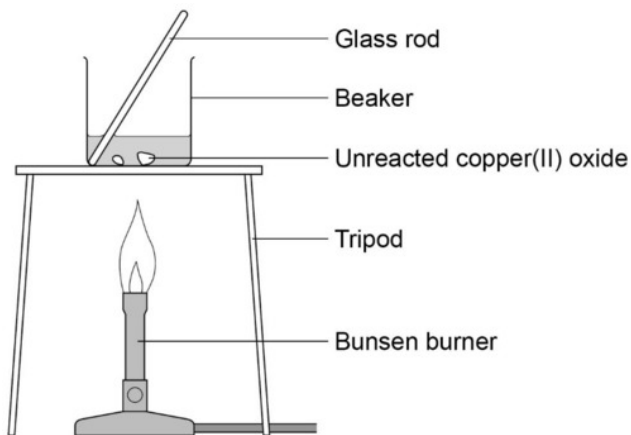
So:

- if the concentration of an acid is changed by a factor of 10, pH decreases by 1 unit
- If the concentration of an acid changed by a factor of 100, pH decreases by 2 units

Strong Acids – the acid completely ionises in aqueous solution

Weak Acids – the acid partially ionises in aqueous solution

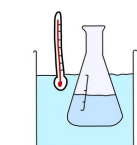
Making Salts – This is a neutralisation reaction



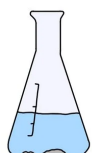
Bases are insoluble so heating and stirring will help them dissolve.

You will observe:

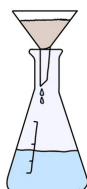
- The base disappearing as it dissolves
- The colour of the solution changing
- (If it's a carbonate) You will observe fizzing as it releases carbon dioxide



HEAT ACID IN WATER BATH



ADD INSOLUBLE BASE IN EXCESS
MIX TO REACT



FILTER TO REMOVE
UNREACTED BASE



GENTLY HEAT TO EVAPORATE WATER



LEAVE TO CRYSTALLISE
WASH AND DRY

Heating and stirring helps it react

Adding in excess makes sure all the acid reacts. You then filter to remove excess.

Heating using a water bath makes it safer

Topic 5: Energy Changes

Aim: Investigate whether concentration affects change in temperature

1. Measure 10cm³ of hydrochloric acid and add it to a polystyrene cup.
2. Record the starting temperature of the acid.
3. Measure the mass of a metal on a balance. Then add to cup.
4. STIR WELL to distribute the heat equally.
5. Measure the end temperature when it has stopped changing.
6. Find the temperature difference.
7. Repeat 3 times and calculate a mean
8. Repeat for different metals with the same mass and surface area.

Variables

Independent (CHANGE):

Type of metal

Dependent

(MEASURE): Temperature change

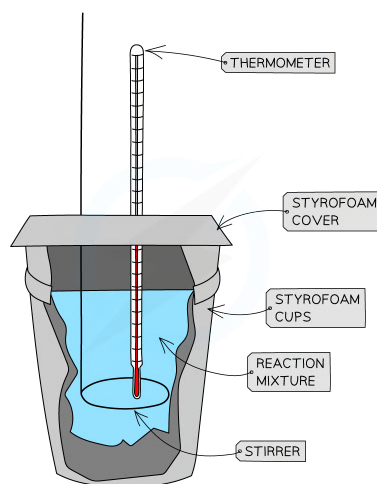
Control (SAME):

- Concentration of hydrochloric acid
- Surface area of metal

To improve accuracy

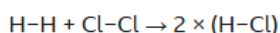
Use a polystyrene cup with A LID to stop heat being lost to the surroundings.

Make sure to stir the solution.



To calculate bond energy

1. Add together the bond energies for all the bonds in the reactants \ominus – this is the 'energy in'.
2. Add together the bond energies for all the bonds in the products \oplus – this is the 'energy out'.
3. Calculate the energy change = energy in – energy out.



Bond	Bond energy (kJ/mol)
H-H	436
Cl-Cl	243
H-Cl	432

1. Energy in = 436 + 243 = 679 kJ/mol (this is the energy absorbed when the bonds of the reactants break).
2. Energy out = 2 × 432 = 864 kJ/mol (this is the energy released when the bonds of the products form).
3. Energy change = in – out = 679 – 864 = **-185 kJ/mol**

Physics Paper 1 - AQA Foundation Tier

Topic 1: Energy	Topic 2: Electricity
<ol style="list-style-type: none">1. Energy in systems2. Energy transfers3. Efficiency4. Thermal conductivity5. Power6. Gravitational potential energy7. Kinetic energy8. Trends in energy resources	<ol style="list-style-type: none">1. Identifying circuit symbols.2. Describing the functions of circuit components.3. Describing the relationship between current, temperature and resistance.4. Identifying IV characteristics graphs.5. The national grid
Topic 3: Particle Model of Matter	Topic 4: Atomic Structure
<ol style="list-style-type: none">1. Specific heat capacity2. <u>REQUIRED PRAC: Specific heat capacity</u>	<ol style="list-style-type: none">1. Radiation from the nucleus2. Decay from the atom

I can do the following key skills:

Calculating the mean
Substituting equations
Rearranging equations

Topic 1: Energy

Energy Changes

Energy store
Kinetic
Gravitational
Elastic
Electrostatic
Magnetic
Chemical
Nuclear
Thermal

Energy Change Scenarios: you need to explain what energy stores decrease then increase for each scenario

- an object projected upwards

Kinetic energy **decreases**, GPE **increases**

- a moving object hitting an obstacle

Kinetic energy **decreases**, thermal energy **increases**

- an object accelerated by a constant force

Chemical energy **decreases**, kinetic energy **increases**

- a vehicle slowing down

Kinetic energy **decreases**, thermal energy **increases**

- bringing water to a boil in an electric kettle

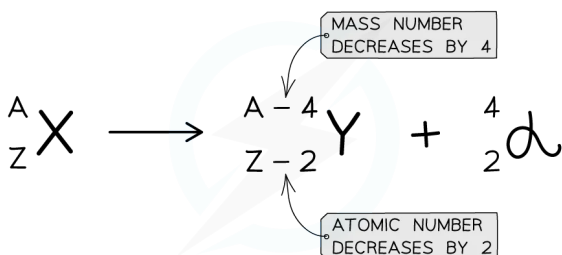
Thermal energy of heating element increases, thermal energy of water increases

Topic 4: Atomic Structure

Particle	What is it	Charge	Range in air	Penetration	Ionisation
Alpha (α)	2 protons + 2 neutrons	+2	Few cm	Stopped by paper	High
Beta (β^-)	Electron	-1	Few 10s of cm	Stopped by few mm Aluminium	Medium
Gamma (γ)	Electromagnetic wave	0	Infinite	Reduced by few mm Lead	Low

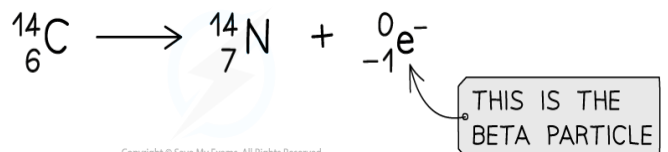
Copyright © Save My Exams. All Rights Reserved

Alpha Decay



Copyright © Save My Exams. All Rights Reserved

Beta Decay

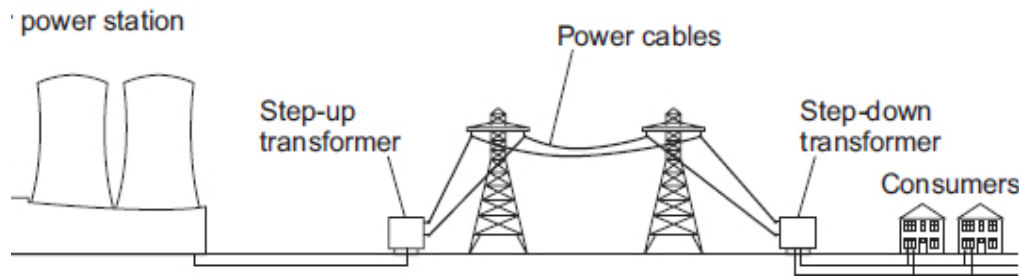


Copyright © Save My Exams. All Rights Reserved

Topic 2: Electricity

National Grid:

This is a network of cables and transformers across the country



Step-Up Transformers

- Increase potential difference
- Decrease current
- So, less energy is lost from the power cables to the surroundings
- Which increases the efficiency

Step-Down Transformers

- Decrease potential difference
- So, it is safe for the consumers



Open switch



Closed switch



Lamp



Voltmeter



Ammeter



Resistor



LDR



Thermistor



Variable resistor



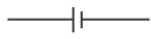
Diode



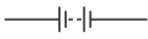
LED



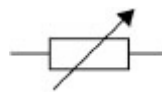
Fuse



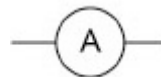
Cell



Battery



Allows you to change resistance. So, it changes current and potential difference

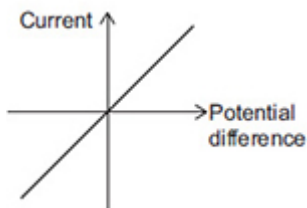


Allows you to measure current if in series.

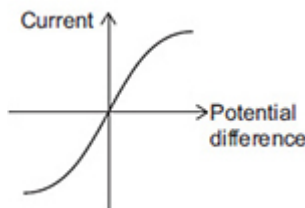


To correct zero error, take a reading when it is off, then subtract the number

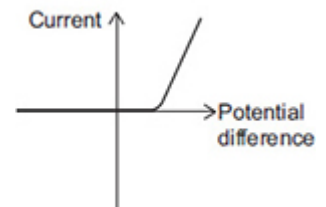
IV-Characteristics



- Resistor
- Directly Proportional
- Constant temperature



- Filament lamp
- Higher current, means higher temperature
- So, the resistance will increase



- Diode
- Very high resistance in one direction only

Topic 3: Particle Model

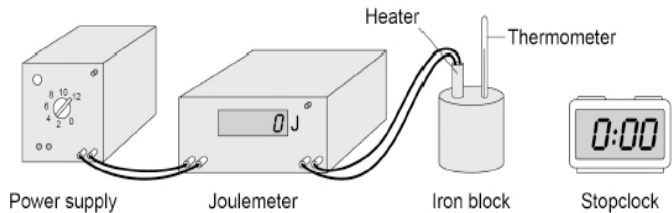
Specific Heat Capacity Required Practical

Aim: Investigate the energy needed to change the temperature of 1kg of a substance by 1°C

Method

1. Turn on the **heater** and leave to warm up for a few minutes.
2. Record the **initial temperature** using a **thermometer**.
3. Measure mass using balance.
4. Set the **timer** for 5 minutes.

5. **Measure** the energy going into the block using the **joulemeter**



6. Record the **final temperature** and **calculate temperature 6**.

Use energy = mass x specific heat capacity x temperature change

How could you improve the accuracy of the investigation?

If thermal energy is transferred to surroundings it could make SHC appear higher than its true value.

Insulating the metal block would improve accuracy as it would reduce thermal energy transferred to surroundings.

Sources of error

Random (parallax) from not reading thermometer at eye level – use a digital thermometer instead.

Variables

Independent variable:
substance type

Dependent variable:
Energy transferred

Control variable: mass,
time.

