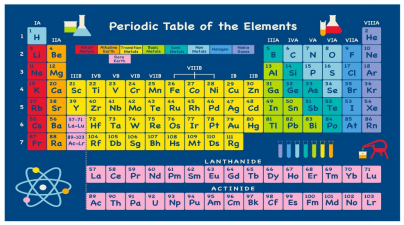
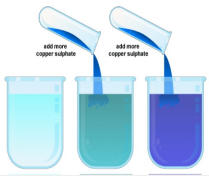
Unit one - Elements, Mixtures and Compounds





Lesson 1: The Periodic Table

By the end of this lesson I should know

1. That elements are the building blocks of everything that exists

2. That elements are listed in the Periodic Table

3. That the periodic table can be divided into metals / non-metals

4. Metals and non-metals have different PROPERTIES

5. Each element in the periodic table has its own unique set of letters called a CHEMICAL SYMBOL.

All things are made up of tiny building blocks called ATOMS. Atoms of all one type are called ELEMENTS.

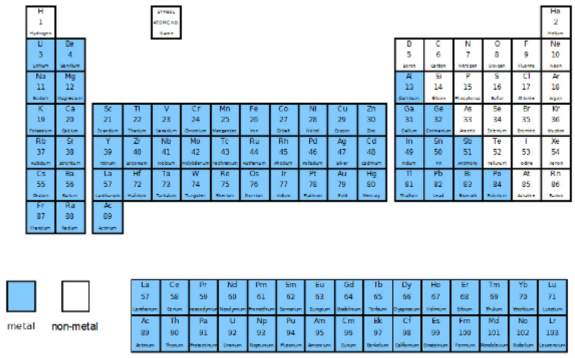
There are 118 different ELEMENTS and they are displayed on the PERIODIC TABLE.

Elements are substances made up of ONE TYPE of atom.

Different elements have different PROPERTIES from one another.

All elements are either METAL or NON-METAL.

Metals and non-metals



Look at some examples of metal elements and non-metal elements.

Can you see any similarities between the samples of metals and non-metals you have been given?

We call these things "properties". They differ between metals and non-metals.

Most metals will share properties with other metals, but not all metals have identical properties.

What are Properties?

Physical properties e.g. Shiny/dull; hardness; conducts electricity; melting point, boiling point.

Chemical properties (the way a chemical behaves in a chemical reaction) e.g. reactivity with water, oxygen, acid; flammability (how easily it catches on fire).

Metals vs non-metals

comparing the "properties" of elements can help us to categorise them

properties of metals	properties of non-metals

Metals vs non-metals

comparing the "properties" of elements can help us to categorise them

properties of metals	properties of non-metals
Shiny Conduct Electricity Mostly very hard All solids (except for mercury) Smooth	Dull Mostly do not conduct electricity Can be quite hard or soft Some are solid, some are gases and one (bromine) is a liquid. Smooth or rough Colours

CHEMICAL SYMBOLS

Notice that all the elements in the periodic table have their own letter or letters. For example, Carbon has the letter 'C', Magnesium has the letters 'Mg'.

These letters are called the CHEMICAL SYMBOL for the element.

- If there is only one letter in the chemical symbol it is a CAPITAL letter
- If there are two letters in the chemical symbol, the first is a CAPITAL and the second is lower case - Cu, Al, Ar

Stick a chemical symbols table in your jotter and use your periodic table to complete it. Finish it for homework if you do not finish in class.

Chemical Symbols

Element name	Chemical Symbol
Oxygen	
Helium	
	Mg
	H
Carbon	
Tin	
	Cl
Sodium	
	Kr
	Ag
Lead	

Homework 1
Research and Design

Use the internet or books from a library to research the element below

Make a data card showing the following information about your element:

- Name and chemical symbol
- Melting and boiling points
- Use
- How the element behaves / what the element does.
- Any other information you think you should include.

Lesson 2 : Properties of Elements

By the end of this lesson I should know:

1. The difference between a 'group' and a 'period'.

2. That elements close together on the periodic table have similar chemical properties properties.

3. Metals do not always share properties - some are very different from others.

4. Alkali metals are very soft and very reactive.

5. Transition metals are unreactive and usually hard solids (except mercury).

The vertical columns on the periodic table are called GROUPS.

The horizontal rows are called PERIODS.

Page 13

Use data cards produced for your homework.

Find others in the class with similar properties to your own data card.

Can you see a pattern in terms of position of the elements in the periodic table?

If you have not done your homework then you must tell your teacher who will give you a data card to use for today.

Page 14

Conclusion: Elements that are in the same column or _____ in the _____ _____ have similar _____ _____ to each other.
Elements are only made up of _____ type of atom.
Alkali metals (group __) all react explosively in _____.

brainiac clip
http://www.youtube.com/watch?v=m55kgyApYrY

Page 15

Use your white 'show me board' to answer these questions.

1. Elements are made of tiny particles called .....?
2. The elements are listed in a chart called the ....
3. The metal elements are found on the ..... hand side of the chart.
4. Vertical columns in the chart are called .....
5. Elements in the same vertical column of the chart have similar ....

Page 16

Lesson 3 : Solids, Liquids and Gases

By the end of this lesson I should know:

1. Where 'halogens', 'noble gases', 'alkali metals' and 'transition metals' are found on the periodic table.
2. Which elements are solids, which are liquids and which are gases.
3. How to make and record observations about elements and say which state they are in.

Page 17

Halogens

Halogens are found in group 7. Chlorine and fluorine are examples of Halogens. The Halogens are quite reactive and will readily form compounds with other elements.

Page 18

Noble Gases

Noble gases are found in group 0. They include elements such as Helium, Neon and Argon. These elements are very stable and therefore they do not react.

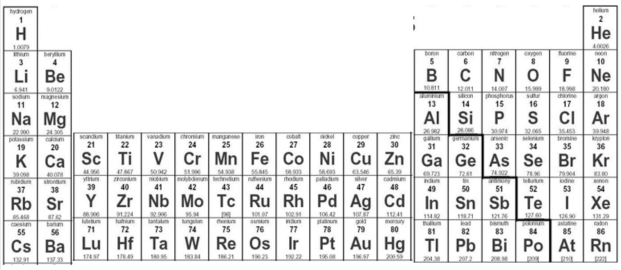
http://www.youtube.com/watch?v=QLrofyj6a2s&safe=active

Alkali Metals

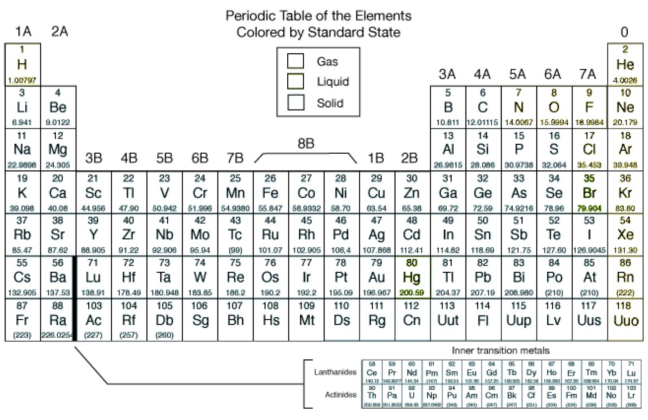
Alkali metals are found in group 1. Sodium and Lithium are examples of alkali metals. The alkali metals are very reactive and will readily form compounds with other elements. They are so reactive they must be kept in oil to make sure they don't react with water in the atmosphere.

Transition Metals

Transition metals are found in the middle of the Periodic Table. Iron, Copper and Zinc are examples of transition metals. The transition metals are not very reactive but do form compounds with other elements.



Solid, liquid or gas?

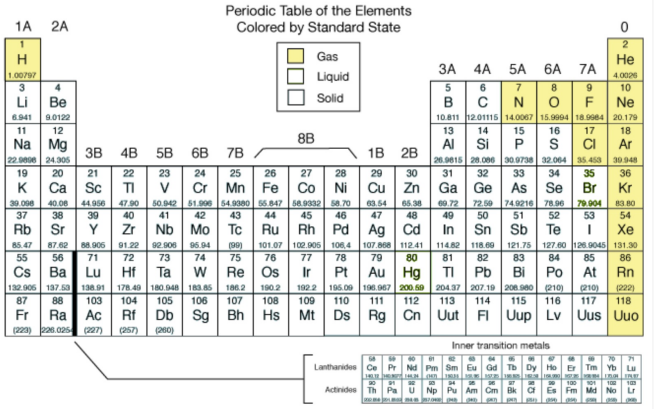


Look at some elements in jars and categorise them as solids, liquids or gases them by their appearance.

Observing

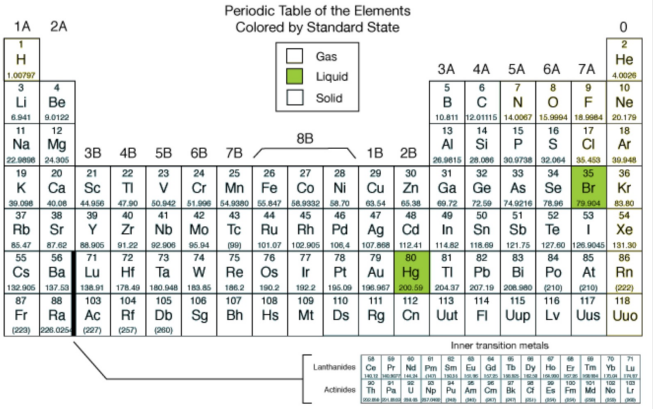
Solid	Liquid	Gas

These 12 elements are gases…



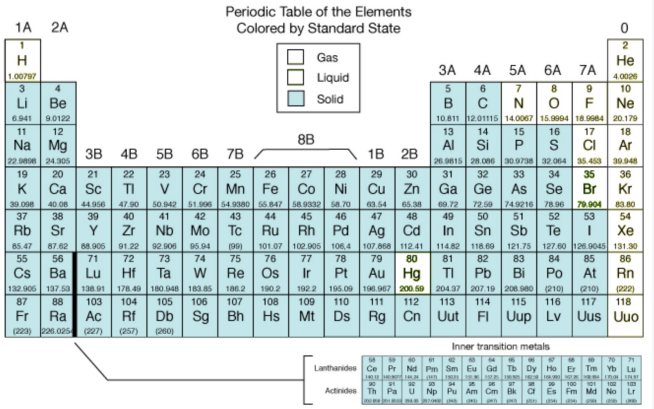
Page 25

These 2 elements are liquids…



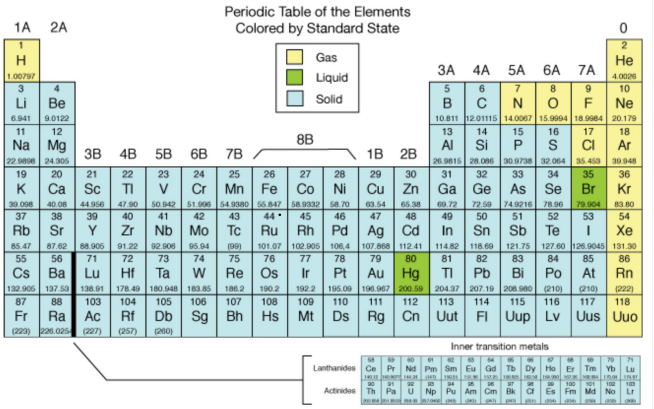
Page 26

The other 104 are solids…



Page 27

Complete table showing solids, liquids and gases.



Page 28

Homework 2
Chemical Symbols

Page 29

Lesson 4 : States of Matter

By the end of this lesson I should know:

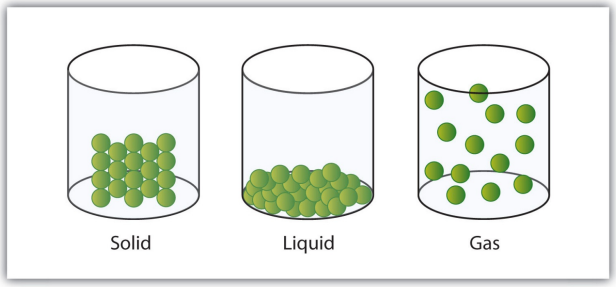
1. Some of the properties of solids, liquids and gases

2. That solids, liquids and gases are made of particles and be able to describe how these particles are arranged in solids, liquids and gases.

3. The particle theory of matter to explain the changes from solid to liquid to gas

Page 30

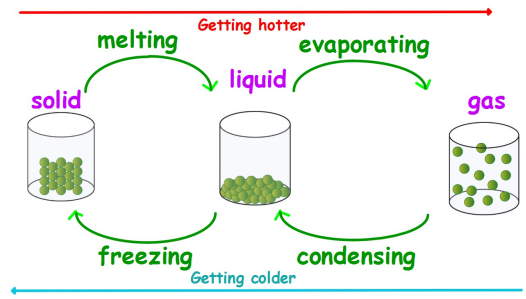
States of matter



Page 31

States of matter

Elements can also be grouped in another way. They can be grouped as a solid, liquid or gas. This is called the three states of matter. Matter is used to describe the particles that everything which has a mass is made from...
...us, earth, iPod, water, air, paper etc.



Green arrows show the "Changes of state"

Page 32

On your whiteboards, draw a picture of the particles in a:

solid **liquid** **gas**

Page 33

Complete Homework 3

Page 34

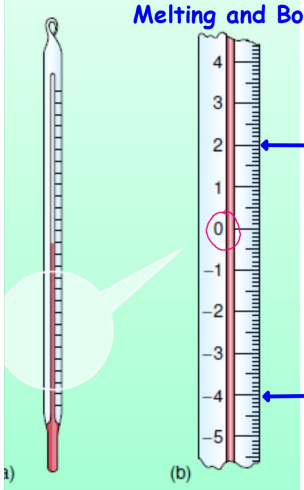
Lesson 5 : Melting & Boiling Points

By the end of this lesson I should know:

1. Different substances have different melting and boiling points.
2. We can watch the rate at which things evaporate. The lower a substances boiling point the quicker it will evaporate.
3. If a substance is below its melting point it is a solid, between its melting point and boiling point it's a liquid and above its boiling point it is a gas.

Page 35

Melting and Boiling points



above the boiling point, a substance will be a gas

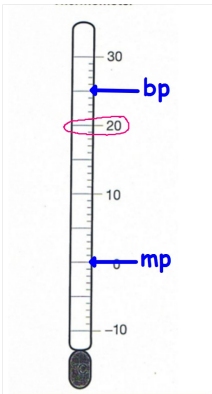
boiling point (bp)

in between the melting and boiling points, a substance will be liquid.

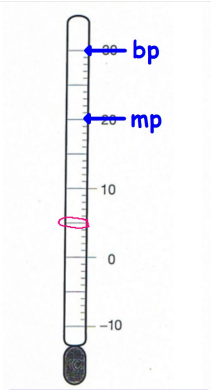
melting point (mp)

below the melting point, a substance will be a solid

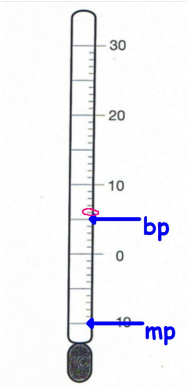
Page 36



what state is A at 20°C?



what state is B at 5°C?



what state is C at 6°C?

Page 37

Homework 3
States of Matter,
M.P. & B.P.

Page 38

Lesson 6 & 7 : Elements & Compounds 1

By the end of this lesson I should know:

1. Elements are found in a chart called the periodic table.
2. Elements are made up of atoms.
3. Mixtures are formed when elements muddle together without chemically bonding.
4. Mixtures are easy to separate.
5. Compounds are formed when elements join together (bond) forming something new.
6. Compounds are difficult to separate.

Page 39

Elements and Compounds

Elements are the building blocks of life. Elements are found in the periodic table.

A closer look at an element

IRON  

what can you tell your class about the element iron?

Did you know that iron is magnetic?

Page 40

When iron joins with the oxygen in the air, a new substance called iron oxide (rust) is formed. Iron oxide is not an element - it is called a COMPOUND.

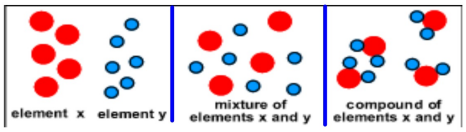
A Compound is a new substance made when 2 or more elements join together in a chemical reaction.

A closer look at an iron compound
Look at the sample of iron oxide (rust).
Does it look like the elements it was made from?
Does it behave like the elements? (test the rust with a magnet)

Compounds behave in different ways from the elements they are made from. We say that the compound has different PROPERTIES.

Page 41

Elements , Mixtures and Compounds

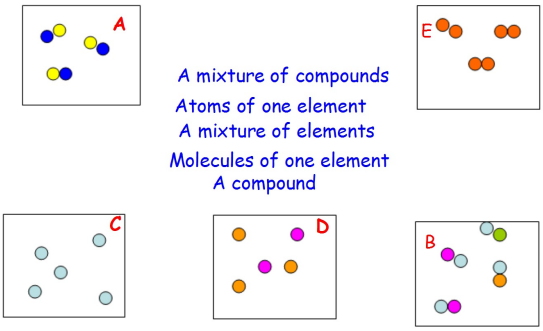


elements
made up of one type of atom

mixtures are made when elements muddle together without chemically joining.
Easy to separate

compounds
are made when elements chemically join together forming a bond.
Difficult to separate

Page 42



Page 43

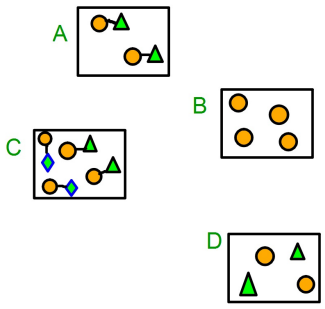
Match up the particle arrangement with the correct description:

Compound

Mixture

Element

Mixture of compounds



Page 44

Making Salt

Look at the elements Sodium and Chlorine
How do they appear?

Sodium

Chlorine

How are they different from the compound sodium chloride?

Using *Chemical Science Level 3* make a poster to show how the properties of elements differ from compounds

Page 45

Lesson 8 : Solutes and Solvents

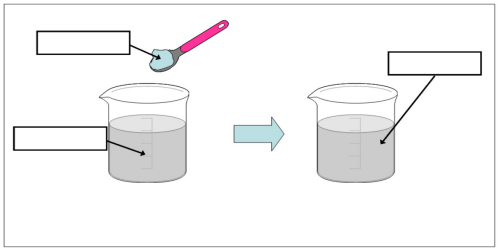
By the end of this lesson I should know:

1. A solute dissolves in a solvent to make a solution.
2. Something insoluble does not dissolve.
3. Something insoluble does not dissolve.
4. A solution that is 'saturated' is full and cannot dissolve any more solute. This can be demonstrated with salt and water.
5. When salt is dissolved in water, it splits into its different parts – sodium ions and chlorine ions. These ions fit in between the molecules of water.

Page 46

Making a solution

Sugar was added to a beaker of water. After stirring the sugar dissolved in the water.



solute, soluble, solution, insoluble, solvent
solute soluble solution solvent

Page 47

Solubility

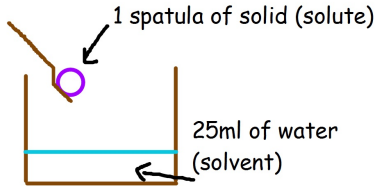
Look at the tray of chemicals and the equipment list.
In your group write down a **method** you could use to test the solubility of the chemicals in the tray.

Equipment list
- beaker
- stirring rod
- spatula
- water
- measuring cylinder

Page 48

Testing solubility

Equipment Handling



Testing solubility

Results

Solute	soluble or insoluble
sugar	
salt	
iron oxide	
copper oxide	
copper carbonate	
copper sulfate	
sulfur	
potassium nitrate	

Sugar was added to lemon juice to make lemonade
Name the Solute -
Name the Solvent-

Testing solubility

Sugar was added to lemon juice to make lemonade
Name the Solute -
Name the Solvent-
Name the Solution-

Match up the definitions with the correct words

Soluble | insoluble | saturated | solute | solvent | solution

1. When a substance can dissolve
2. When a substance doesn't dissolve
3. The liquid that can do the dissolving
4. The substance that you are adding to the liquid
5. What you make when a solute is added to a solvent
6. What is formed when you add too much solute to a solvent, that no more dissolves.

Look at the chemistry animation "dissolving" in desk tools

Homework 4
Solutes, Solvents & Solutions

Separating Iron from Sulphur

It was very easy to separate iron from sulphur using a magnet. It would not be possible to separate iron from sulphur if you were trying to separate the chemical iron sulphide as the iron is JOINED to the sulphur and cannot be separated easily.

Iron and Sulfur are easy to separate with a magnet. It is not possible to separate iron from iron sulphide with a magnet as the 2 elements are joined chemically.

Page 55

Lesson 11 : Separation Techniques
By the end of this lesson I should know:

Equipment Handling

Page 56

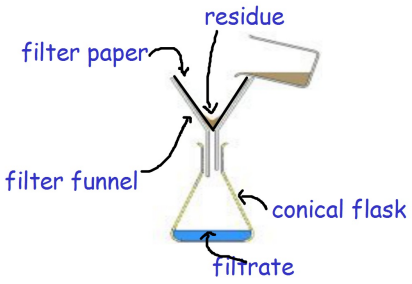
How could you separate cooked pasta from boiling water?

Page 57

Separation techniques

Equipment Handling

Filtration can be used to remove a solid that doesn't dissolve from a liquid



Page 58

Filtering / Filtration

Page 59

Results

Observing

Filtering / Filtration

What happened when you added the two colourless solutions together?

What happened after the lead nitrate and potassium iodide solution was filtered?

Express View (written)

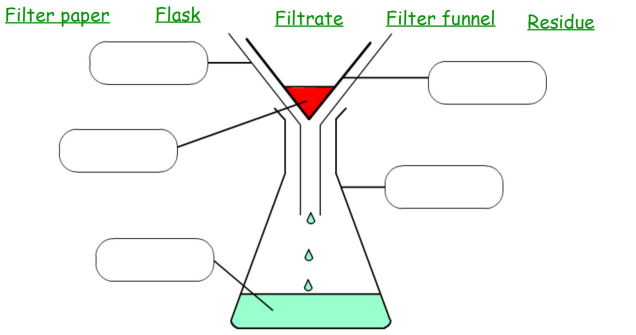
Filtration is used to separate a solid THAT DOES NOT DISSOLVE from a liquid.

Page 60

Summary

Can you name the equipment we use to filter substances? Drag the labels to the correct places on the diagram.

Filter paper | Conical flask | Filtrate | Filter funnel | Residue



Page 61

Filtration is used to separate an INSOLUBLE solid from a liquid.

Page 62

Lesson 12 : Separation Techniques

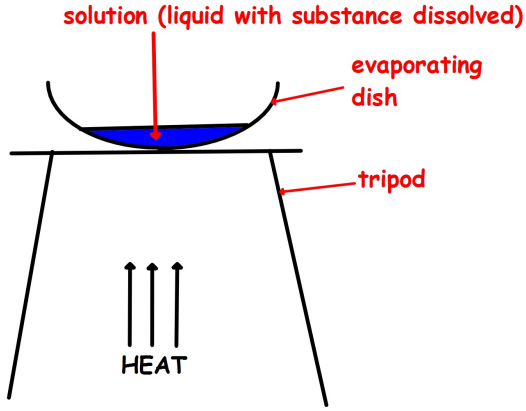
By the end of this lesson I should know:

How to separate a soluble salt by evaporation

How to separate two liquids by distillation

Page 63

Evaporation

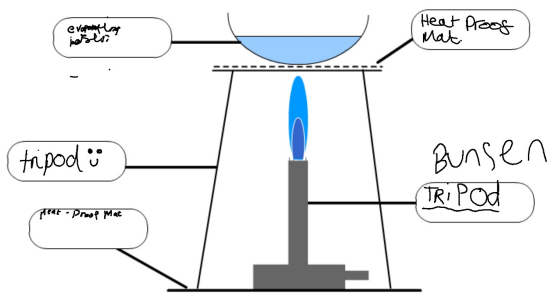


Page 64

Evaporation is used to separate a SOLUBLE solid from a liquid that it is dissolved in.

Page 65

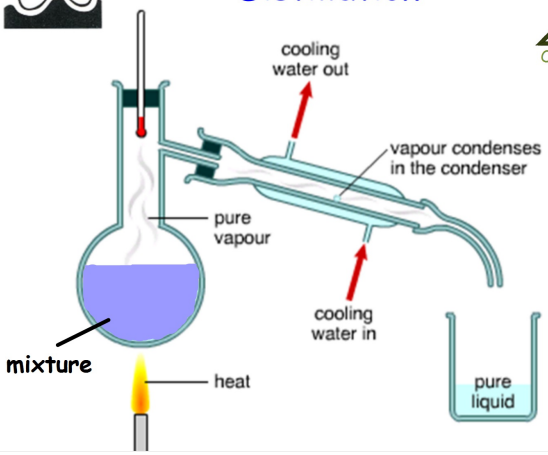
Gauze | Bunsen burner | Heat-proof mat | Evaporating basin | Tripod



Page 66

Distillation

Observing



Page 67

Distillation

This is a separation technique which separates two liquids by their different boiling points. One liquid will boil at a lower temperature than the other and so will come off first.
e.g alcohol and water. Alcohol boils at around 79 degrees celsius and water boils at 100 degrees celsius.

Page 68

Homework 5
Separation Technique
Research

Page 69

Lesson 13 : Separation Techniques

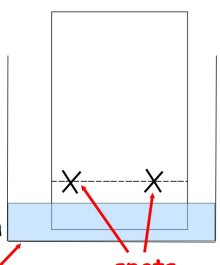
Problem Solving

How to separate inks by chromotography

Page 70

Chromatography

- A little of each ink is spotted onto a cross on the paper which is placed into a beaker of water as shown.
- The water travels up the paper carrying the various molecules with it.
- Different dyes in the ink travel different distances so can then be identified.



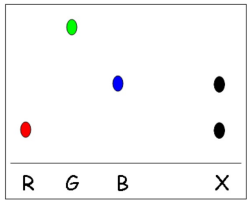
Page 71

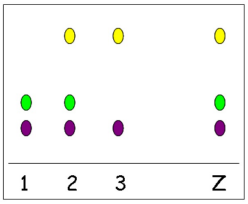
There has been a crime! Someone's lunch has been stolen and a ransom note is left. Use chromatography paper to to find the culprit!

Page 72

Chromatography

Chromatography can be used to separate a mixture of different inks.





1) Ink X contains two different colours. What are they?

2) Which number ink is ink Z?

https://www.twigonglow.com/experiment/felt-tip-chromatography-4108/0

Summary of Separation techniques

A mixture containing something that DOES dissolve can be separated using _____

A mixture of liquids with different boiling points can be separated using _____

A mixture of different inks can be separated using _____

A mixture containing something that DOES NOT dissolve can be separated using _____

distillation, chromatography, evaporation, filtration

Lesson 14+15 : Separation Techniques
By the end of this unit I can:

Plan and carry out an experiment to separate sand and salty water to obtain a dry sample.

Separating Salty water and Sand

Imagine you're trapped on a desert island. You've somehow managed to acquire some fish and chips (seagull delivery?) and you need some salt!

Using the separation techniques you have learned in the past few lessons design an experiment to separate salt from sand and obtain a dry sample of salt.

Planning your investigation

Look at the apparatus kit you have been given.. In your group plan how you are going

to carry out this investigation. **Write your ideas in the box below.**

Plan / method	Diagram of apparatus
	Safety

Answer:-

Step 1 - To filter the solution so that the sand is collected in the filter paper and the salt water goes into the flask.
Step 2 - Evaporate the salt solution to leave the salt in the dish and the water will evaporate into the atmosphere.

Homework 6: sand and salty water evaluation

EVALUATING

After carrying out the experiment to separate salt from sand write an evaluation about your work that lesson. Include your answers to the following questions in your report:

- What did you do?
- What did you find out?
- What went well?
- What did you find difficult? – were you successful at overcoming your difficulties?
- What would you change or do differently next time?
- Is there anything else you thought about before / after / during the lesson that is relevant and you want to mention?

Test REVISION