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Experiment Manual for Key Stage 3

(Materials and their
properties)

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Year 7

7E Acids and Alkalis

7F Simple Chemical Reactions

7G The Particle Model For Solids, Liquids and Gases

7H Solutions

Year 8

8E Atoms and Elements

8F Compounds and Mixtures

8G Rocks and Weathering

8H The Rock Cycle


Year 9

9E Metals and their Compounds

9F Patterns of Reactivity

9G Environmental Chemistry

9H Using Chemistry

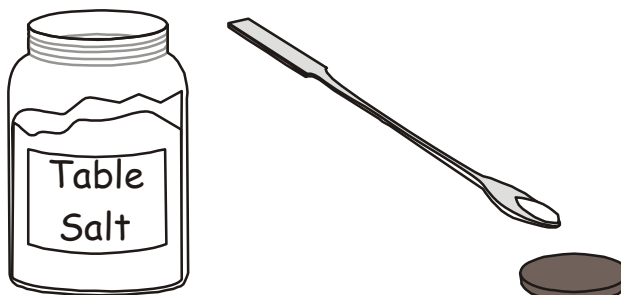
7E Acids and Alkalis	
	What are acids and alkalis like and where do we use them?
7E1	Survey of acids and alkalis
7E2	What are acids and alkalis like?
 7E3	Cleaning old coins
7E4	Acids are corrosive
7E5	Acids: solutions of solids in water
7E6	Acids: solutions of gases in water
	How can acids and alkalis be identified and distinguished from each other?
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7E8	Using your indicator
7E9	Investigating different litmus papers
7E10	Soil analysis - Part I
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7E14	Safety I: Hazard signs
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7E16	Safety III: Spillages
7E17	Diluting acids and alkalis
7E18	Acidity/alkalinity of some household products
	What happens when an acid is added to an alkali?
7E19	pH changes during neutralisation
	Where is neutralisation important?
7E20	How to cure indigestion
7E21	Simulating stomach conditions

7E3 Cleaning old coins

Baking powder Spatula Paper towel Collection of old coins Vinegar

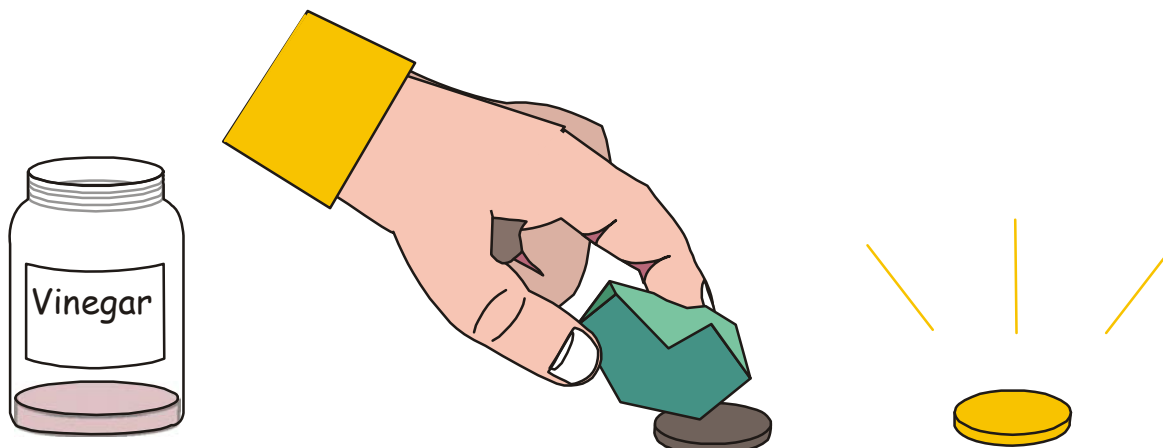
1

Add a small amount of table salt to the surface of a tarnished copper coin.



2

Soak a paper towel in vinegar and use it, with the salt, to rub the surface of the coin.



What happens to the surface of the coin as you rub it?.....

The coin becomes tarnished because Copper reacts with a gas in the air.

Which gas?


What is the substance that forms on the coin?

What is the function of the salt in this experiment?

What class of substance is vinegar, an acid or an alkali?.....

What evidence in this experiment is there that metal oxides dissolve in acids?

.....

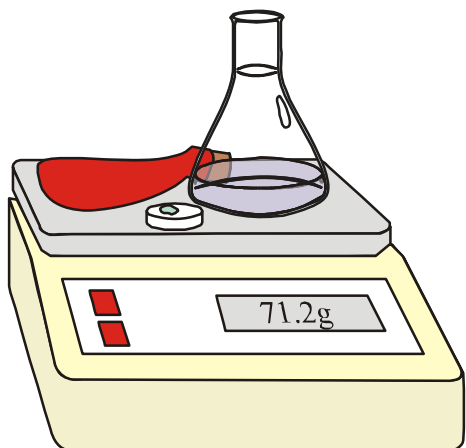
7F Simple Chemical Reactions	
	What is a chemical reaction?
7F1	Chemical reactions: Colour change
7F2	Chemical reactions: Colour change: Kitchen products
7F3	Chemical reactions: Effervescence: Part 1
7F4	Chemical reactions: Effervescence: Part 2
7F5	Recognising chemical reactions: Temperature Change
7F6	Demo: Mass is conserved I
	7F7 Demo: Mass is conserved II
7F8	Plaster of Paris with water
	How does water react with metals?
7F9	Sodium and water
7F10	The "pop" test
7F11	Calcium and water: reaction speed and temperature
	How do acids react with metals?
7F12	Reaction of Zinc with dilute HCL (Grain size)
7F13	Reaction of Zinc with dilute HCL (Temperature)
7F14	Reaction of Magnesium with dilute HCL
	How do acids react with carbonates?
7F15	Making limewater
7F16	Test for Carbon Dioxide: Part 1
7F17	Test for Carbon Dioxide: Part 2
7F18	Reaction of baking powder with vinegar
7F19	Survey of Carbonates
7F20	Dissolving an egg shell
	What new substances are made when materials burn in oxygen?
7F21	Burning Magnesium
7F22	Combustion of Iron wool
7F23	Reaction of Sulphur with Oxygen
7F24	Reaction of Sodium with Oxygen
	What is produced when fuels burn?
7F25	Combustion of Hydrogen
7F26	Combustion of Butane
7F27	Combustion of Sugar: Part 1
7F28	Combustion of Sugar: Part 2
	What is needed for things to burn?
7F29	% of O ₂ in the atmosphere I
7F30	% of O ₂ in the atmosphere II
7F31	Egg in a bottle

7F Equipment list

Chemicals	Specialised Equipment	Household materials
Alkali: Calcium Hydroxide powder	Anti bumping granules	Baking powder
Alkali: Limewater solution	Beaker 250ml	Chalk
Alkali: Sodium Hydroxide 0.5M	Beaker 250ml	Cooking oil
Carbonate: Ammonium Carbonate	Bung + hole for 19mm test tube	Detergent
Carbonate: Calcium Carbonate	Bunsen burner	Granite
Carbonate: Copper Carbonate	Crucible ceramic	Lego bricks large collection
Halide: Cobalt II Chloride	Crucible nickel	Permanent marker
Halide: Iron II Chloride	Digital thermometer	Plastic bottle 500ml
Halide: Sodium Chloride	Disposable pipettes	Plastic bottle push-pull top
Indicator :Litmus paper pH6 to pH8	Electrolysis equipment	Salt
Indicator :Litmus standard	Electronic balance	Straws
Metal: Iron filings	Evaporation dish	String
Metal: Magnesium (ribbon)	Filter paper	
Organic: Alcohol	Fume cupboard	Sugar
Organic: Sudan III	Funnel glass	Transparent plastic cups
Oxide: Calcium Oxide	Funnel plastic	
Oxide: Mercury Oxide	Gas bottle	
Sulphate: Alum	Gas collecting apparatus	
Sulphate: Iron II Sulphate	Gauze	
Sulphate: Magnesium Sulphate Epsom	Glue contact	
Sulphate: Sodium Sulphate	Glue plastic/plastic	
Sulphide: Copper II Sulphide	Glue wood/wood	
Sulphide: Iron II Sulphide	Hot plate	
Metal: Sodium	Lighter	
Indicator: Indicator solution	Measuring cylinder plastic 10ml	
Non metals: Sulphur	Metal cube set	
Acid: Sulphuric 0.1M	Retort stand and clamps	
	Sand tray	
	Spatula	
	Test tube 12mm	
	Test tube 19mm	
	Test tube holder	
	Test tube rack	
	Tongs	
	Tripod stand	
	Tubing plastic 6mm hole	
	Tweezers	
	Watch glass	
	Wooden splints	

7F7 Demo: Mass is conserved II

Flask conical Electronic balance Alka seltzer tablet Balloon Tight fitting rubber bung + hole Stick tack



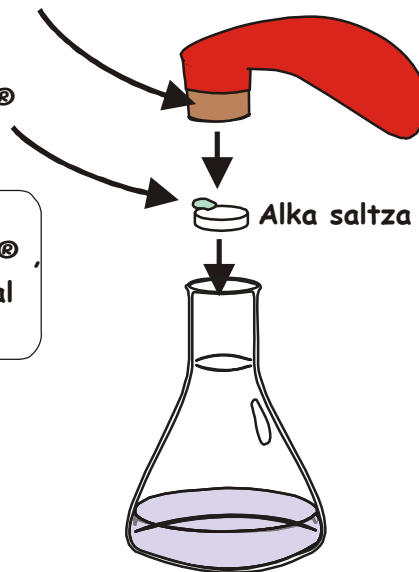
①

Add some water to a conical flask then use an electronic balance to measure the mass of all the components of the experiment.

Rubber bung with hole

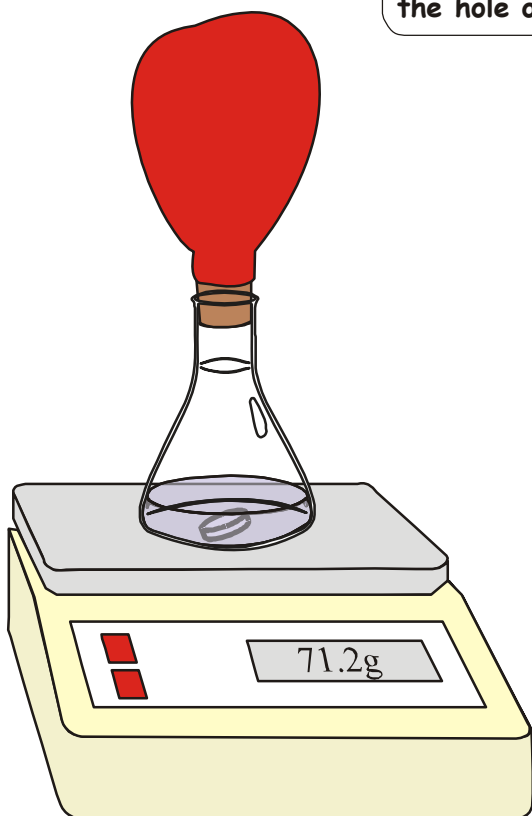
Blue tac ®

Alka saltza tablet



②

Stick the Alka Saltza tablet to the rubber bung using blue tac ®, making sure that you do not seal the hole on the bung.



③

Carefully put the stopper with the tablet attached into a conical flask taking care not to drop the tablet before you are ready.

④

When you are ready, gently tap the conical flask so that the tablet falls into the water and return the apparatus to the electronic balance.

⑤


Monitor the mass of the apparatus as the reaction continues.

What was the initial mass?.....

What was the mass after the reaction had taken place?.....

How does this experiment show that mass is conserved during a chemical reaction?

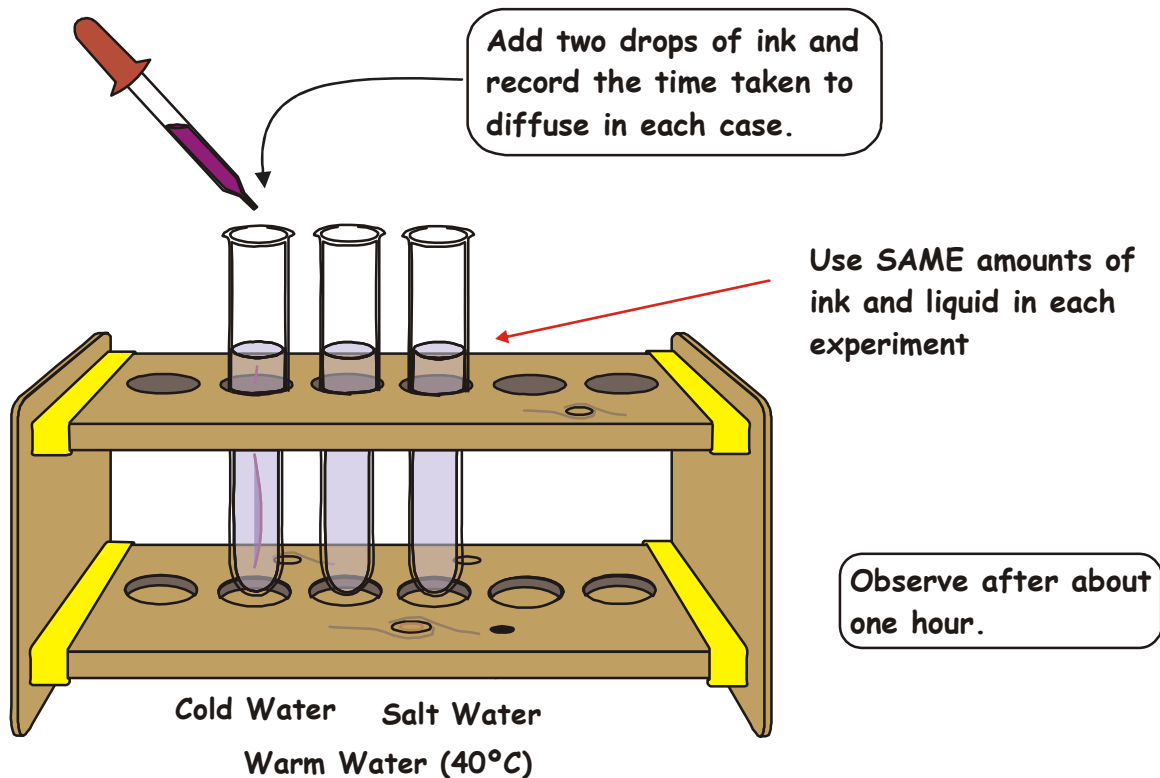
.....

7G Particle Model for S L G	
	How can we explain evidence from experiments?
7G1	Shape of solids, liquids and gases
7G2	Volume of solids, liquids and gases
7G3	Compression of gases and liquids
7G4	Guess the mass
7G5	Volume of geometric shapes
7G6	Measure the average mass
7G7	Measure the average volume
7G8	Measure your lung capacity
7G9	Volume of a drop of water
7G10	Volume of a sheet of A4 paper
7G11	Make a displacement vessel
7G12	Measuring volume with a displacement vessel
	What are the differences between S, L and G?
7G13	Investigating sand: Part 1
7G14	Investigating sand: Part 2
7G15	Comparing the hardness of pencils
7G16	Comparing the fluidity of various liquids
	How the particle model explains differences between S, L and G
7G17	A particle model for the diffusion of ink in water
7G18	A particle model for solids
7G19	A particle model for liquids
	How can the particle model explain other phenomena?
7G20	Brownian motion in milk
7G21	Spaces between molecules
	Diffusion
	7G22 Diffusion of ink in water
7G23	Diffusion of salt particles through agar
7G24	Diffusion of air freshener molecules: teacher demo
7G25	Diffusion of Potassium Permanganate
	Density
7G26	Density of various substances
7G27	Density of various liquids
7G28	Archimedes' Diablo I
7G29	Archimedes' Diablo II
7G30	Expansion of ice

	Atmospheric pressure
7G31	The mass of air in a football
7G32	Demonstration that air has a mass
7G33	How to make a barometer
7G34	Atmospheric pressure I
7G35	Atmospheric pressure II
7G36	How to make a syringe pump
7G37	How to make a suction pump
7G38	Air pressure and flow I
7G39	Air pressure and flow II
7G40	Pressure in a syringe
	Effect of heating matter
7G41	Temperature and fluidity
7G42	Expansion in gases
7G43	Expansion in liquids
7G44	Ball and ring
7G45	Particle model for expansion in solids

7G22 Diffusion of ink in water

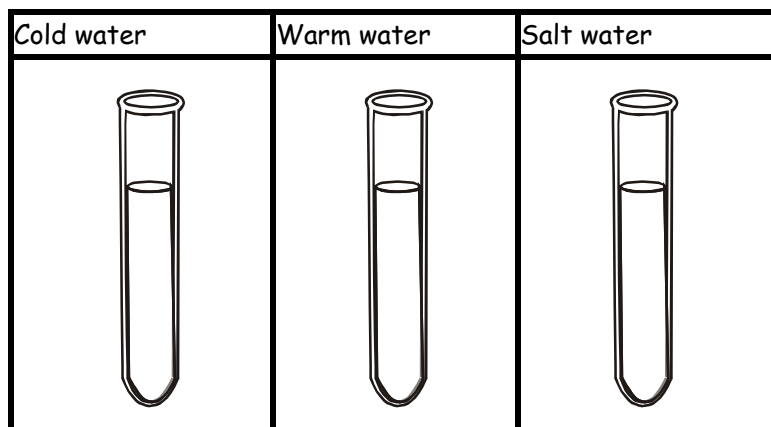
Test tube 12mm x3 Test tube rack Ink Salt Pipette



When you initially add the ink to cold water it sinks to the bottom like a "weight".


Why is this?.....

Sketch the distribution of the ink in each case after about 20 minutes:



Explain the differences you see in the three cases above:.....

(See [expt 7G17](#) for particle model.)

	7H Solutions
	How can we tell whether a liquid is a mixture?
7H1	Measure the boiling point of water
7H2	Is tap water pure?
7H3	Measure density
	How much salt can we get from rock salt?
7H4	Concentration of salt in seawater
7H5	Separation of salt from rock salt
7H6	Find the % salt in a rock salt sample
	What happens to the solute when a solution is made?
7H7	Soluble or insoluble?
7H8	Speeding up dissolving: Temperature
7H9	Speeding up dissolving: Powder and stirring
	How can we separate solvents from solutes?
7H10	Separation of water from food colouring
7H11	Separation of salt from sand
7H12	Separation of Alcohol from wine
	Using chromatography separate and substances in mixtures?
 7H13	Separation of pigments by chromatography
7H14	Chromatography of ink
	Is there a limit to the amount of solid that will dissolve in a liquid?
7H15	Growing crystals I
7H16	Growing crystals II
7H17	How to grow big crystals
	What else affects solubility?
7H18	Solubility of sugar: Part I
7H19	Solubility of sugar: Part II

7H13 Separation of pigments by chromatography

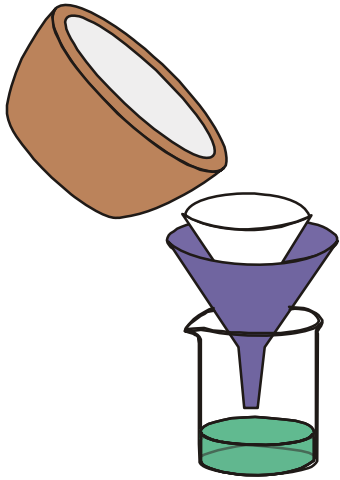
Alcohol Mortar and Pestle Sand Funnel Filter paper Beaker 250ml Kebab stick

①

Take a leaf (e.g. Ivy or geranium) cut it up and add it to a mortar. Add a measure of clean sand and alcohol to the leaves and grind until the pigments are clearly dissolved in the alcohol.



Keep away from ignition sources

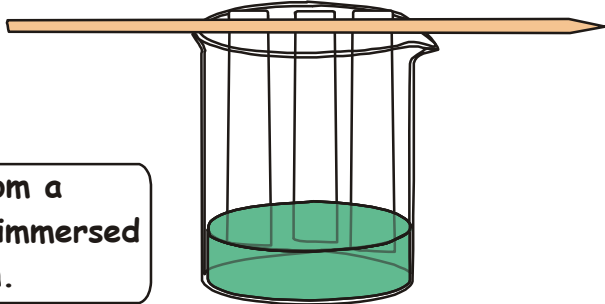


②

Filter the solution into a clean beaker.

③

Suspend strips of filter paper from a tooth pick so that their tips are immersed in the Alcohol/Chlorophyll solution.



Stick your samples in the table below:

①	②	③

Can you identify different pigments in the samples?


.....

Try to find out the name of the pigments

.....

Why do some pigments travel faster than others?.....

.....

8E Atoms and Elements	
	How many different materials are there?
8E1	Survey of materials
8E2	Mixture or pure substance?
8E3	Is water an element?
8E4	What's in a potato?
8E5	Is wood an element?
	What are elements made from?
8E6	Elements: Only one type of atom
	What are elements like?
8E7	The periodic table: First three rows: Colouring atoms
8E8	The periodic table: First three rows: Properties and uses
	8E9 Element bingo
8E10	Element dominoes
8E11	Chemical signs (elements)
8E12	Element card games
8E13	Is this substance an element?
8E14	Characteristics of Sulphur
	How do we get all the other materials?
8E15	Molecules: the gases of the atmosphere
8E16	Making molecules using Lego bricks
8E17	Building compounds using Lego bricks
8E18	Properties of Carbon Dioxide
8E19	Grouping elements compounds and molecules
8E20	Sorting substances using Venn diagrams
	How can we represent the changes when new materials are made?
8E21	Reactions between elements: Iron and Sulphur
8E22	Reactions between elements: Zinc and Sulphur
8E23	Reactions between elements: Hydrogen and Oxygen
8E24	Make an electrolysis bath

8E9 Element bingo

Print, and photocopy the [following page](#) then cut into sets ☐

①

Provide each pupil with a bingo card.

You are going to describe the elements in the first three rows of the P.T. (we suggest the order shown below). When the pupil is sure he or she knows which element you are describing they must cross it off on their bingo card.

H, Be, C, O, Ne, He, Li, B, N, F, Ar, Na, Cl, Mg, S, Al, P, Si

②

Describe the elements in the following way:

a) Say whether it is:

A solid, liquid or a gas

A metal or a non-metal

b) Describe its appearance, if possible.

(e.g. greenish coloured gas, shiny metal)

d) Provide some interesting physical property

(e.g. "soft, you can cut it with a knife",

"floats on water")

e) Provide some interesting chemical property.

(e.g. "reacts vigorously with water")

f) Provide a use of the element.

(e.g. "used to kill bacteria in swimming pools")

8E9 Element bingo

H	Card1						He
	Be	B	C		O	F	
Na	Mg		Si		S	Cl	Ar

	Card2						He
Li	Be	B	C	N		F	Ne
	Mg	Al	Si		S	Cl	

	Card5						He
Li	Be	B		N	O		Ne
Na		Al	Si	P	S	Cl	


H	Card6						
		B	C	N	O	F	Ne
Na	Mg	Al		P	S		Ar

H	Card3						He
Li	Be		C		O		Ne
Na	Mg	Al		P		Cl	Ar

H	Card4						He
	Be		C		O		Ne
Na	Mg	Al		P	S	Cl	Ar

H	Card7						He
	Be	B	C	N		F	Ne
	Mg		Si	P		Cl	Ar

	Card8						
Li	Be	B	C	N	O	F	Ne
Na	Mg				S	Cl	Ar

<h2>8F Compounds and Mixtures</h2>	
How are elements and compounds different?	
8F1	Where are we?
How do compounds differ from the elements from which they are made?	
8F2	Comparing salt with its elements
8F3	Electrolysis of brine solution
8F4	Comparing Iron Sulphide with its elements
8F5	Heating Mercury Oxide
8F6	Heating Mercury Oxide: Lego brick model
8F7	What are compounds made of?
Do compounds react chemically?	
8F8	Reaction of Sodium Carbonate and Iron II Chloride
8F9	Formation of precipitates: Copper II Carbonate
8F10	Reaction of vinegar with Sodium Carbonate
 8F11	Decomposition of Copper II Carbonate
8F12	Formation of precipitates: Iron II Carbonate
8F13	Chemical signs (compounds)
8F14	Reaction of Sodium Hydroxide with Copper II Sulphate
8F15	Reaction of Sodium Hydroxide with Magnesium Sulphate
8F16	Production of Ammonia I
8F17	Production of Ammonia II
8F18	Water of crystallisation: Condensation
8F19	Water of crystallisation: teacher demo
8F20	% of water present in hydrated Copper II Sulphate
Are there other sorts of material besides elements and compounds?	
8F21	Where are we?
8F22	Sorting substances
8F23	Classification of material systems
8F24	Classification of mixtures
8F25	Determine the boiling point of Alcohol
8F26	Boiling point of a mixture of Alcohol and water
8F27	Measure the % of Copper in Brass
8F28	Boiling point of water and salt water
8F29	Melting point of a mixture of ice and salt
8F30	A solution of a gas in a liquid
Separating components of a mixture (links to 7h)	
8F31	A mixture of oil and water
8F32	Separation of oil from water
7H	7H10 to 7H14
Naming compounds and acids	
8F33	Naming compounds: Binary compounds I

8F11 Decomposition of Copper II Carbonate

Ignition tube □ bung + hole □ Tubing/ connector □ T/T holder □ Copper II Carbonate □ beaker □ Limewater □ B/burner □



Use safety goggles

①

Place the dry Copper II Carbonate powder in a test tube. Insert the rubber bung, connector and tube as shown opposite and heat gently.

②

Observe what happens to both the powder and lime water solution.

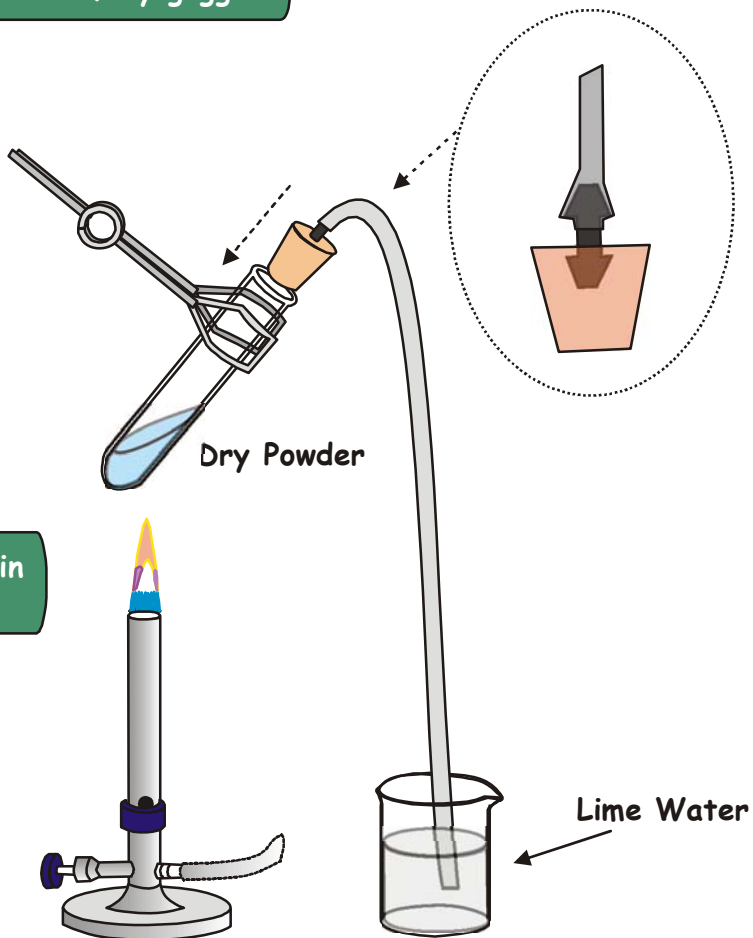


Heat gently moving in and out of flame.



HARMFUL

The dry Copper II Carbonate PPT from previous Expt



What happens to the Copper II Carbonate as you heat it?.....

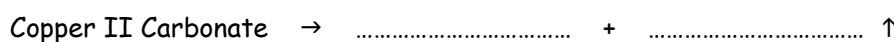
Describe the substance that remains in the test tube:.....

What is its name and formula?.....

What happens to the limewater?.....

What does this tell you?.....


Write down the word equation for its decomposition:



What does the arrow \uparrow mean in the equation above?

.....

Is there any other way you could test for this substance?.....

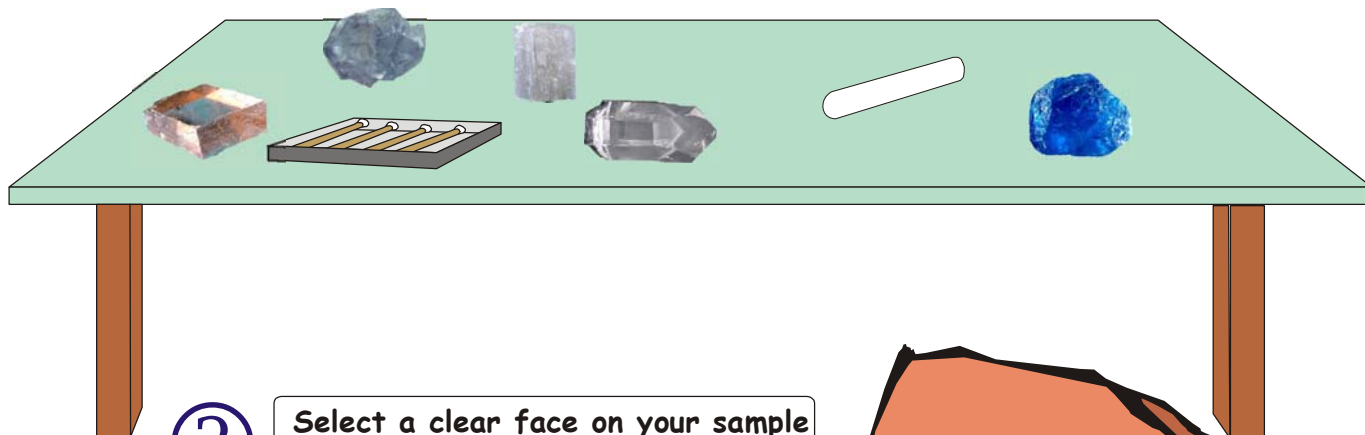
<h2>8G Rocks and Weathering</h2>	
	What are rocks made of?
8G1	The elements of the Earth's crust
8G2	Classification of rocks according to texture
8G3	Interlocking or non-interlocking grains
8G4	Survey of rocks
8G5	Density of some rocks
8G6	Comparing the hardness of some rocks
8G7	Mohs hardness test (using crystals)
	8G8 Mohs hardness test (finger nail, penny, pen knife)
8G9	Colouring in granite
8G10	Identify the rocks (photo survey)
	How does rain cause rocks to weather?
8G11	Weathering: Concept map
8G12	Rain is acidic
8G13	Rapid erosion
8G14	Permeability of some rocks
8G15	Porosity of different rocks
8G16	Weathering of buildings
	How do changes in temperature cause rocks to weather?
8G17	Freeze-thaw weathering of sandstone
8G18	Erosion of rocks - frost weathering
8G19	Heating and cooling granite in a Bunsen burner flame
	What happens to weathered pieces of rock?
8G20	Transport
8G21	Erosion of rocks - biological erosion
	Why do sediments form layers?
8G22	Formation of sediment beds

8G8 Mohs hardness test (finger nail, penny, pen knife)

Collection of materials of different hardness Knife Penny

①

If you do not have a Mohs testing set available a quick "rule of thumb" method is to use your fingernail, a penny and a steel knife. The hardness of each is listed below.



②

Select a clear face on your sample crystal and hold it firmly.

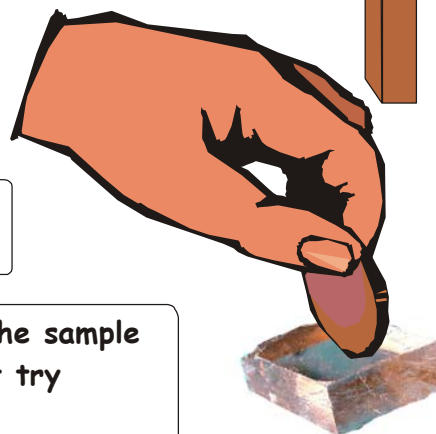
③

Attempt to make a scratch with a penny.

④

If there is a scratch mark it means the sample is softer than the penny and you must try with your finger nail.

If there is no scratch mark you must try with the steel pen knife blade.



Estimate the Mohs hardness of the samples provided by your teacher and write in the table below:



Fingernail: 2.5

Penny: 3

Steel blade: 5.5

Sample name	Mohs hardness

Sample name	Mohs hardness

8H The Rock Cycle	
	How is sedimentary rock formed?
8H1	Three types of rock
8H2	Formation of rocks: Sedimentary: Clastic
 8H3	Formation of coal
8H4	Formation of oil
	Are all limestones different?
8H5	Formation of rocks : Sedimentary: Biogenic
8H6	Formation of rocks : Sedimentary: Precipitation
8H7	The fizz test
8H8	Making slaked lime
	What is different about metamorphic rocks?
8H9	Formation of rocks of the Earth's crust : Metamorphic
8H10	Porosity of clay and baked clay
8H11	Comparing sedimentary and metamorphic rocks
8H12	From sedimentary to metamorphic rock: a model
	Where do igneous rocks come from?
8H13	Formation of rocks of the Earth's crust: Igneous
 8H14	Growing crystals from Salol

8H3 Formation of coal

Print, and photocopy the [following page](#) then cut into sets ☐

①

Explain that coal is classed as a biogenic sedimentary rock. This means that it is produced from sediments resulting from biological activity.

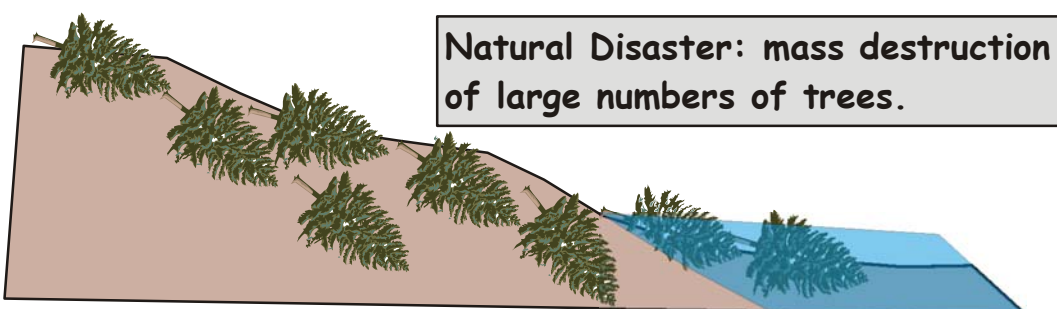
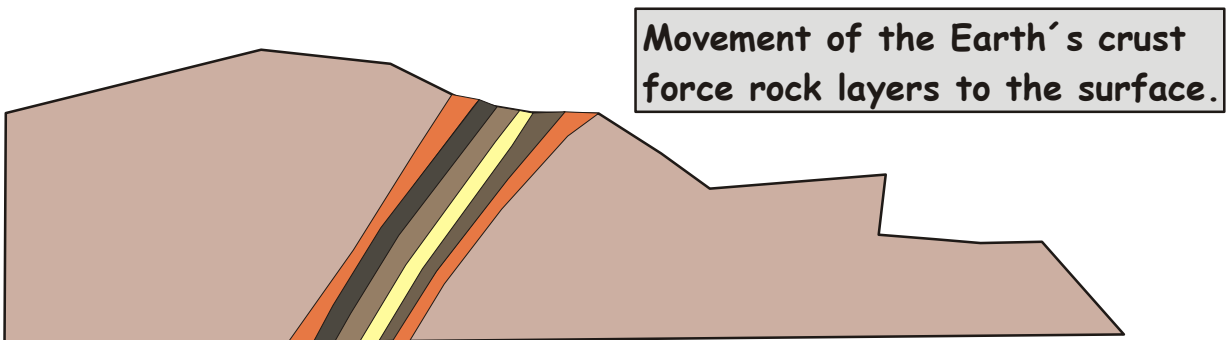
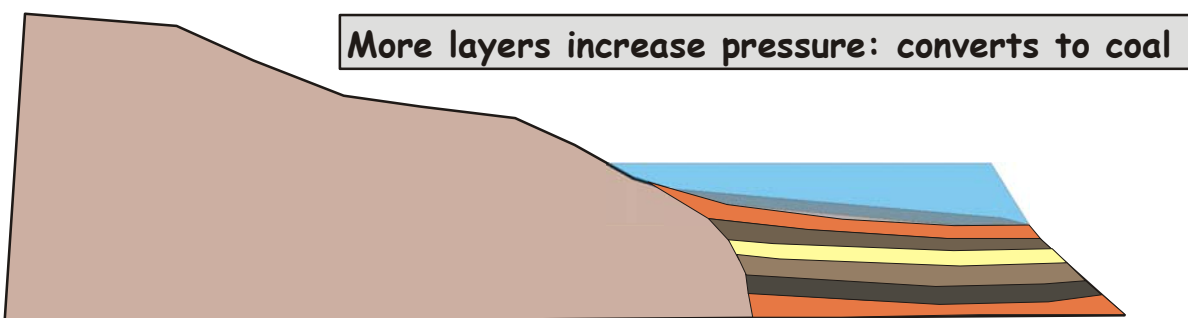
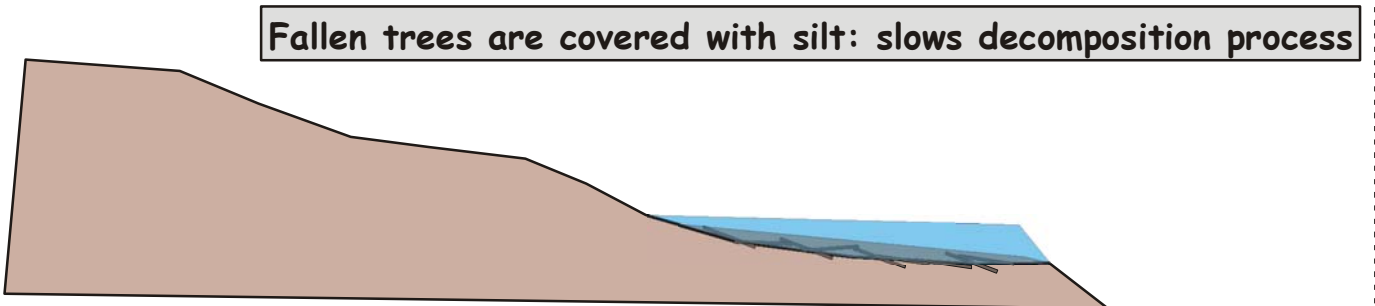
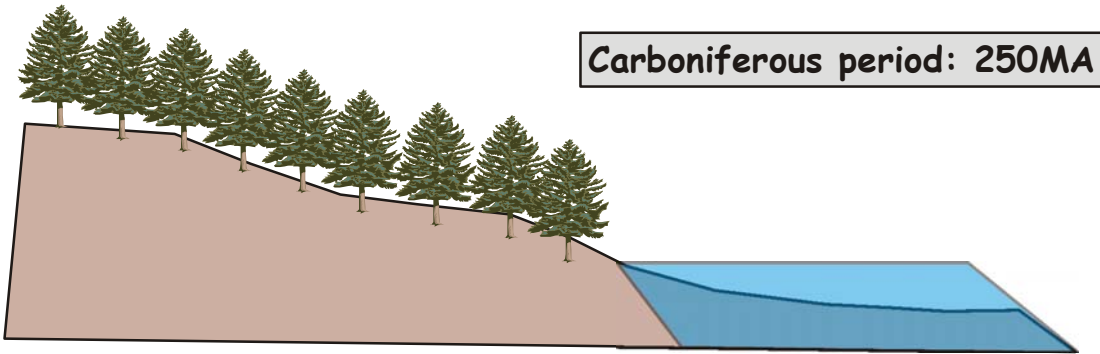
②

Print and photocopy the worksheet on the [following page](#). Explain that this shows the various stages in the production of coal arranged in the wrong order.

③

Get children to cut out the diagrams and stick them into their exercise book in the correct order.

8H3 Formation of coal

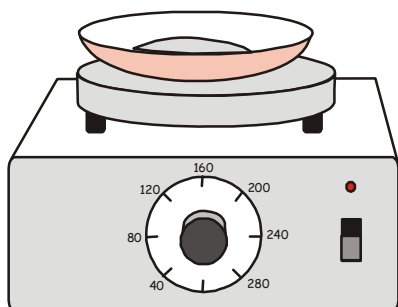


8H14 Growing crystals from Solol

Hotplate Spatula Solol Ceramic dish Ice bath Stopwatch Tongs Freezer Large plastic lid

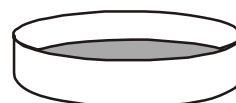
1

Add three measures of Solol to a watch glass and heat on a hotplate set to just above its melting point at 45°C .



2

Freeze some water in a petri dish or large plastic container lid to help cool the liquid Solol.



Set hot plate to 48°C

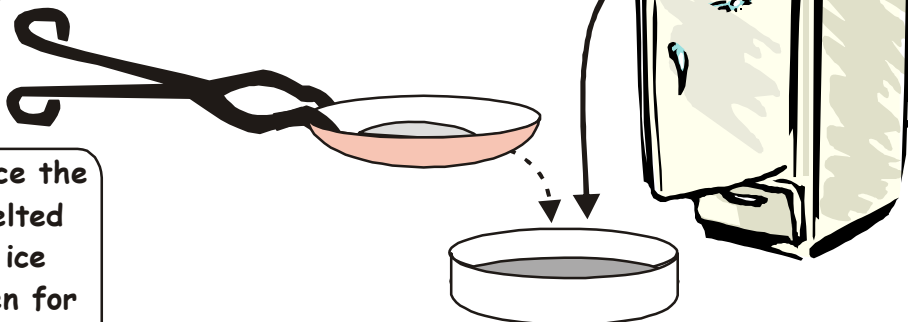


Wear safety goggles.

3

FAST COOLING

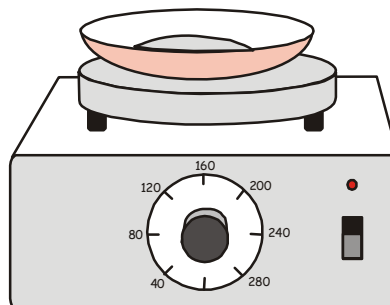
Using a pair of tongs place the watch glass containing melted Solol in contact with the ice and record the time taken for it to completely solidify.



4

SLOW COOLING

Heat the Solol until melting, as before, but this time simply turn the hot plate off and leave the Solol to solidify slowly recording the time taken.




Set hot plate to 48°C

What is the effect of fast cooling on the crystal grain size?

.....

What is the effect of slow cooling on the crystal grain size?.....

.....

9E Metals and Metal Compounds	
	Why are metals useful?
9E1	Internet survey: Uses of metals
9E2	Internet survey: Physical properties
9E3	Malleability of metals
9E4	Hardness of metals
9E5	Density of various metals
	What happens when metals react with acids?
9E6	Metals and acids: Magnesium, Zinc and Tin
9E7	Speeding up the reaction: Zinc and Zinc dust
	How do acids react with metal carbonates?
	9E8 Reaction of metal carbonates with acids
	Evidence of chemical reactions between acids and metal oxides?
9E9	Reaction of Copper Oxide with Sulphuric acid
9E10	Cleaning old coins
9E11	Reaction of Zinc Oxide with Hydrochloric acid
9E12	Reaction of Iron III Oxide and Hydrochloric acid
	What is a salt?
9E13	Construct a lattice of Sodium Chloride
9E14	Salts - part I
9E15	Salts - part II
9E16	The flame test
9E17	Making salts using a burette: part I
9E18	Making salts using a burette: part II
9E19	Making salts: card activity
9E20	Internet survey: Useful salts
9E21	The halide test

9E8 Reaction of metal carbonates with acids

Test tube 16 mm x2 Tubing/connector Bung: one hole Spatula Sodium Carbonate Limewater

①

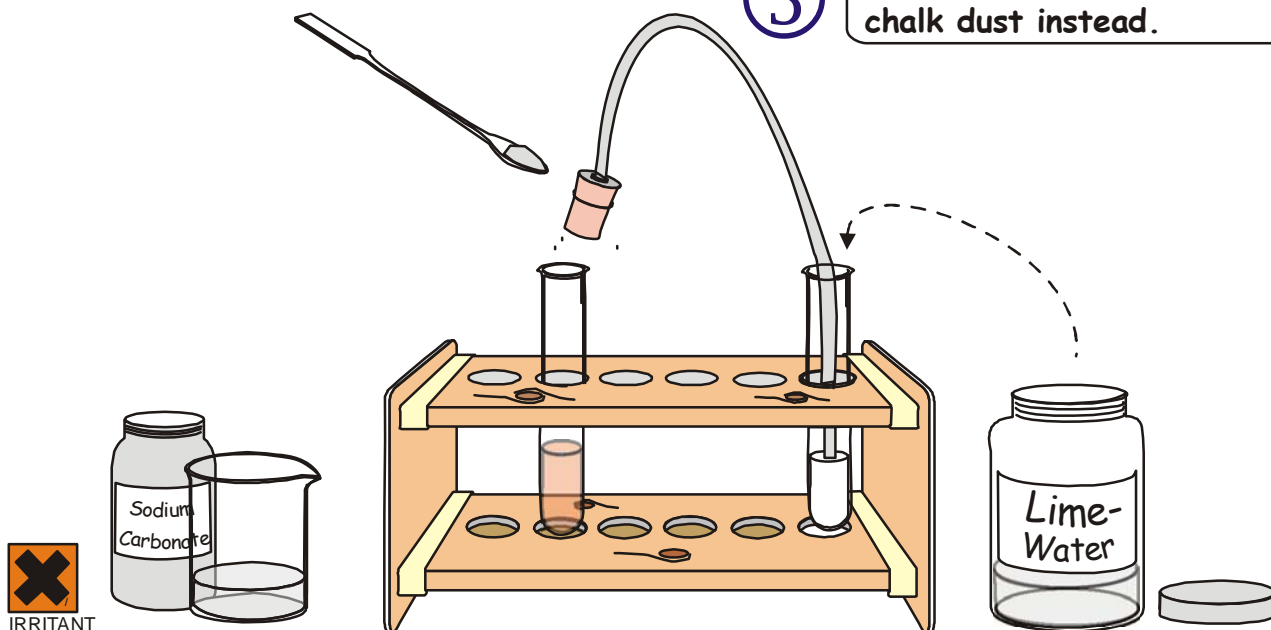
Introduce half a measure of Sodium Carbonate into a test tube with vinegar and observe what happens.

②

Observe what happens to the lime water solution [see [expt 7F10](#)].

③

Repeat the experiment using chalk dust instead.



What happens when the Sodium Carbonate is added to an Acid?.....

What happens to the lime water?.....

What does this tell you?.....

Complete the following: When a Metal Carbonate reacts with an Acid a is produced called, which causes limewater to turn white.

What is the chemical name for chalk?.....


What is its formula?.....

Write down the word equation for the reaction of chalk with HCl:

..... + → +

Find out how chalk was formed.

.....

<h1>9F Patterns Of Reactivity</h1>	
Why do metals tarnish?	
9F1	Tarnishing of alkali metals
9F2	Tarnishing of Copper
How do metals react with water?	
9F3	Reaction of alkali metals with water
9F4	Reaction of metals with water: Teacher demo
9F5	Reaction of Magnesium Oxide with water
Is the order of reactivity of metals with water and acids?	
9F6	The reactivity rhyme
Can we make predictions about the reactions of metals with Oxygen?	
9F7	Reaction of Magnesium with Oxygen: Teacher demo
9F8	Reaction of Copper with Oxygen
9F9	Reaction of Zinc with Oxygen
9F10	Burning alkali metals I
9F11	Burning alkali metals II
Can metals displace each other?	
9F12	Displacement of Iron ions from Iron II Sulphate
 9F13	Displacement by various metals
9F14	Thermite: Iron III Oxide and Aluminium: Preparation
9F15	Thermite: Iron III Oxide and Aluminium: Reaction
9F16	Reaction: Magnesium powder and Silver Nitrate
9F17	Displacement of Silver from Silver Nitrate
How does the activity series relate to uses and sources of metals?	
9F18	Reduction of Copper II Oxide with Carbon
9F19	Reduction of Iron III Oxide with Carbon
9F20	Reduction of Lead II Oxide with Carbon
9F21	Reduction of Lead Oxide with Hydrogen
9F22	Cell electrodes and the reactivity series

9F13 Displacement by various metals

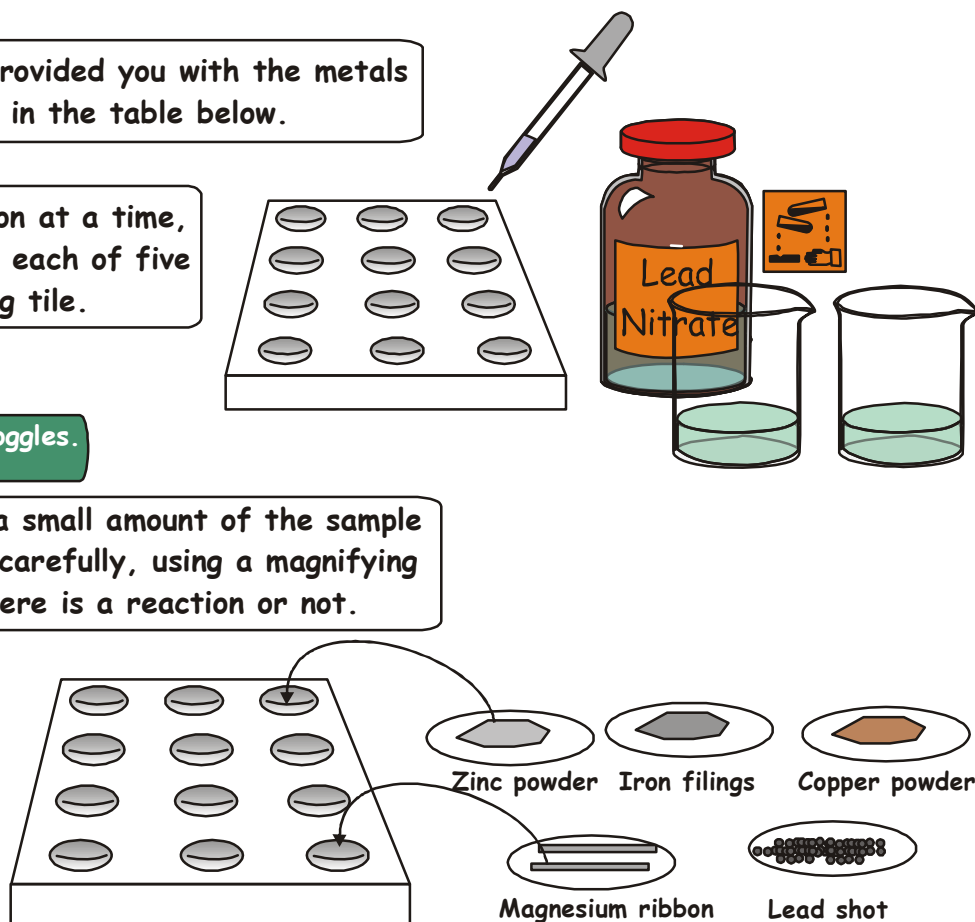
Dropping tile Pipette Beakers 100 ml Metal samples listed below Salt samples listed below

① Your teacher has provided you with the metals and solutions listed in the table below.

② Choosing one solution at a time, add three drops to each of five wells in the spotting tile.

 Wear safety goggles.

③ To each well add a small amount of the sample metals and watch carefully, using a magnifying glass, to see if there is a reaction or not.




Fill in the results table below. Put a "tick" if a displacement reaction takes place. Put a "cross" if no reaction takes place.

	Copper	Iron	Lead	Magnesium	Zinc	
Copper Sulphate	X					
Iron Sulphate		X				
Lead Nitrate			X			
Magnesium Sulphate				X		
Zinc Sulphate					X	

Use the table to place the metals in order of reactivity:

1:..... 2:..... 3:..... 4:..... 5:..... 6:.....

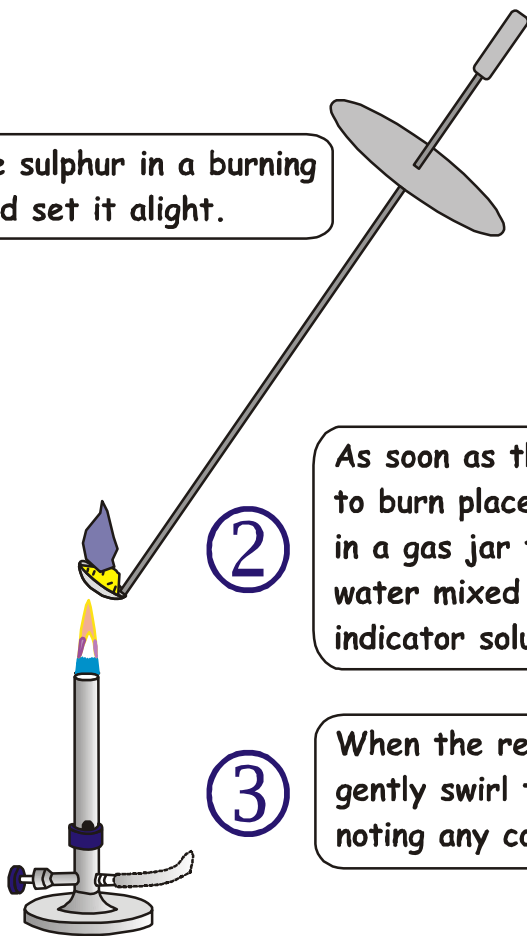
	9G Environmental Chemistry
	How are soils different from each other?
9G1	Make an environmental map of your school grounds
9G2	Investigating the components of soil
9G3	How much air is in soil?
9G4	Humidity of soil
9G5	Measuring the pH of soils
	What happens to rocks and building materials over time?
9G6	Erosion of rocks and buildings
9G7	Acid erosion of rocks
9G8	What is concrete made of?
	What causes acid rain?
9G9	Molecules that contaminate the atmosphere
	9G10 Formation of acid rain from Sulphur Dioxide
9G11	Formation of acid rain from Carbon Dioxide I
9G12	Formation of acid rain from Carbon Dioxide II
	What are the effects of acid rain and how can they be reduced?
9G13	Hard and soft water - part I
9G14	Hard and soft water - part II
9G15	Stop acid rain poster
	Is global warming happening?
9G16	Examining data (excel project)

9G10 Formation of acid rain from Sulphur Dioxide

Gas jar Burning spoon Sulphur Indicator solution Bunsen burner

①

Put some sulphur in a burning spoon and set it alight.

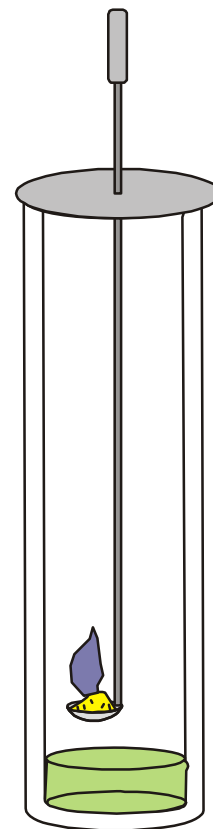



②

As soon as the sulphur starts to burn place the burning spoon in a gas jar that contains some water mixed with universal indicator solution.

③

When the reaction has stopped, gently swirl the solution around noting any colour changes.



 Wear safety goggles.
Fume cupboard.

What is the colour of the flame produced when Sulphur burns?.....

What is the name of the gas formed when Sulphur burns in air?.....

Write down the word equation for this chemical reaction:

..... + → ↑

What happens to the indicator solution?.....

What does this tell you?.....


Write down the word equation for the chemical reaction between the gas and water:

..... + →

Name the product formed.

Find out the names and sources of some of the gasses that produce acid rain:.....

.....

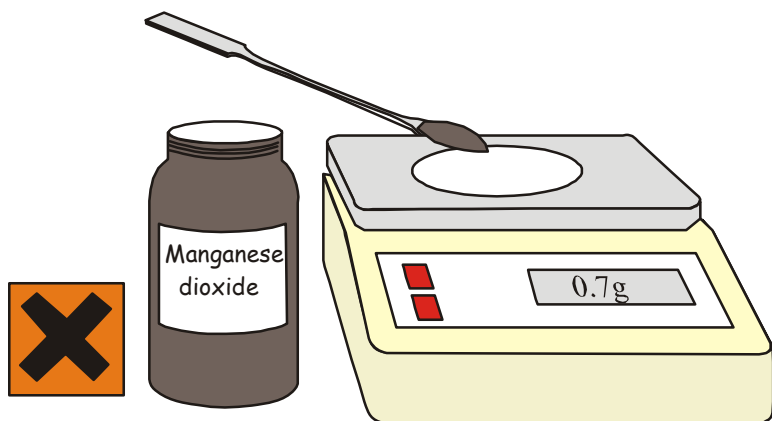
9H Using Chemistry	
	What chemical reactions take place when fuels burn?
9H1	Combustion of Hydrogen
9H2	Combustion of Butane
9H3	Combustion of Sugar
9H4	Production of Oxygen I
9H5	Production of Oxygen II
9H6	Test for Oxygen
9H7	Combustion of Carbon
	How else are chemical reactions used as energy resources?
9H8	Voltaic cells
	9H9 Genie in a bottle
9H10	Glycerol and Potassium Permanganate
9H11	Endothermic reactions: Vinegar and baking powder
9H12	Exothermic reactions: Copper Sulphate and Zinc
	What types of new material are made through chemical Reactions?
9H13	Chemical reactions and your home
	What happens to atoms and molecules when new materials are made?
9H14	Conservation of mass I
9H15	Conservation of mass II
9H16	Balancing simple equations: Teacher presentation
9H17	Conservation of mass : Chalk and Hydrochloric acid

9H9 Genie in a bottle

Large conical flask 500 ml Hydrogen peroxide 30% Manganese dioxide Filter paper Electronic balance Splints

① Pour about 100ml of 30% Hydrogen Peroxide solution into a conical flask.

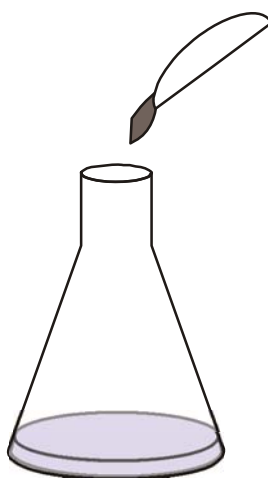
② Add about 1g of Manganese Dioxide to some filter paper.



⚠ Avoid breathing dust.

③ Pour the Manganese Dioxide into the Hydrogen Peroxide solution and **STAND WELL BACK**.

④ Perform the smouldering splint test (*expt 9H6*) on the gas present in the conical flask.



1. Violent reaction
2. Rapid release of Gas
3. Never allow reactants to mix in a sealed container
4. Keep pupils well back.
5. Practice the experiment in absence of pupils
6. Safety goggles

Which gas is released during this experiment?.....

How was the presence of this gas demonstrated?

In its diluted form Hydrogen Peroxide is also known as Oxygenated water. Write down its chemical formula below:

Hydrogen Peroxide:.....

In the presence of Manganese Dioxide, Hydrogen Peroxide will decompose rapidly into Oxygen and water. The Manganese Dioxide acts as a catalyst. What does that mean?