S3 Chemistry
Separating & Analysis Techniques
Lesson 1
Safety & Revision

REVISION

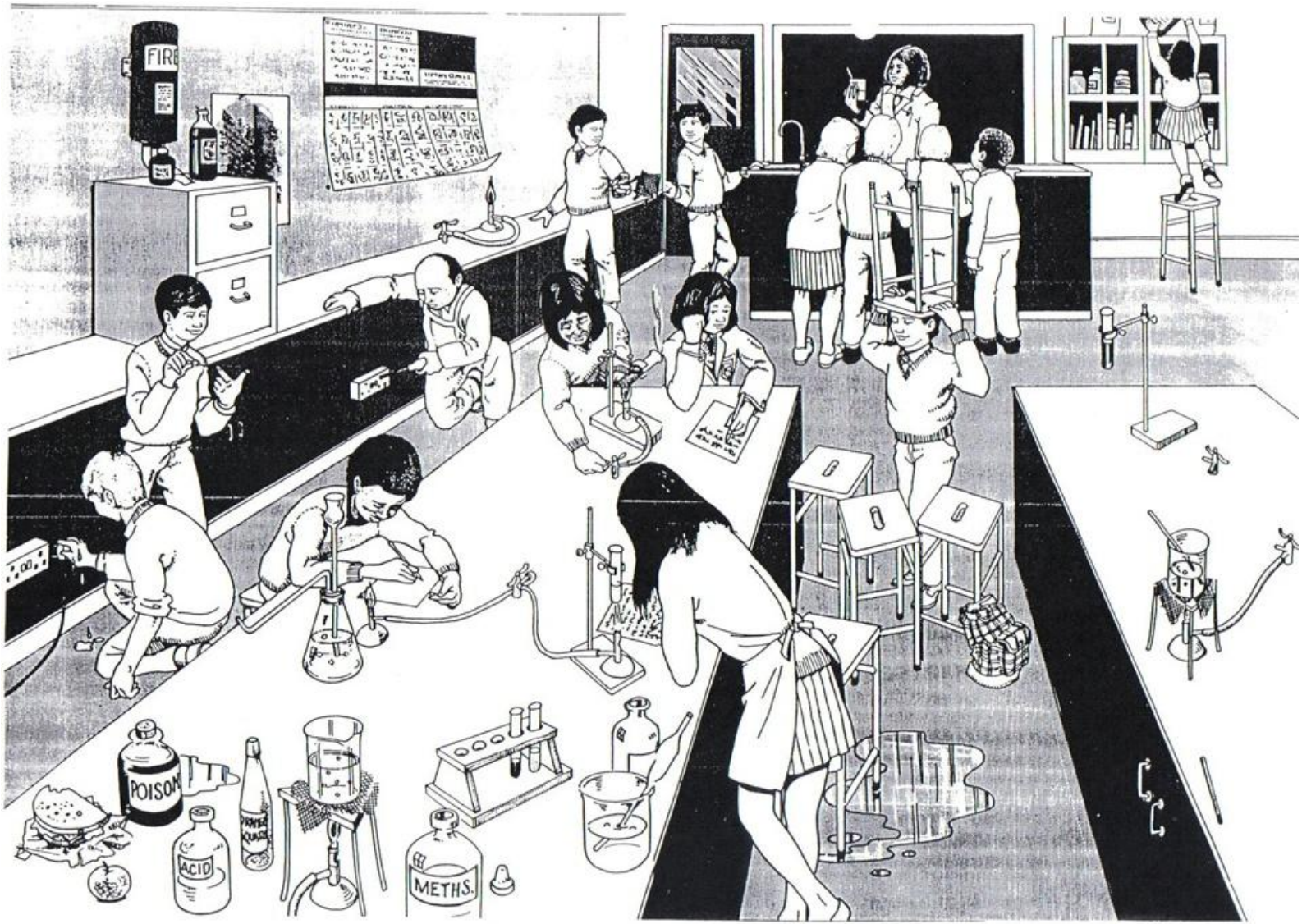
I have developed my knowledge of the Periodic Table by considering the properties and uses of a variety of elements relative to their positions.
SCN 3-15a

Having contributed to a variety of practical activities to make and break down compounds, I can describe examples of how the properties of compounds are different from their constituent elements.
SCN - 3-15b

NEW LEARNING

Chemical Analysis: Hazards associated with using chemicals in the laboratory
NAT 3

Lesson Starter - An Unsafe Lab



Write a list of all the hazards you can see above.

Safety & Revision

Today we will learn

How to be safe in the lab. We will also check how well we remember things from S1/S2.

We will do this by

Discussing lab safety. Learning what each hazard warning symbol means. Taking part in a show me board revision quiz.

We will have succeeded if

We can keep ourselves safe in the lab. We can identify the things from S1/S2 we need to look over again.

Hazard Warning Symbols

Old symbols

Explosive

Harmful

Toxic

Flammable

Corrosive

Oxidising

Dangerous to the Environment

Biohazard

Radioactive

European Chemicals Agency
New CLP symbols

Gas under pressure

Health Hazard

Serious Health Hazard

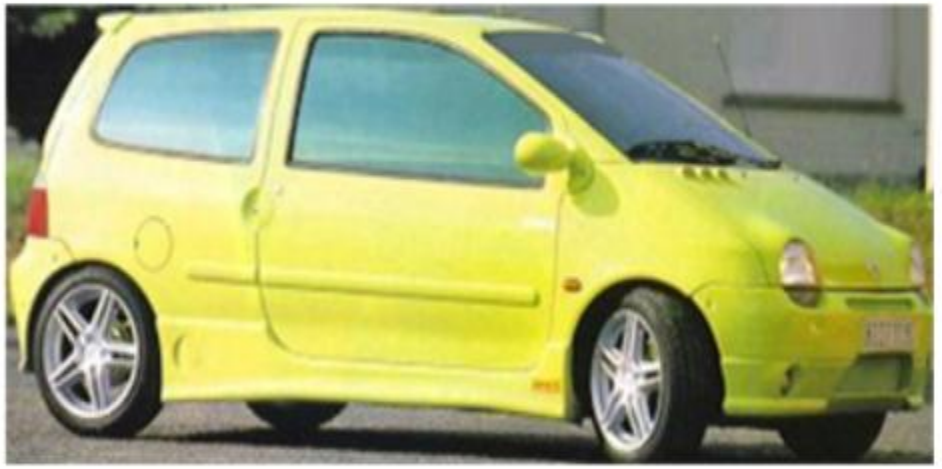
What can you remember?

Use your show me boards to try to answer the questions which follow.

If you can't remember some of these things don't worry. You can download a completed set of these notes from the S3 Chemistry part of the school website.

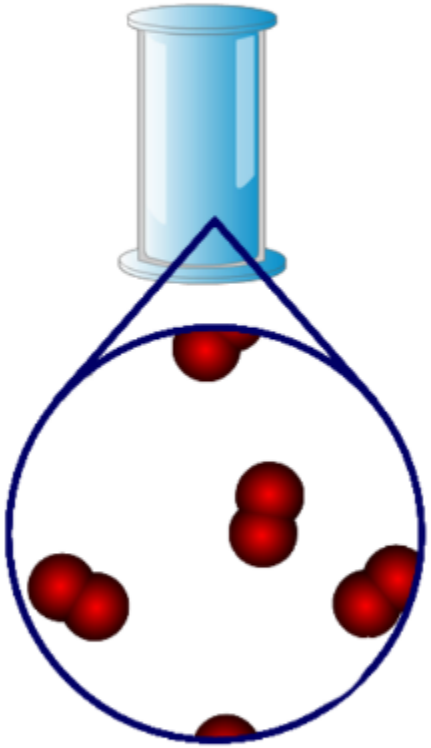
All Substances Are Made Of Atoms

All substances are made of very tiny particles called atoms. Many substances are made up of different types of atoms.



Atoms & Elements

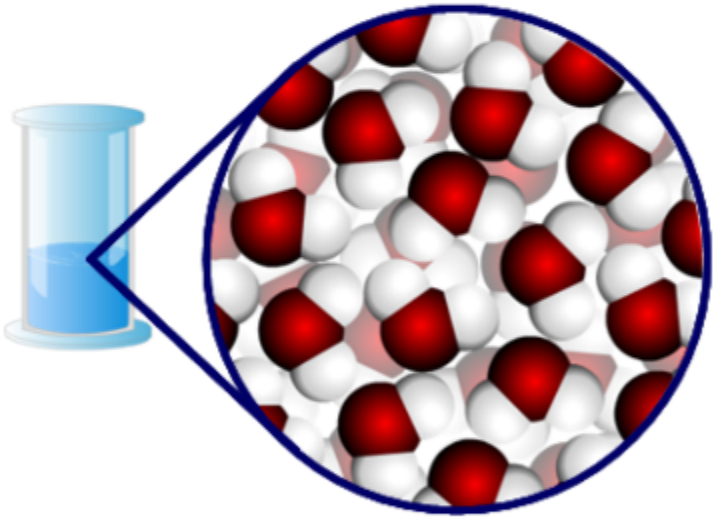
An element is a substance made up of only one type of atom.

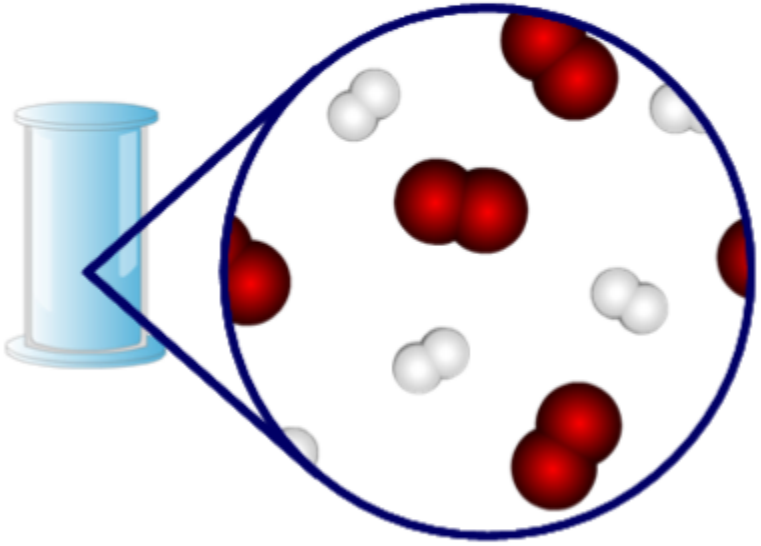


Compounds & Mixtures

An compound is a substance made up of two or more types of atom JOINED.

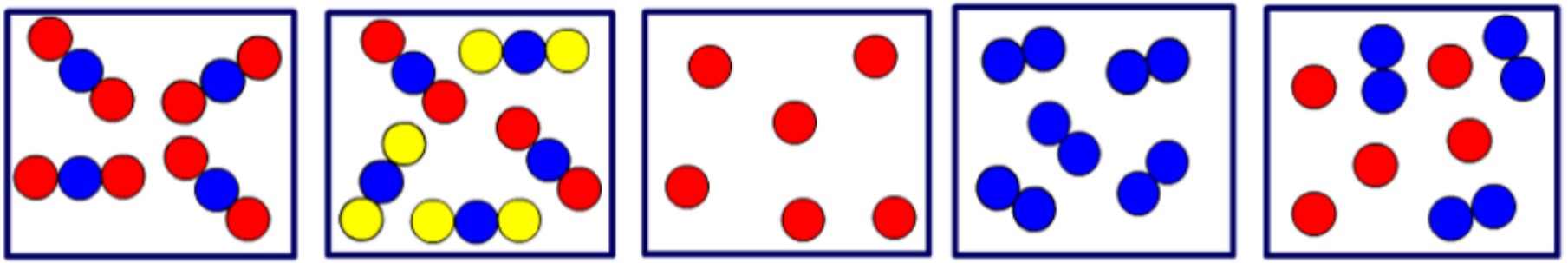
A mixture is a substance made up of two or more types of substances mixed together but NOT JOINED CHEMICALLY.





Which Type of Substance is Shown?

element	element	compound	mixture of elements	mixture of compounds
C	D	A	E	B



A B C D E

Chemical Symbols of Elements

The symbol for many of the more common elements uses just the first letter of the name.

C = Carbon

O = Oxygen

Others elements have the first two letters.

Li = Lithium

Al = Aluminium

Some of the symbols are not always as you might expect. These may come from the element name in another language.

Pb = Lead

Au = Gold

Compound Names (2 Elements Only: -IDE)

When we name simple two element compounds we chop off the end of the second element name and replace it with -IDE.

NOTE - Metal elements are always the first part of the compound name.

Element 1	Element 2	Name of compound
iron	sulphur	Iron sulphide
magnesium	nitrogen	Magnesium nitride
sodium	chlorine	Sodium chloride
tin	oxygen	Tin oxide
aluminium	bromine	Aluminium bromide
nickel	iodine	Nickel iodide
zinc	sulphur	Zinc sulphide
lithium	nitrogen	Lithium nitride

Compound Names (More Than 2 Elements): Exceptions to the -IDE rule

There are only two exceptions to the rule that compound names ending in -IDE only have two elements in them. These are Hydroxide and Cyanide.

Element 1	Element 2	Element 3	Name of compound
sodium	hydrogen	oxygen	sodium hydroxide
lithium	hydrogen	oxygen	lithium hydroxide
calcium	hydrogen	oxygen	Calcium hydroxide
potassium	carbon	nitrogen	potassium cyanide
sodium	carbon	nitrogen	Sodium cyanide

Compound Names (More Than 2 Elements)

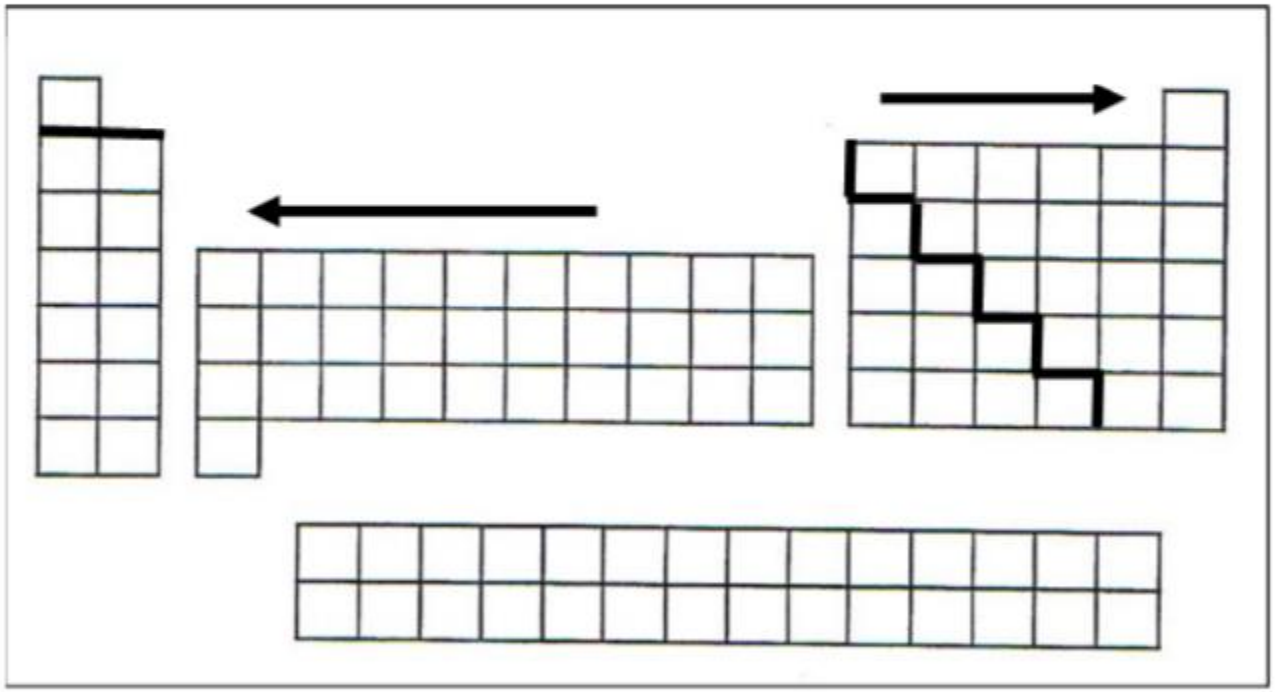
Many compounds contain more than two elements.

For compounds containing two elements *PLUS OXYGEN*, the ending of the other non-metal usually changes to -ATE or -ITE.

Element 1	Element 2	Element 3	Name of compound
nickel	sulphur	oxygen	nickel sulphate
magnesium	nitrogen	oxygen	magnesium nitrate
sodium	nitrogen	oxygen	Sodium nitrate
copper	sulphur	oxygen	**copper sulphate**
aluminium	bromine	oxygen	Aluminium bromate

Metals, Non-Metals & the Periodic Table

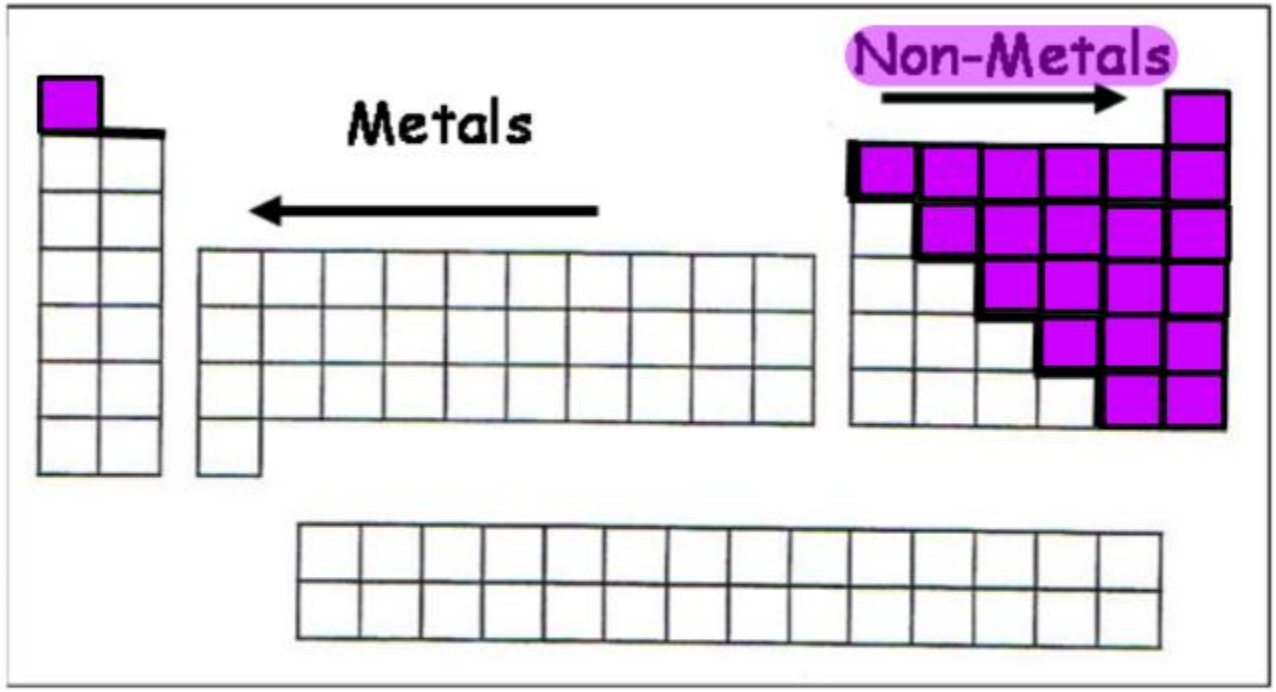
In terms of the ZIG ZAG line, where do we find metals & non-metals ?



??? on LEFT

??? on RIGHT

Metals, Non-Metals & the Periodic Table



Metals
on LEFT

Non-metals
on RIGHT

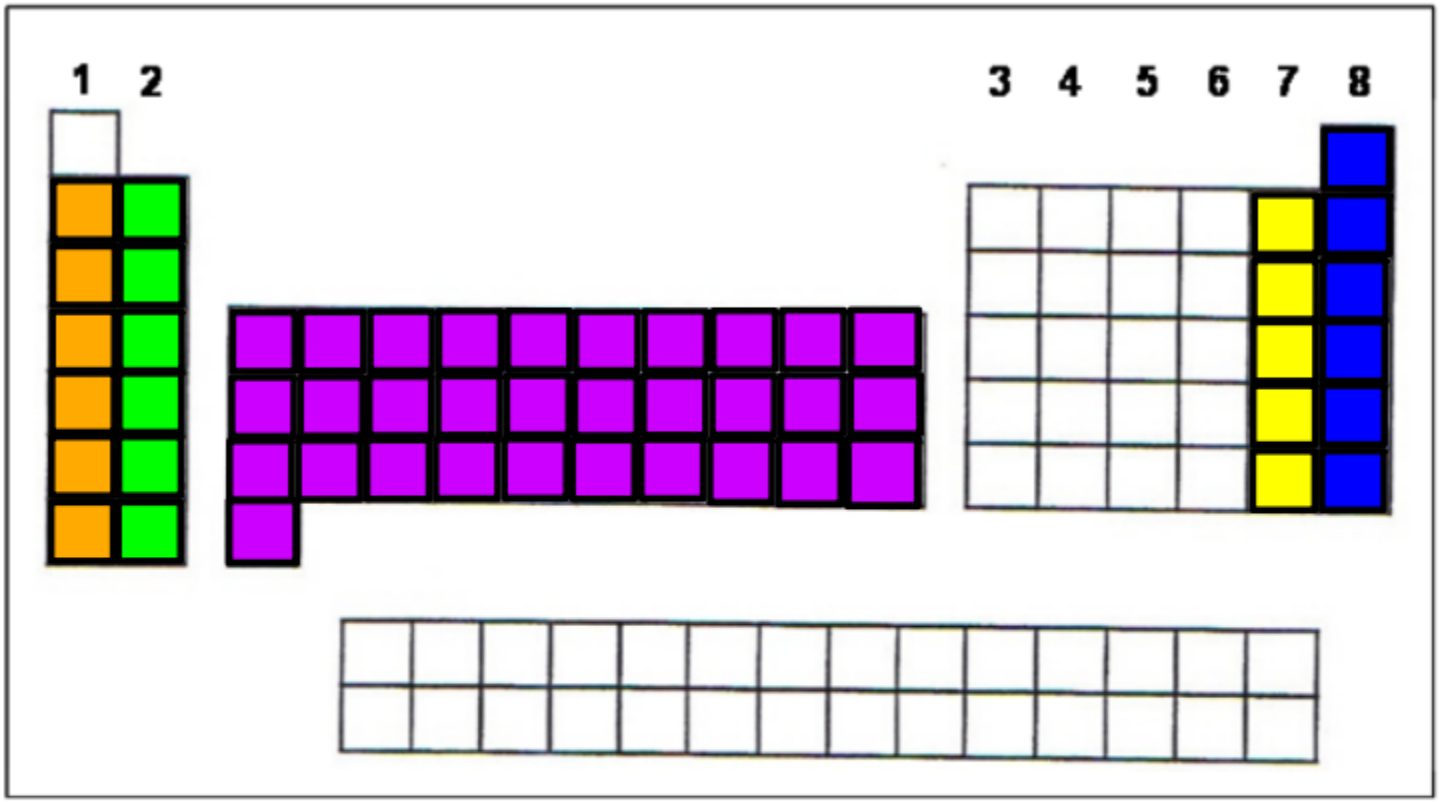
Careful - Hydrogen (non-metal) found on left (ABOVE zig-zig)

Metals, Non-Metals & the Periodic Table

Use your copy of the periodic table to decide whether each of the following are metals (M) or non-metals (NM):

1. sulphur NM
2. chlorine NM
3. sodium M
4. iron M
5. carbon NM
6. silver M

Periodic Table - Important Areas



KEY

- Alkali Metals
- Alkaline Earth Metals
- Transition Metals
- Halogens
- Noble Gases

The columns are called groups.

The rows are called periods.

Safety & Revision

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Exit Task

Rate how well you think you remember your S1/S2 knowledge using your fingers.

Fist to Five

Starter Questions

1. State one lab safety rule and explain why it is important.

   e.g. Wear safety glasses, tie long hair back, no eating or drinking, no carry on, always watch experiments carefully, clean up spills, tuck chairs in, etc

2. What does this hazard warning symbol mean?

   Flammable

3. Name the elements present in copper sulfate.

   Copper, sulphur and oxygen.

S3 Chemistry
Separating & Analysis Techniques
Lesson 2
Solubility

REVISION

By investigating common conditions that increase the amount of substance that will dissolve or the speed of dissolving, I can relate my findings to the world around me.

SCN 2-16b

NEW LEARNING

I have taken part in practical investigations into solubility using different solvents and can apply what I have learned to solve everyday practical problems.
SCN 3-16b

Solubility

Today we will learn

About the solubility of substances. We will also develop our Chemistry literacy skills.

We will do this by

Learning the definitions of words to do with the solubility of substances. Carrying out an experiment to test the solubility of some substances in different solvents.

We will have succeeded if

We can define new solubility-linked words. We can successfully predict and test whether a substance is soluble or insoluble.

Soluble Substances

If something is soluble in a solvent (liquid) you can dissolve it in that solvent to make a solution.

When it dissolves it looks like it disappears: i.e. the solution formed is transparent (see through) with no substance left at the bottom of the container. *Note* that a solution can be coloured and still transparent.

Insoluble Substances

If something is insoluble in a solvent (liquid) it cannot be dissolved by that solvent but might dissolve in something else.

When we try to dissolve insoluble substances they often look opaque (can't see through it) then the undissolved solid usually falls to the bottom of the container.

Solutions

A solvent is the liquid that the solute dissolves in
A solute is the solid that dissolves in a solvent
A solution is formed when a solute dissolves in a solvent

SOLVENT
TEA

SOLUTE
SUGAR

SOLUTION
SUGARY TEA

Memory Aid –
The solute is what you put
The solvent is where it went
The solution is what you're producing

Solubility information NAT 5 Data booklet p8

Solubilities of Selected Compounds in Water

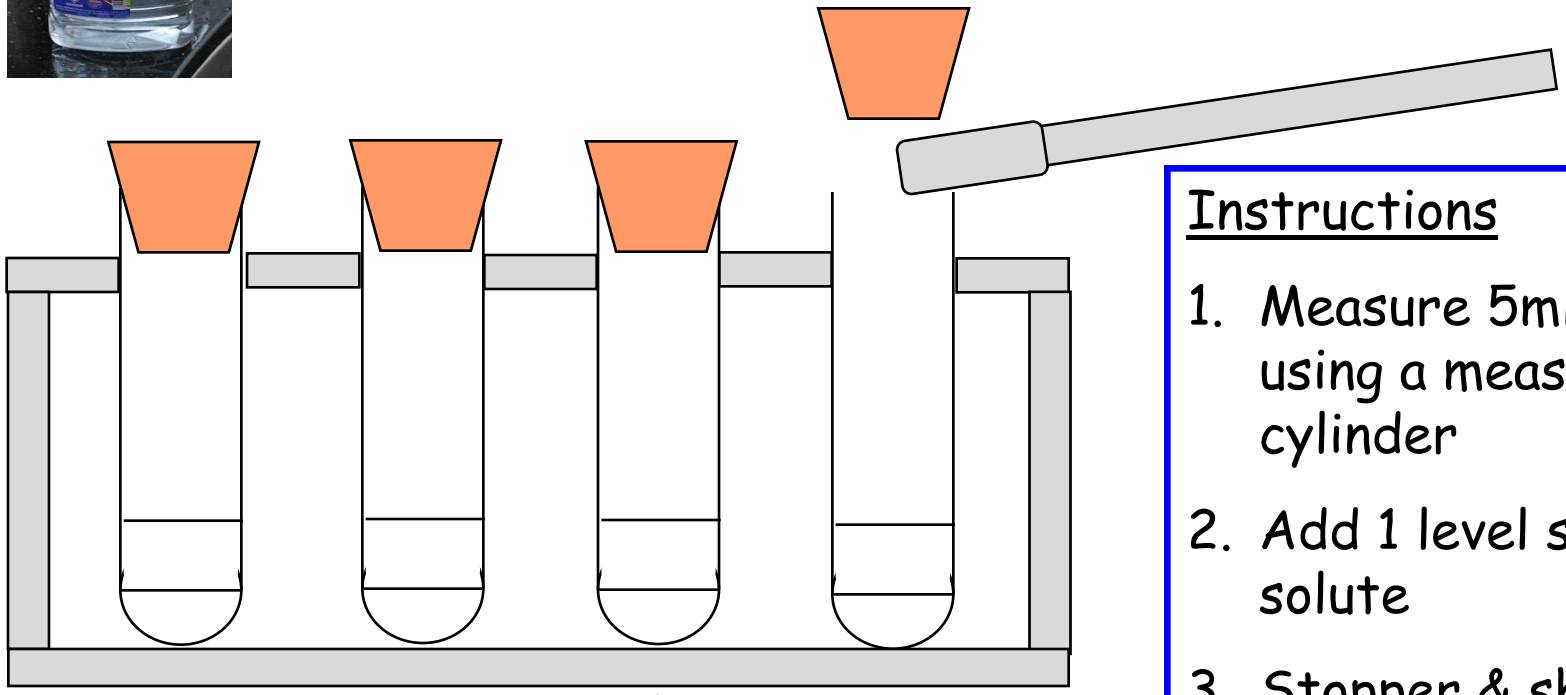
The table shows how some compounds behave in cold water

vs means very soluble (a solubility greater than 10 g l^{-1})
s means soluble (a solubility of between 1 and 10 g l^{-1})
i means insoluble (a solubility of less than 1 g l^{-1})
– no data

	bromide	carbonate	chloride	iodide	nitrate	phosphate	sulfate	oxide	hydroxide
aluminium	vs	–	vs	vs	vs	i	vs	i	i
ammonium	vs	vs	vs	vs	vs	vs	vs	–	–
barium	vs	i	vs	vs	vs	i	i	vs	vs
calcium	vs	i	vs	vs	vs	i	s	s	s
copper(II)	vs	i	vs	–	vs	i	vs	i	i
iron(II)	vs	i	vs	vs	vs	i	vs	i	i
iron(III)	vs	–	vs	–	vs	i	vs	i	i
lead(II)	s	i	s	i	vs	i	i	i	i
lithium	vs	vs	vs	vs	vs	i	vs	vs	vs
magnesium	vs	i	vs	vs	vs	i	vs	i	i
nickel	vs	i	vs	vs	vs	i	vs	i	i
potassium	vs	vs	vs	vs	vs	vs	vs	vs	vs
silver	i	i	i	i	vs	i	s	i	–
sodium	vs	vs	vs	vs	vs	vs	vs	vs	vs
tin(II)	vs	i	vs	s	–	i	vs	i	i
zinc	vs	i	vs	vs	vs	i	vs	i	i

Note: Some of the compounds in the table hydrolyse significantly in water.

Solubility in Different Solvents



salt + 5ml water

wax + 5ml water

salt + 5ml white spirit

wax + 5ml white spirit

Instructions

1. Measure 5ml solvent using a measuring cylinder
2. Add 1 level spatula of solute
3. Stopper & shake tube
4. Note whether solute has dissolved.

Conclusion:

Only ___salt___ dissolves in water

Only ___wax___ dissolves in white spirit.

Solubility

Today we will learn

About the solubility of substances. We will also develop our Chemistry literacy skills.

We will do this by

Learning the definitions of words to do with the solubility of substances. Carrying out an experiment to test the solubility of some substances in different solvents.

We will have succeeded if

We can define new solubility-linked words. We can successfully predict and test whether a substance is soluble or insoluble.

Exit Task

1. Predict whether the following 3 substances would be soluble or insoluble in water (Use Data Booklet):

A. Magnesium chloride soluble

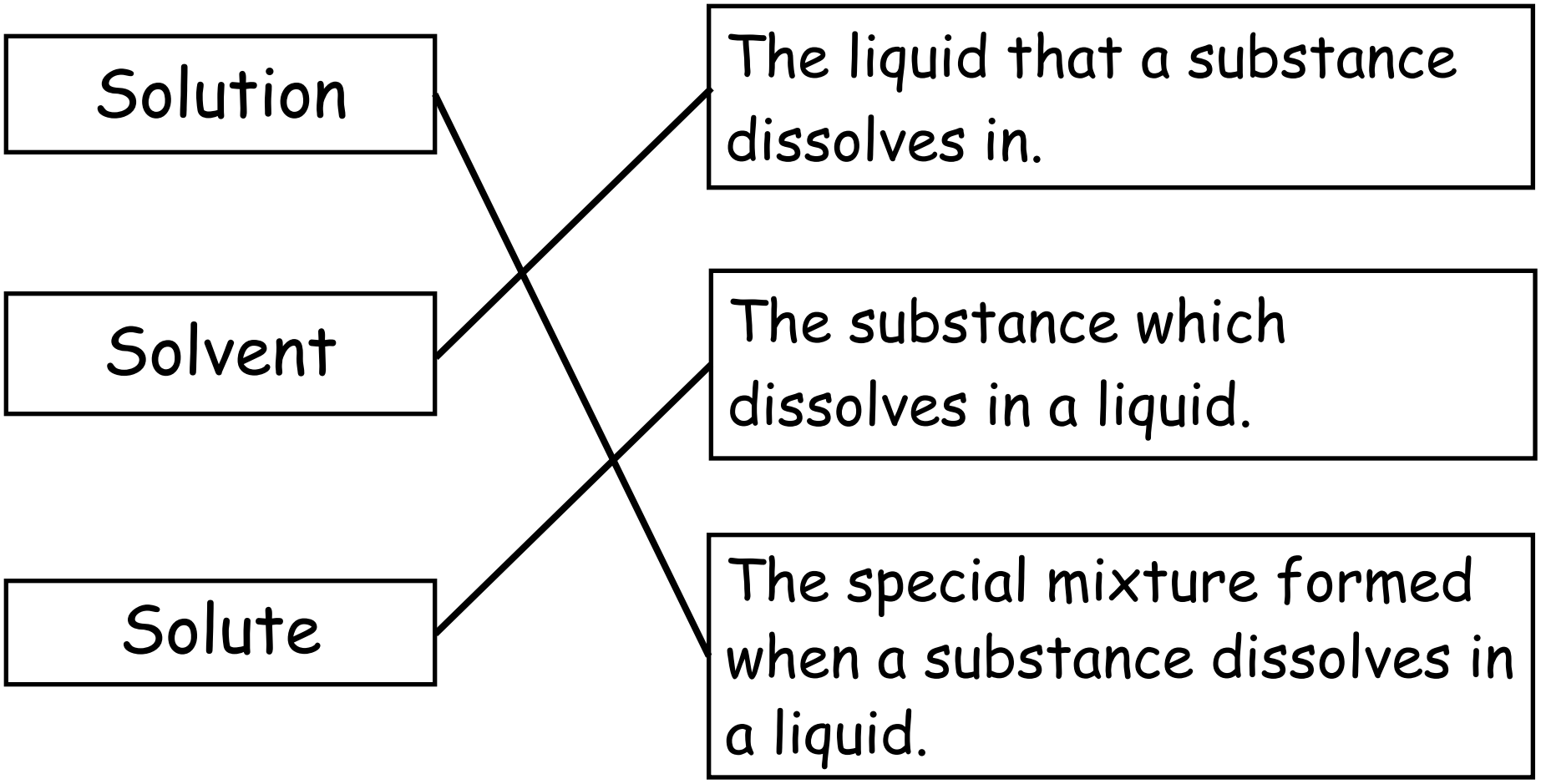
B. Ammonium phosphate soluble

C. Silver chloride insoluble

2. A **solution** can be made by dissolving magnesium sulfate in water. What term can be used to describe the water? Solvent

Starter – Match Up

Match the word to the definition.



S3 Chemistry
Separating & Analysis Techniques
Lesson 3
Concentration of Solutions

REVISION

By investigating common conditions that increase the amount of substance that will dissolve or the speed of dissolving, I can relate my findings to the world around me.

SCN 2-16b

NEW LEARNING

I have taken part in practical investigations into solubility using different solvents and can apply what I have learned to solve everyday practical problems.
SCN 3-16b

Concentration Of Solutions

Today we will learn

About the concentration of solutions. We will also develop our Chemistry literacy skills.

We will do this by

Learning the definitions of words to do with the concentration of solutions. Carrying out an experiment to create saturated solutions.

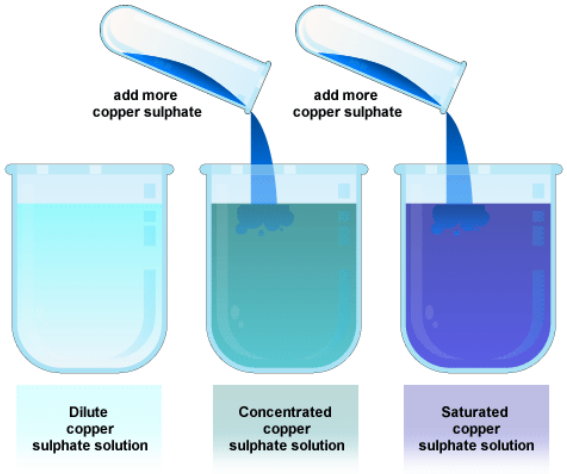
We will have succeeded if

We can define new concentration-linked words.

Concentration of Solutions

A **concentrated** solution is one in which a lot of solute has been dissolved in the solvent.

A **dilute** solution is one in which only a little solute has been dissolved in the solvent.



What can we do to create a dilute solution from a more concentrated one?

What if we wanted to make a solution more concentrated from a dilute one and we had no more solute?

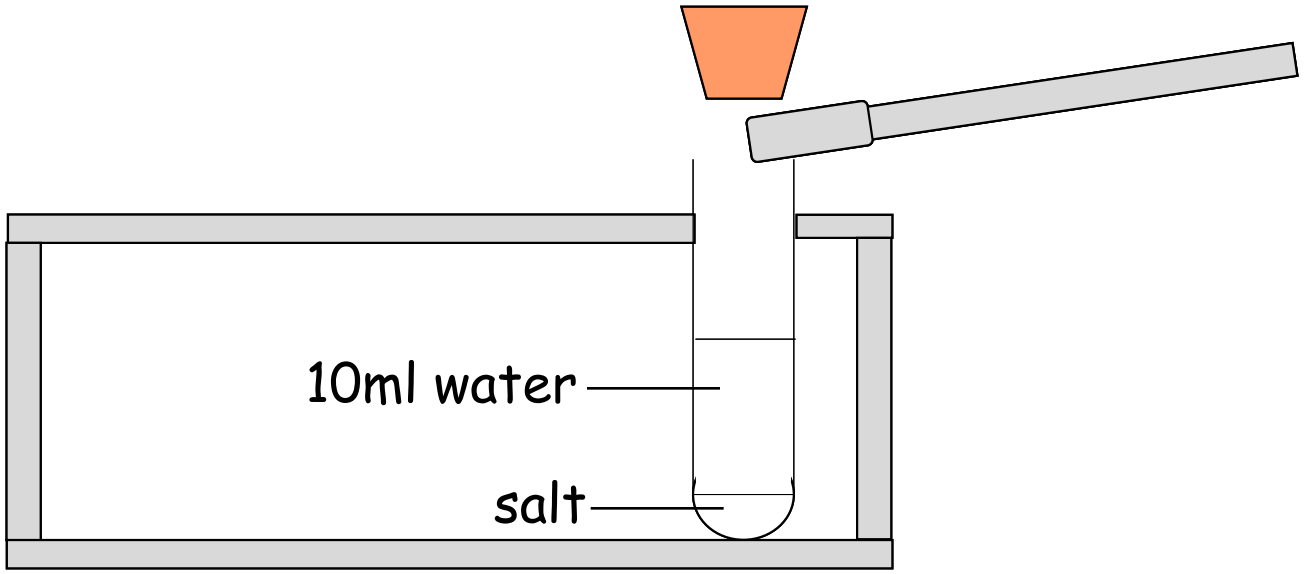
Saturated Solutions

What would happen if you kept adding teaspoons of sugar to a cup of tea?

You would see excess sugar at the bottom of the cup. You have made a saturated solution.

A saturated solution is one in which no more solute can dissolve.

Making a Saturated Solution



Conclusion:

_____ spatulas of salt dissolved in hot water.

_____ spatulas of salt dissolved in room temperature water.

Increasing the temperature of the solvent increased the quantity of solute which dissolved in the solvent.

Concentration Of Solutions

Today we will learn

About the concentration of solutions. We will also develop our Chemistry literacy skills.

We will do this by

Learning the definitions of words to do with the concentration of solutions. Carrying out an experiment to create saturated solutions.

We will have succeeded if

We can define new concentration-linked words.

Exit Ticket

Three pupils made solutions in chemistry class:

- Zoe added 7 spatulas of salt to 10ml of water.
- Jason added just 1 spatula of salt to his 10ml of water.
- Megan added so many spatulas of salt that lots of salt was left undissolved in the bottom of her test tube.

Using the new words we learned today state which type of solution each pupil made on your exit ticket.

Think, Pair, Share Lesson Starter

We already learned that when a solute dissolves it sometimes looks like it has disappeared but the solute is actually still there (e.g. when salt dissolves). The solution made is actually a special type of mixture in which the individual parts are too small to see with the eye.

Consider if we made a salt solution:

How could we test by experiment that ALL the salt is still there when we have made a solution?

S3 Chemistry
Separating & Analysis Techniques
Lesson 4
Conservation of Mass

REVISION

I have taken part in practical investigations into solubility using different solvents and can apply what I have learned to solve everyday practical problems.
SCN 3-16b

NEW LEARNING

Through evaluation of experimental results, I can demonstrate my understanding of conservation of mass.

SCN 4-16b

Conservation Of Mass

Today we will learn

About conservation of mass.

We will do this by

Carrying out an experiment to prove that mass is conserved when solutions are made.

We will have succeeded if

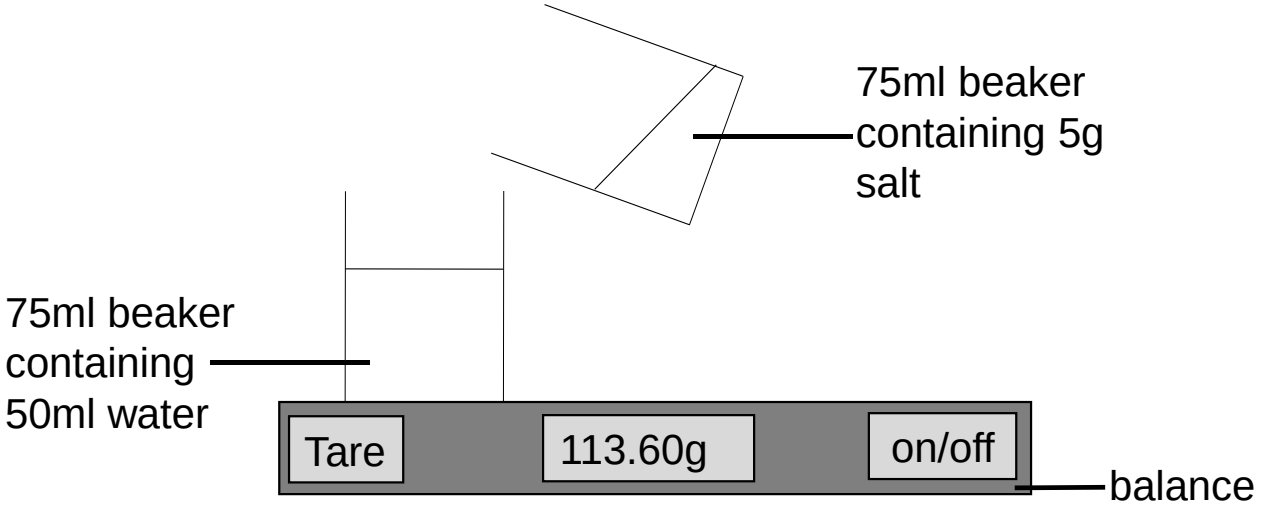
We can prove by experiment that all the solute added to a solvent is still there when a solution is made.

Conservation of Mass

The law of conservation of mass states that mass is never lost or gained in chemical reactions or physical changes. The mass of the chemicals is conserved (stays the same).

When a solution is made the mass of the solution will be equal to the mass of the solvent plus the mass of the solute.

Conservation of Mass – Method 1



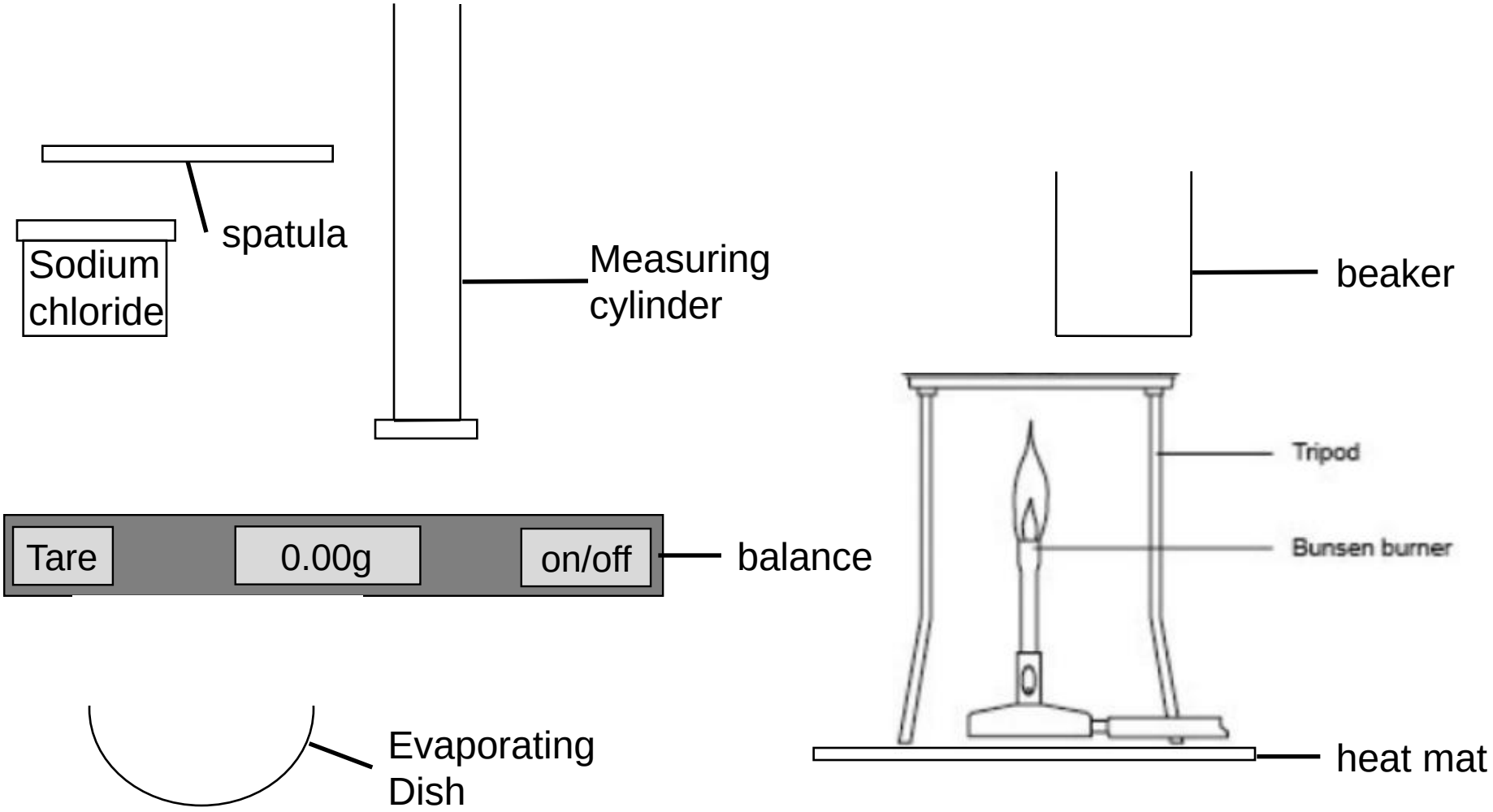
Summarised Instructions

1. Weigh out 5g of sodium chloride into a beaker.
2. Weigh the beaker containing 50ml water
3. Add the 5g sodium chloride to the beaker of water and stir to dissolve.
4. Weigh the beaker containing the water and salt.

What do you notice about the mass of the beaker of water after the water was added compared to before? The mass was 5g more than before

Conservation of Mass – Method 2 : Evaporation – Experimental Design Task

Using the equipment below design an experiment to test conservation of mass using the technique of evaporation.



Conservation of Mass – Method 2 : Evaporation – Experimental Design Task

Instructions

1. Place an empty 75ml beaker on top of a balance and press TARE (to zero the balance reading)
2. Using a spatula measure out 5g of sodium chloride into the beaker
3. Using a measuring cylinder measure out 25ml of water and add this to the beaker, stirring to dissolve the salt.
4. Weigh an empty evaporating dish then pour the salt solution into it.
5. Evaporate off SOME of the water (maybe two thirds) using the Bunsen burner, tripod and heat mat. **TAKE CARE** that the solution does not bubble too vigorously and spit out of the dish.
6. Leave the rest of the solution to evaporate slowly overnight.
7. Reweigh the evaporating dish (now containing salt) to check if all 5g of the salt is still there.

Conservation of Mass – Method 2 : Evaporation – Results

	Mass of Salt / g	Mass of Evaporating Dish / g	Total Mass (salt + dish) before / g	Total mass after / g
Group 1				
Group 2				
Group 3				
Group 4				

Conclusion

All of the salt (the solute) that was added to the water (the solvent) was recovered when the water was evaporated.

Exit Task

Consider the work you have done in class today and select two things you have done/understood well and one thing you still don't understand/have to work on.

Two Stars & A Wish

Starter - Brainstorm Challenge

What's the best way to clean this muddy water?

S3 Chemistry

Separating & Analysis Techniques

Lesson 5

Separation Techniques: Filtration & Evaporation

REVISION

I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience.
SCN 2-16a

NEW LEARNING

I can differentiate between pure substances and mixtures in common use and can select appropriate physical methods for separating mixtures into their components.
SCN 3-16a

Separating Techniques: Filtration & Evaporation

Today we will learn to

Name the various chemical and physical methods for separating mixtures.

We will do this by

Doing the first two of these and checking our techniques!

We will have succeeded if

We can properly separate a mixture using these first two methods.

Separating Mixtures

Mixtures can be separated into their different parts by different methods according to the type of mixture involved.

There are several methods of separating mixtures:

1. Filtration
2. Evaporation
3. Distillation
4. Chromatography

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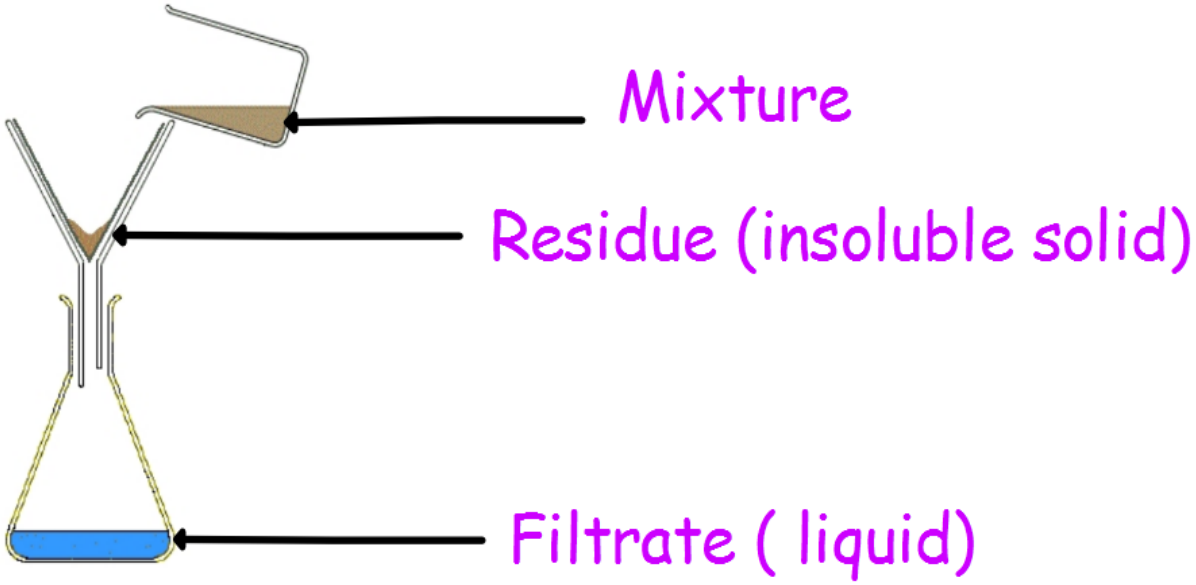
Filtration

Used to separate a solid which doesn't dissolve (INSOLUBLE) from a liquid.



This technique might be used to separate sand from water.

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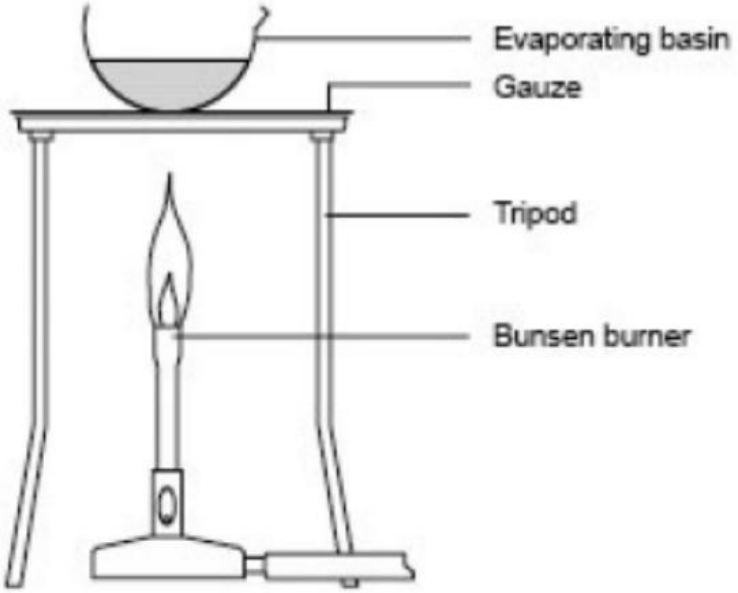
Evaporation

Used to separate a solid which does dissolve (SOLUBLE) from a liquid.

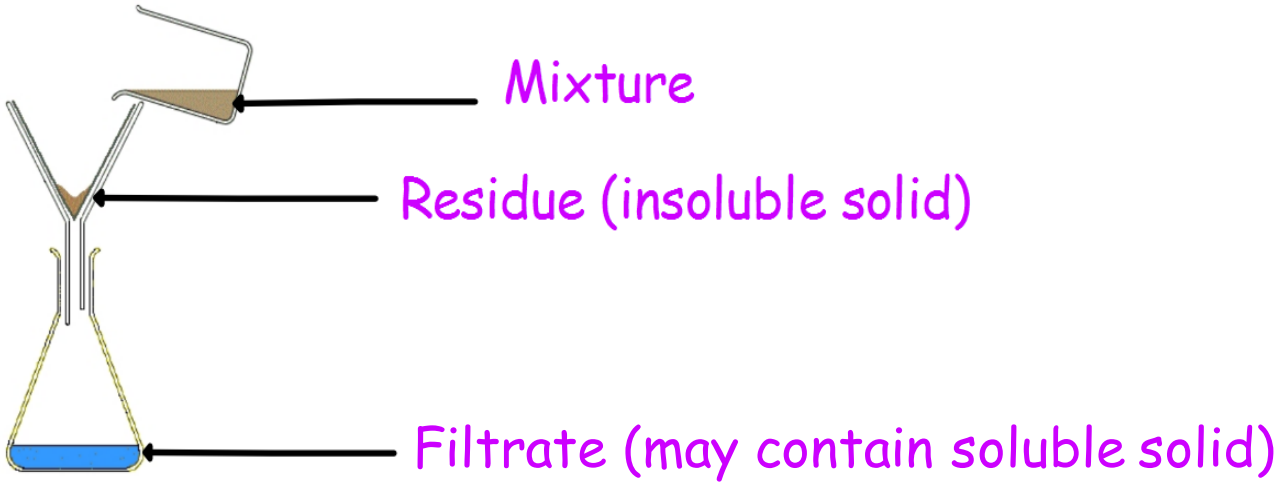


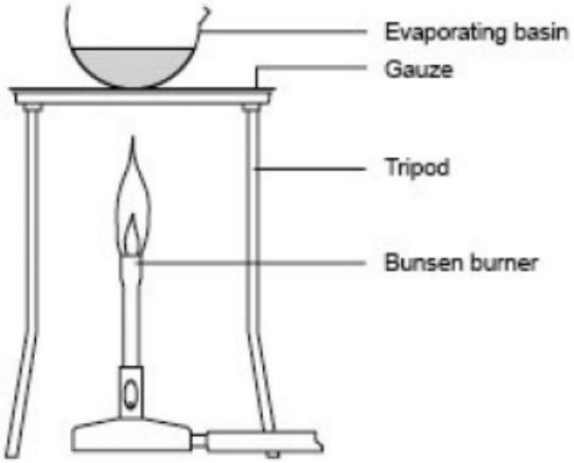
This technique might be used to separate salt from water.

Filtration and Evaporation

Used to separate a solid which doesn't dissolve (INSOLUBLE) from one which does (SOLUBLE).

The mixture of two solids will have water added to it. One solid will dissolve and the other won't. Filtration will separate the insoluble solid then evaporation can be used to recover the soluble solid from the **filtrate**.





This technique might be used to separate a mixture of salt and sand.

Separating Techniques: Filtration & Evaporation

Today we will learn to

Name the various chemical and physical methods for separating mixtures.

We will do this by

Doing the first two of these and checking our techniques!

We will have succeeded if

We can properly separate a mixture using these first two methods.

Exit Questions

1. Name 4 types of separation technique used in chemistry.

   Filtration, evaporation, distillation and chromatography.

2. What names are given to the solid and the liquid after separating a mixture by filtration?

   Residue (solid) and filtrate (liquid).

3. Would you be able to separate a mixture of lead sulfate and water using filtration? Give a reason for your answer.

   Yes, because lead sulfate is insoluble.

Starter Questions

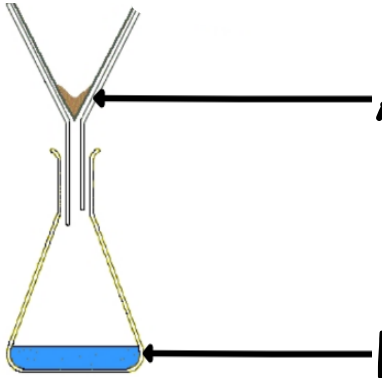
1. Which technique should be used to separate an insoluble solid from a liquid?

Filtration

2. Sodium chloride (salt) is soluble in water which technique should be used to separate it from water?

Evaporation

3. Name the parts labelled on the filtration apparatus below.



S3 Chemistry

Separating & Analysis Techniques

Lesson 6

Separation Techniques: Distillation

REVISION

I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience.
SCN 2-16a

NEW LEARNING

I can differentiate between pure substances and mixtures in common use and can select appropriate physical methods for separating mixtures into their components.
SCN 3-16a

Separating Techniques: Distillation

Today we will learn

About the best technique to separate a mixture of liquids.

We will do this by

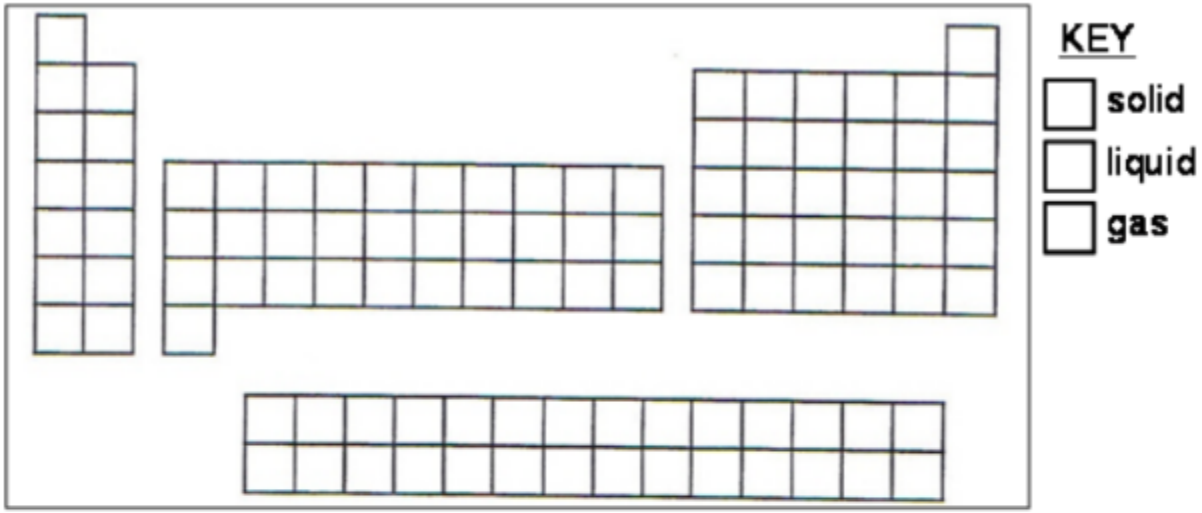
Learning about melting and boiling points.

Separating alcohol and water by distillation and testing the resulting alcohol for flammability.

We will have succeeded if

We can properly separate alcohol and water using distillation and can accurately draw and describe a distillation.

Solids, Liquids, Gases & the Periodic Table



It is not necessary to memorise the state of all the elements in the periodic table as we can work it out from melting point and boiling point information BUT there are a few key patterns we should remember.

In which state do most of the elements exist at room temperature?

Only two elements are liquid at room temperature.

Can you name them?

Solids, Liquids, Gases & the Periodic Table

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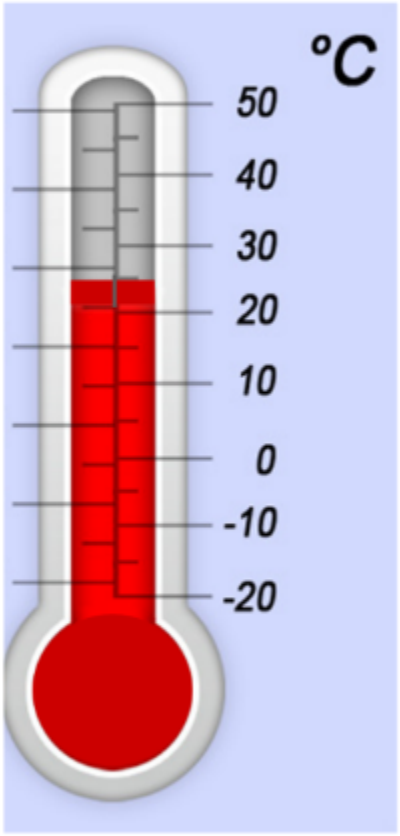
Melting & Boiling Points

MELTING POINT

What is melting point?

The temperature at which something changes from a SOLID to a LIQUID



BOILING POINT

What is boiling point?

The temperature at which something changes from a LIQUID to a GAS

Solids, Liquids & Gases Challenge

Element	Melting point (°C)	Boiling point (°C)	State at 20°C
Bromine			
Aluminium			
Mercury			
Iodine			
Lithium			

Remember to ask yourself the following two questions about your element at room temperature (20°C):

Will it have melted ?

Will it have boiled ?

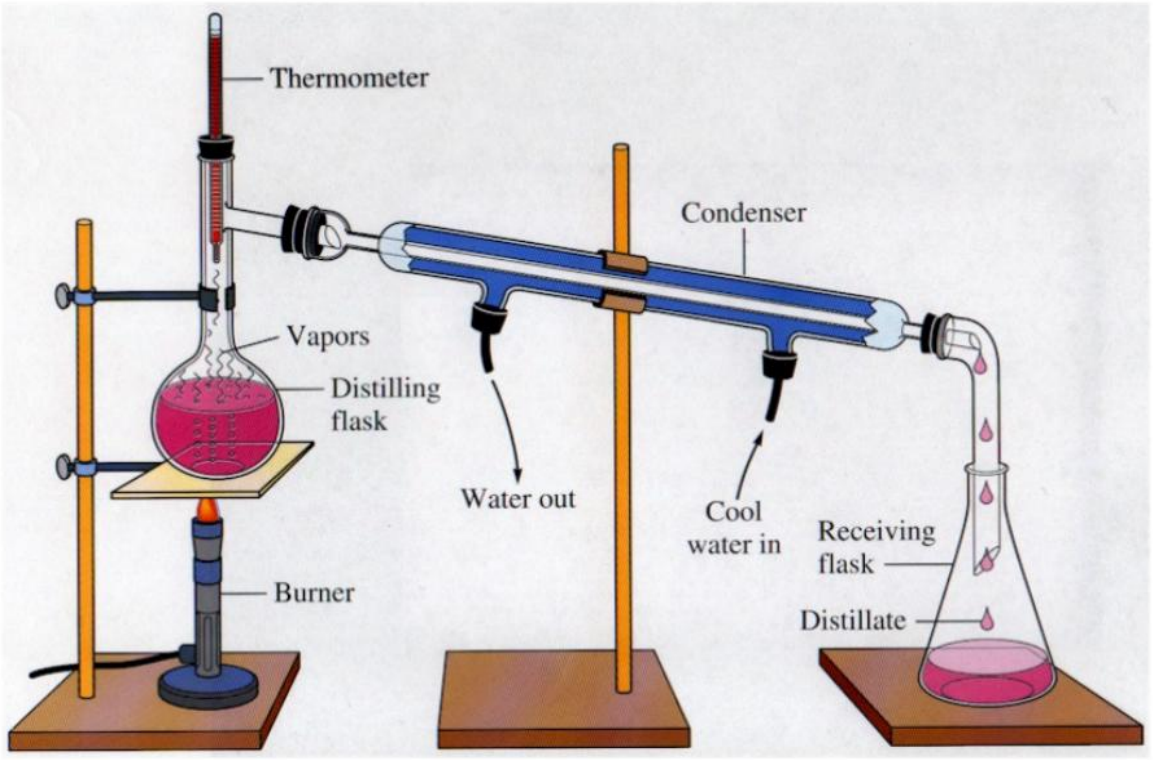
Solids, Liquids & Gases Challenge

Element	Melting point (°C)	Boiling point (°C)	State at 20°C
Bromine	-7	59	liquid
Aluminium	660	2467	solid
Mercury	-39	357	liquid
Iodine	114	184	solid
Lithium	181	1347	solid

Distillation

Used to separate two liquids of different boiling points.

Your teacher will show you how this apparatus works.



Task

Copy the picture of the distillation apparatus into your jotter and label the key pieces of equipment

When a mixture of two liquids is heated, the liquid with the lowest boiling point ___boils___ first. The vapour is cooled in the ___condenser___ and turns back to a liquid. This is then collected as the ___distillate___.

Separating Techniques: Distillation

Today we will learn

About the best technique to separate a mixture of liquids.

We will do this by

Learning about melting and boiling points.

Separating alcohol and water by distillation and testing the resulting alcohol for flammability.

We will have succeeded if

We can properly separate alcohol and water using distillation and can accurately draw and describe a distillation.

Exit Task

Distillation – What is happening to the particles?

Put these processes in the correct order:

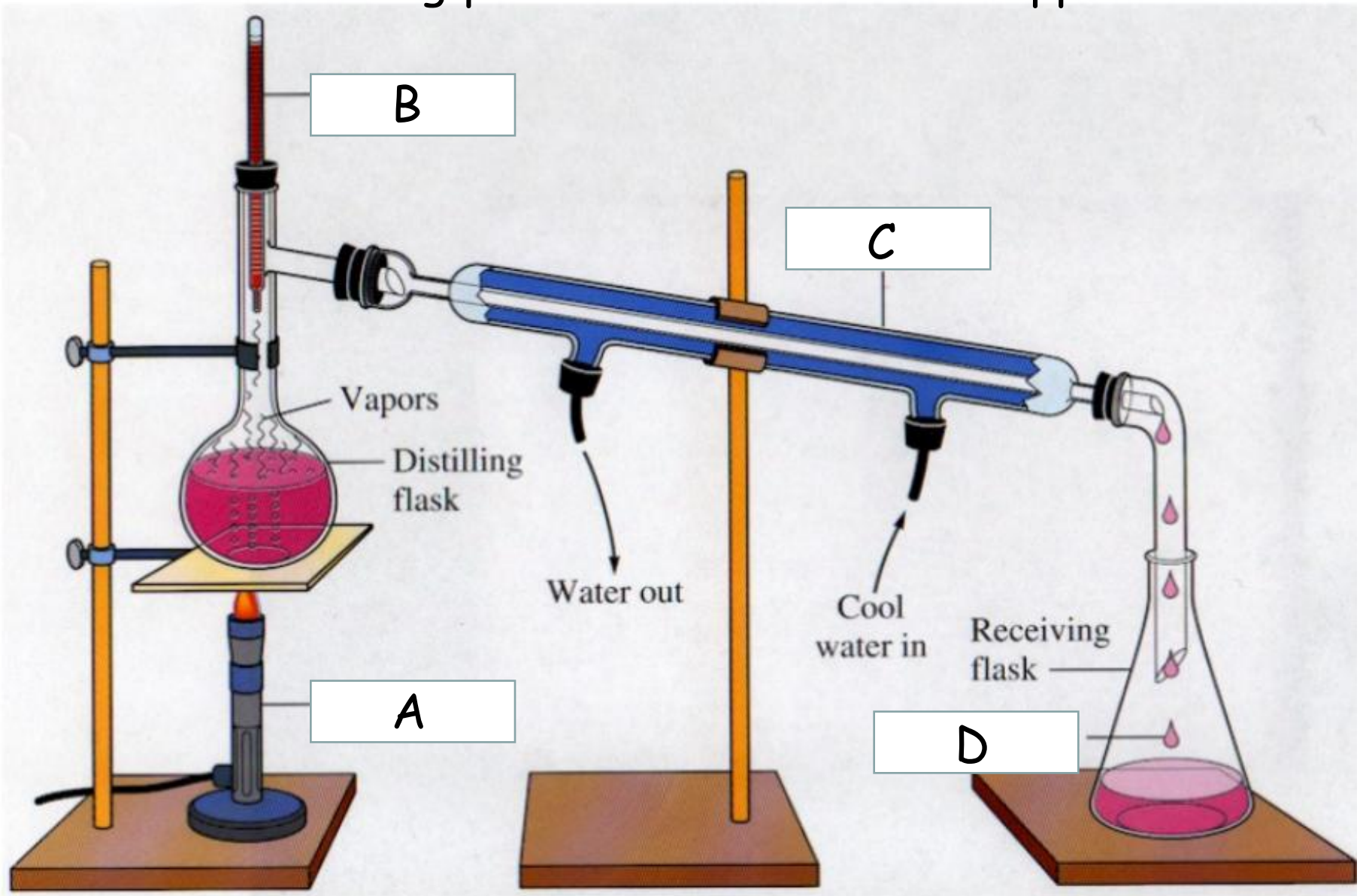
A: Heat makes the solution boil
B: Ethanol vapour is cooled
C: Ethanol evaporates to form ethanol vapour
D: Ethanol vapour condenses to form a liquid

How do the water particles behave? Finish the sentences that have been started for you.

1. At the start the water particles are .....
2. When they are heated they.....
3. Then they....
4. In the condenser they...
5. Finally they are.....

Lesson Starter

Label the following parts of the distillation apparatus:



S3 Chemistry

Separating & Analysis Techniques

Lesson 7

Separation Techniques: Chromatography

REVISION

I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience.
SCN 2-16a

NEW LEARNING

I can differentiate between pure substances and mixtures in common use and can select appropriate physical methods for separating mixtures into their components.
SCN 3-16a

Separating Techniques: Chromatography

Today we will learn

About the technique used to separate a mixture of substances with different solubilities in a solvent.

We will do this by

Carrying out chromatography on various samples of ink and using different solvents.

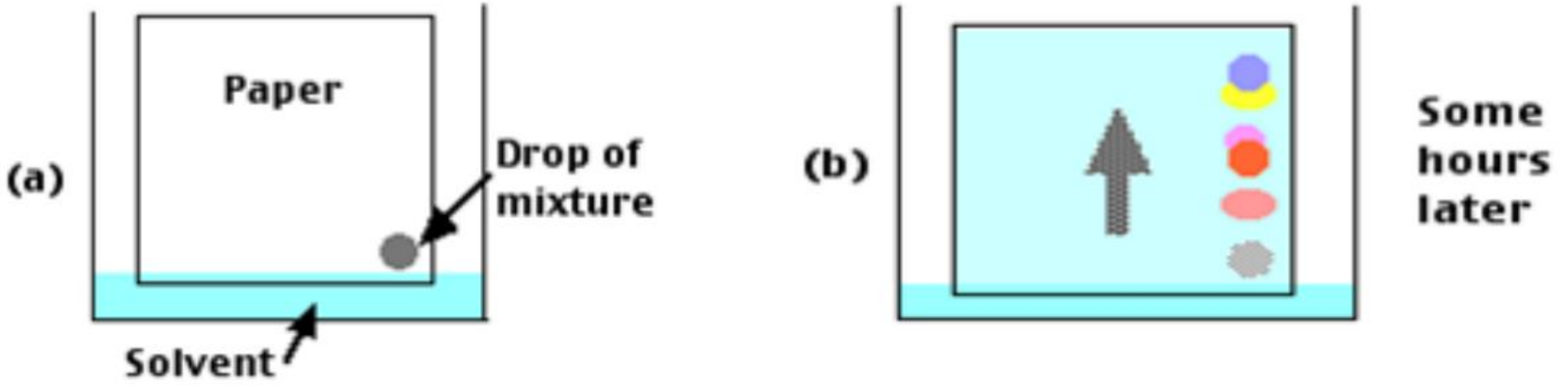
We will have succeeded if

We can state which colour(s) of felt tips contain mixtures of ink and which type of solvent is best at dissolving each type of common pen ink.

Chromatography

Task Complete the note describing chromatography

This is a separating technique used to separate a mixture of substances due to their differences of solubility in certain solvents. It is good for separating mixtures of inks/dyes.



In diagram (a) we can see that the dissolved ink substances dissolve in the solvent and travel up the paper.

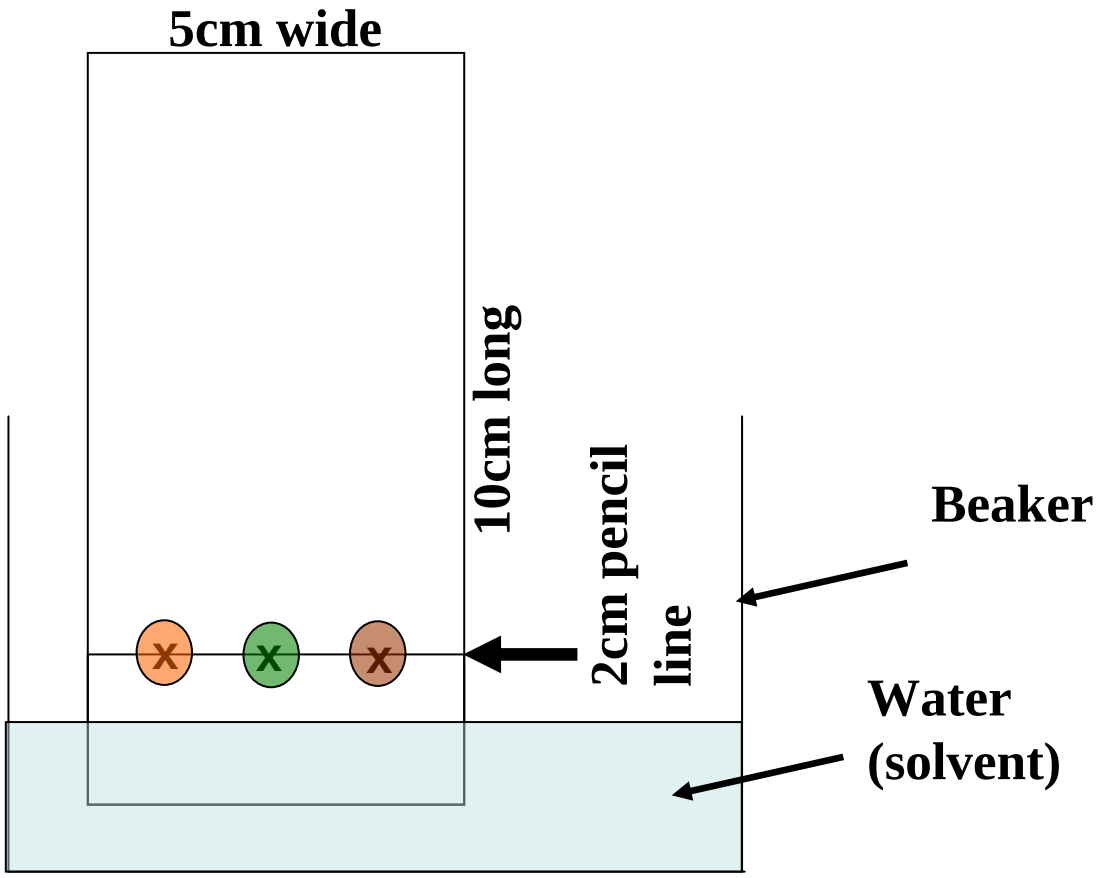
In diagram (b) we can see which ink substances are soluble in the solvent as they travel up the paper.

The blue ink

How do you know this? It travelled furthest up the paper.

The substances which dissolve best travel further up the paper better than others.

Chromatography of Felt Tip Pens

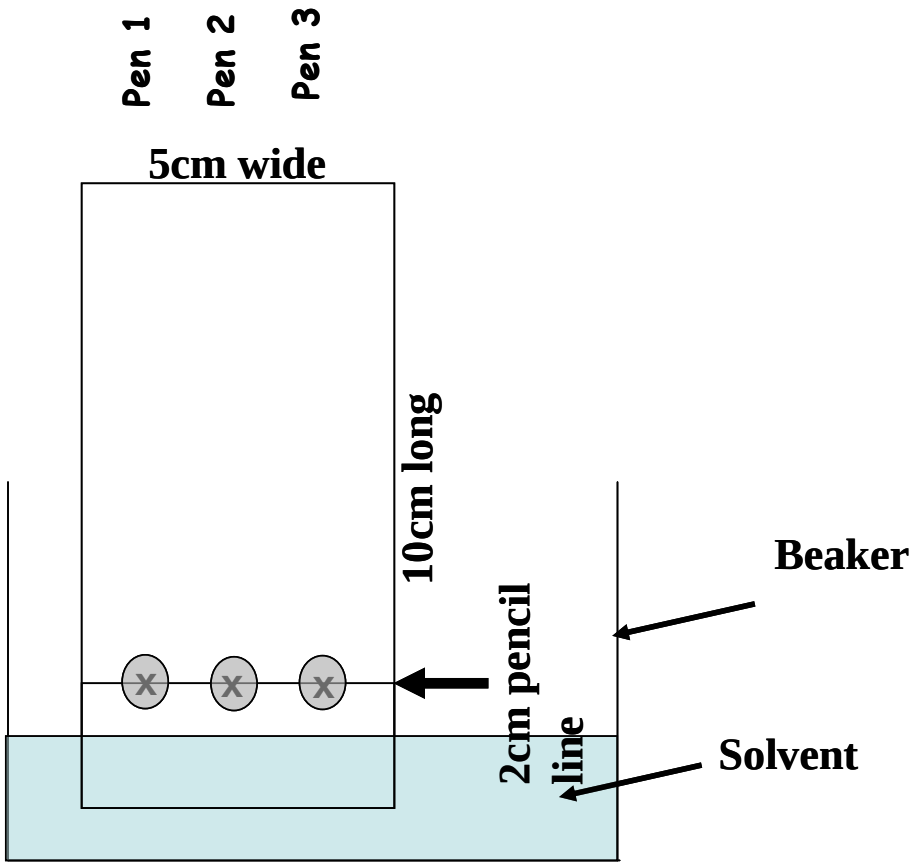


Conclusion

Some of the felt tip pen inks are one pure colour e.g. yellow

Other felt tip pen inks are a mixture of colours e.g.) black

Chromatography –Different Solvents



Conclusion

Not all pen inks are equally soluble in all solvents. Dry –cleaners use a variety of different solvents to dissolve (and remove) pen ink stains from clothes dependent on the type of ink.

Separating Techniques: Chromatography

Today we will learn

About the technique used to separate a mixture of substances with different solubilities in a solvent.

We will do this by

Carrying out chromatography on various samples of ink and using different solvents.

We will have succeeded if

We can state which colour(s) of felt tips contain mixtures of ink and which type of solvent is best at dissolving each type of common pen ink.

Exit Task

Question you have about the lesson

Pyramid

Things you have been reminded of today

Things you have learned today

Starter Questions

1. Which colour of flame should be visible when the Bunsen burner is lit but not in use?

   Yellow

2. Which colour of flame is the hottest and is usually used when heating with the Bunsen burner?

   Blue

3. Which safety precautions should you take when using the Bunsen burner?

   Goggles on, long hair back, avoid loose clothing (scarves etc), light the Bunsen safely, never leave unattended, don't touch metal parts above yellow/blue switch.

S3 Chemistry

Separating & Analysis Techniques

Lesson 8

Analysis Techniques: Flame Tests

NEW LEARNING

I can monitor the environment by collecting and analysing samples.

SCN 4-18a

Analysis Techniques: Flame Tests

Today we will learn

About the technique used to identify the presence of certain metal ions in solution.

We will do this by

Carrying out flame test experiments on various named and unknown metal ion solutions.

We will have succeeded if

We can identify by the results of our experiments which metal ion is present in each of our unknown metal ion solutions.

Flame Tests

- Metals change the colour of a flame when they are heated in it.

- Different metals give different colours to the flame, so flame tests can be used to identify the presence of a particular metal in a sample.

https://www.youtube.com/watch?v=7i8MtNP_JXY

Flame Tests

Producing Colours From Metal Salts

1 Dip the wire loop in acid to clean it

2 Place the loop in a blue flame

3 Dip the wire loop into your salt solution and then place it in the flame .

4 Note the colour of the flame into the table in your jotter.

5 Repeat for the remaining samples.

Flame Tests

Test Results – Known Metal Salts

Metal Salt	Flame Colour	Metal Ion present
Lithium chloride		
Barium chloride		
Potassium chloride		
Sodium chloride		
Copper chloride		
Calcium chloride		
Ammonium chloride		
Strontium nitrate		

Flame Tests

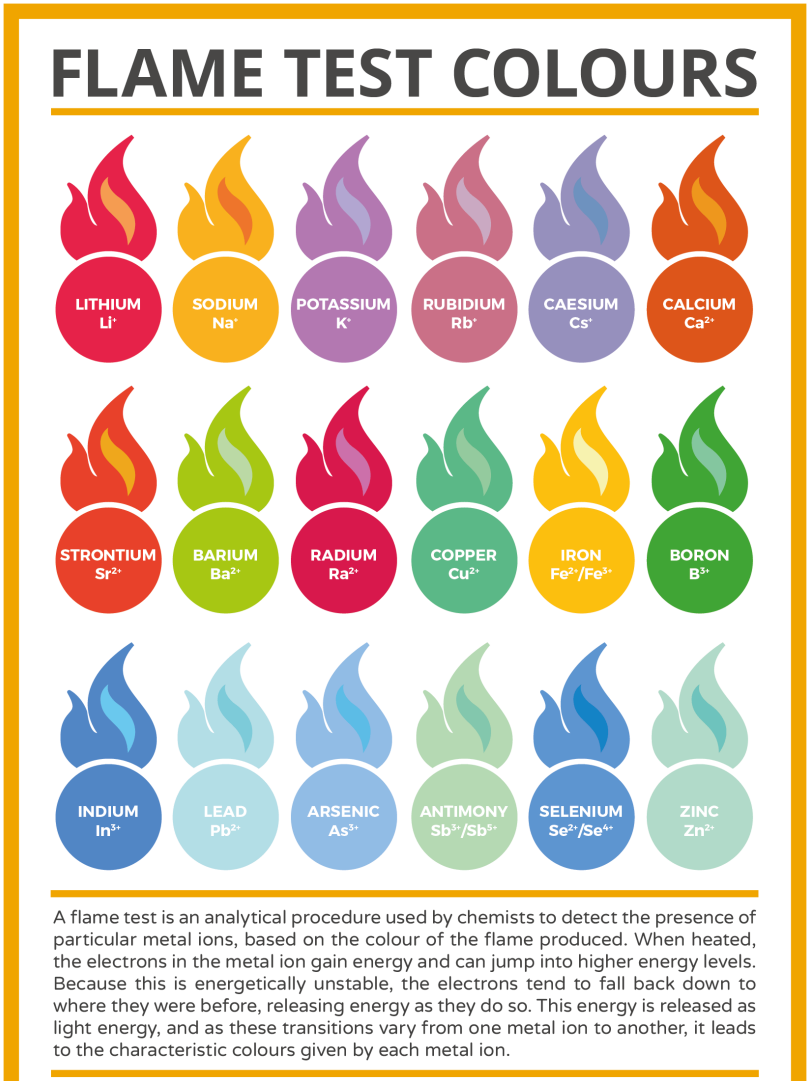
Test Results – Unknown Salts

Metal Salt	Flame Colour	Metal Ion present
Unknown A		
Unknown B		
Unknown C		
Unknown D		

Usefulness of Flame Tests In Everyday Life

Distress Flares

Soil and water analysis



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We will do this by

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We will have succeeded if

We can identify by the results of our experiments which metal ion is present in each of our unknown metal ion solutions.

Coded Flame Colour Message Exit Task

Use the colour code below and coloured pencils to write a secret message to your partner by drawing the correct sequence of coloured flames.

Red : Help !

Lilac : Drowning !

Blue - green : Safe and sound

Yellow : Coastguard not needed

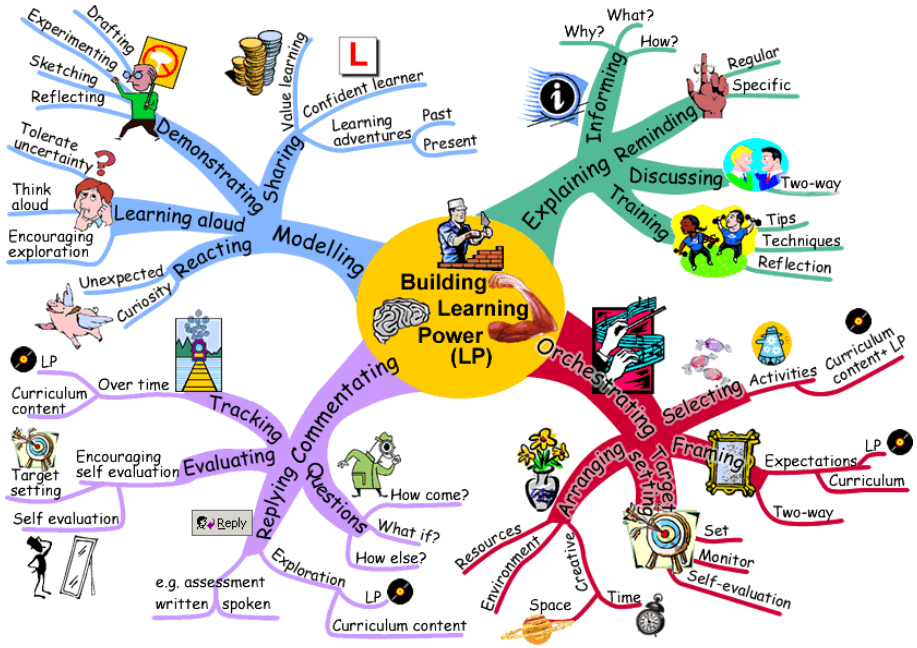
Orange - Red : message over .

You could use more than one colour to send a combined message .

Lesson Starter

Mind Map

Write down some suggestions about the techniques (especially involving chemistry) which Crime Scene Investigators use to solve crimes.




CSI:
CRIME SCENE INVESTIGATION
LESMAHAGOW

S3 Chemistry

Separating & Analysis Techniques

Lesson 9

Separation & Analysis Techniques

CSI Lesmahagow

NEW LEARNING

I can monitor the environment by collecting and analysing samples.

SCN 4-18a

NEW LEARNING

I can differentiate between pure substances and mixtures in common use and can select appropriate physical methods for separating mixtures into their components.
SCN 3-16a

Separation & Analysis Techniques: CSI Lesmahagow

Today we will learn

How crime scene investigators can use Chemistry to help solve crimes.

We will do this by

Planning and carrying out some of the experiments which have featured in this topic in order to help eliminate suspects.

We will have succeeded if

We can identify by the results of our experiments who is most likely to be responsible for the crime at Lesmahagow High.

Setting the Scene: Break in at Lesmahagow High

A sample of pure gold has been stolen from the technician's store in Science.

The thief must have worn gloves and used some kind of tool to pick the locks as all that was left behind was a partial muddy footprint and a ransom note. The note demands that £500 be left at the entrance to the school car park or the thief will strike again!

Can you use your knowledge of chemistry to help catch the thief?

The Suspects

The following suspects are all known to have previously stolen things from around the Lesmahagow area and have no alibi !

Dodgy Dave

Cunning Claire

Light-fingered Les

Pinch-it Pamela

Steal-it Sam

Thieve-It Tammy

Robbing Robbie

Sneaky Suzie

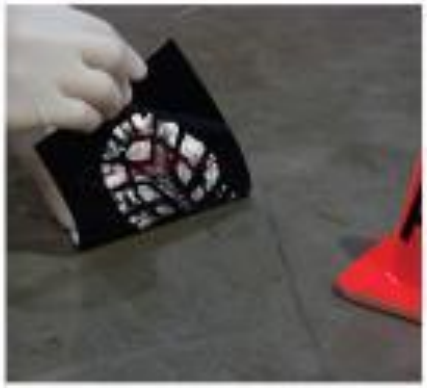
Making Our Plan

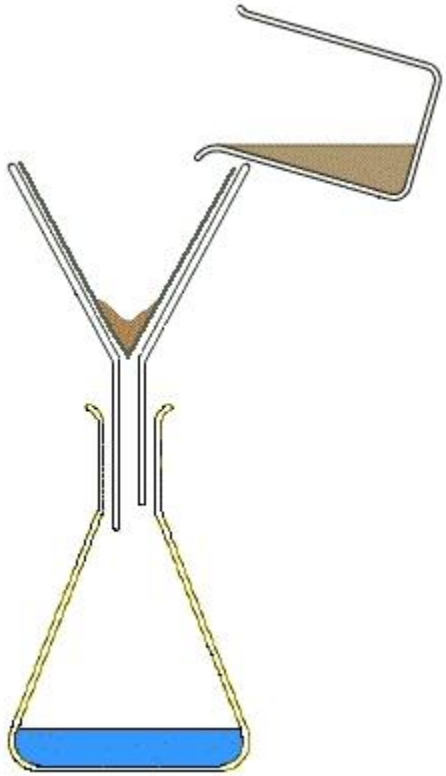
Ransom Note

I have your gold and unless you leave me £500 at the entrance to the school car park by the start of next week I'll be back to steal more chemicals. Next time it'll be the silver!

How can we use our knowledge of chemistry to analyse these two pieces of evidence?

Analysing the Evidence: Muddy Footprint





Flame Test Results

Sample	Flame Colour	Metal Ion present
THIEF'S FOOTPRINT		
Dodgy Dave		
Cunning Claire		
Light-fingered Les		
Pinch-it Pamela		
Steal-it Sam		
Thieve-It Tammy		
Robbing Robbie		
Sneaky Suzie		

Separation & Analysis Techniques: CSI Lesmahagow

Today we will learn

How crime scene investigators can use Chemistry to help solve crimes.

We will do this by

Planning and carrying out some of the experiments which have featured in this topic in order to help eliminate suspects.

We will have succeeded if

We can identify by the results of our experiments who is most likely to be responsible for the crime at Lesmahagow High.

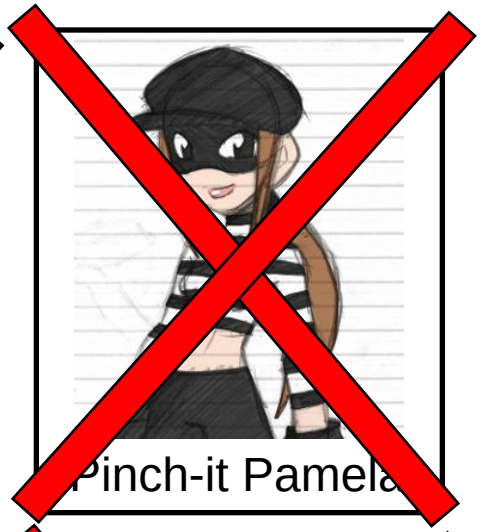
Day 1 Exit Task
Can Anyone Be Eliminated?

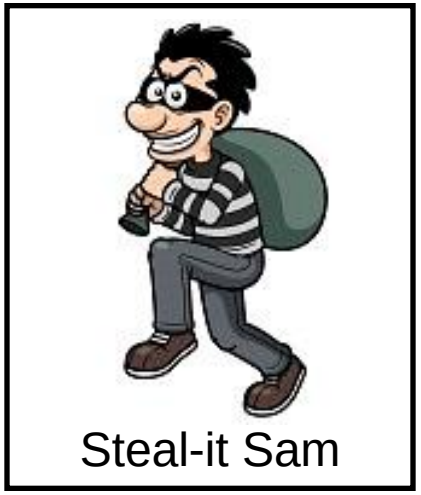
Place a red cross over the photos of the suspects who can be eliminated.


Dodgy Dave


Cunning Claire


ight-fingered L


Pinch-it Pamela


Steal-it Sam


Thieve-It Tammy


Robbing Robbie


Sneaky Suzie

S3 Chemistry

Separating & Analysis Techniques

Lesson 10

Separation & Analysis Techniques

CSI Lesmahagow

NEW LEARNING

I can monitor the environment by collecting and analysing samples.

SCN 4-18a

NEW LEARNING

I can differentiate between pure substances and mixtures in common use and can select appropriate physical methods for separating mixtures into their components.
SCN 3-16a

Day 2 - Lesson starter
The Remaining Suspects & Evidence

Cunning Claire

Thieve-It Tammy

Ransom Note

I have your gold and unless you leave me £500 at the entrance to the school car park by the start of next week I'll be back to steal more chemicals. Next time it'll be the silver!

Robbing Robbie

Steal-it Sam

Which technique can we use to analyse the ransom note and conclude our investigation?

What equipment and chemicals will we need to carry this out?

Separation & Analysis Techniques: CSI Lesmahagow

Today we will learn

How crime scene investigators can use Chemistry to help solve crimes.

We will do this by

Planning and carrying out some of the experiments which have featured in this topic in order to help eliminate suspects.

We will have succeeded if

We can identify by the results of our experiments who is most likely to be responsible for the crime at Lesmahagow High.

Analysing the Evidence: Ransom Note

Ransom Note

I have your gold and unless you leave me £500 at the entrance to the school car park by the start of next week I'll be back to steal more chemicals. Next time it'll be the silver!

Ransom Note Chromatography

Cunning Claire

Compare the chromatogram patterns.
Who's pen makes an identical pattern to the ink extracted from the ransom note?

Ransom Note

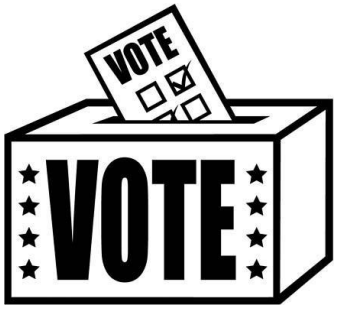
I have your gold and unless you leave me £500 at the entrance to the school car park by the start of next week I'll be back to steal more chemicals. Next time it'll be the silver!

Steal-it Sam

Thieve-It Tammy

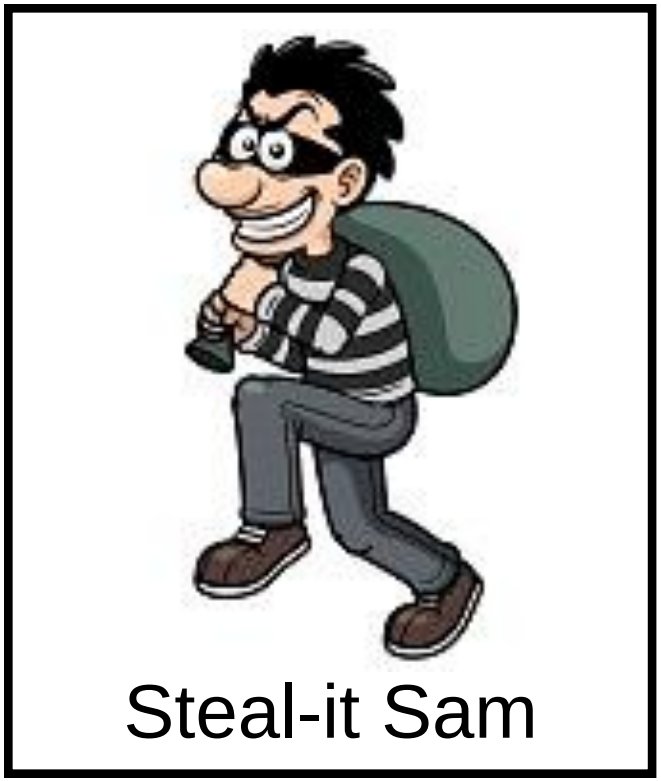
Robbing Robbie

Day 2 Exit Task
Considering the Evidence



Cast your vote individually on who the evidence points to as being the most likely to be guilty of the theft.

The evidence points to…….



Separation & Analysis Techniques: CSI Lesmahagow

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We can identify by the results of our experiments who is most likely to be responsible for the crime at Lesmahagow High.

Exit Task

Tell me three things...

you have done well

you would like to find out more about

you know now that you didn’t know 50 minutes ago