

Name:
Science Class:
Teacher:
Hand in day:

# Y9 Science

## Term 1: Homework Booklet

### Chemistry

	Hand in Date	Parents Signature
<b>Atomic structure and the periodic table</b>		
Homework 1		
Homework 2		
Homework 3		
Homework 4		

## Homework 1

### Read the information below, and then answer the questions

An **element** is a **pure substance** that is made from one kind of atom only.

Particle diagrams can be used to show the atoms of elements. A particle diagram can represent a solid element, a liquid element or a gaseous element.

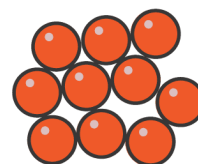
A solid element

The particles are close together and arranged in a regular way.



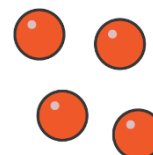
A liquid element

The particles are close together and arranged in a random way.



A gaseous element

The particles are far apart and arranged in a random way.

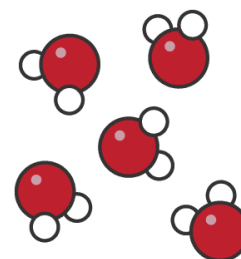


A **compound** is a pure substance that is made from 2 or more different elements are chemically bonded together. This makes it very difficult to separate them.

When a compound is made, the atoms of the elements bond together in a fixed ratio. This means that each compound can be represented by a chemical formula.

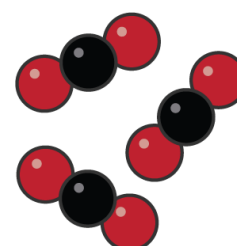
For example, the formula of water is **H<sub>2</sub>O** and the formula of carbon dioxide is **CO<sub>2</sub>**

Water molecules are made up of two elements - hydrogen (shown in white) and oxygen (red)



Water has a specific ratio of two hydrogen atoms to one oxygen atom, so has the formula **H<sub>2</sub>O**

Carbon dioxide molecules are made up of two elements - carbon (black) and oxygen (red)



Carbon dioxide has one carbon atom to two oxygen atoms, so has the formula **CO<sub>2</sub>**

Compounds are usually named after the elements which make them up.

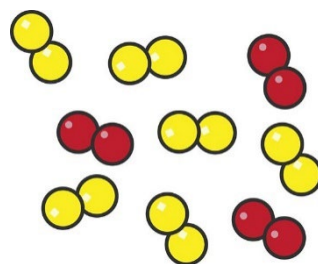
Eg. **NaCl** is called sodium chloride, as it is made from the elements sodium and chlorine

**Al<sub>2</sub>O<sub>3</sub>** is called aluminium oxide, as it is made from the elements aluminium and oxygen

**KBr** is called potassium bromide, as it is made from the elements potassium and bromine

A **mixture** contains 2 or more different substances that are not joined together, so they are relatively easy to separate.

A particle diagram of a mixture can include atoms and molecules, but they are not bonded together.



This particle diagram shows **air**.

Air is a mixture which is made mainly of nitrogen molecules (yellow) and oxygen molecules (red).

## **Questions**

1. What is the definition of an **element**?
2. **Draw** the particle arrangement in a **solid** element
3. **Describe** how the particles in a **gaseous** element are arranged

4. What is the definition of a **compound**?

5. Give two examples of compounds

6. Write the **formula** of water. Why does water have this formula?

7. **Name** the following compounds from the formula provided:

$\text{NaCl} =$

$\text{MgBr}_2 =$

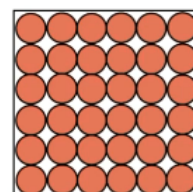
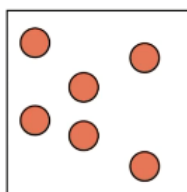
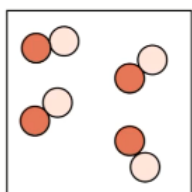
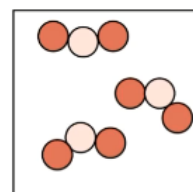
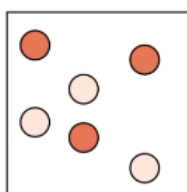
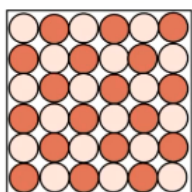
$\text{Al}_2\text{O}_3 =$

$\text{CO}_2 =$

$\text{KBr} =$

8. What is the definition of a **mixture**?

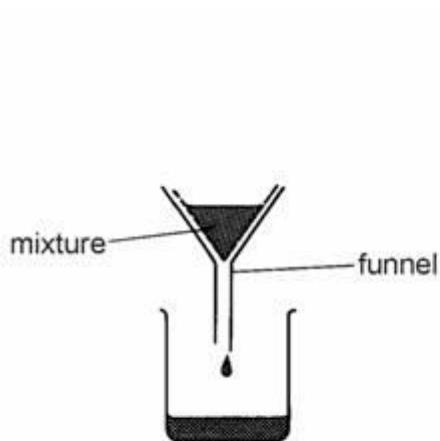
9. Try to identify each diagram as either an element, mixture or compound



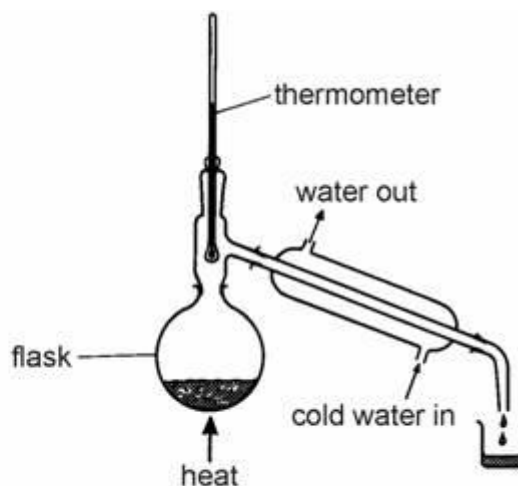
10. Are mixtures generally easy or difficult to separate? Explain your answer.

## Homework 2

The following diagrams show two methods of separating substances.



method 1



method 2

- (a) What is the name of each method?

Method 1 is .....

1 mark

Method 2 is .....

1 mark

- (b) (i) Tick one box to show which of the mixtures can be separated by method 1.

sugar and salt

☐

sand and water

☐

dissolved salt and water

☐

sugar and salt, both dissolved in water

☐

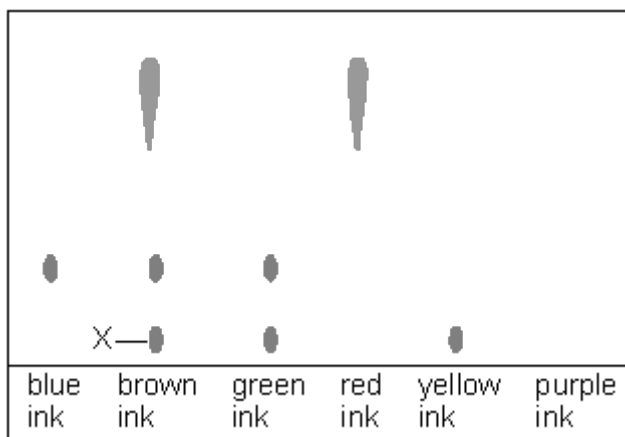
1 mark

- (ii) From the list give a mixture which can be separated by method 2 but not by method 1.

.....

1 mark

(c) Chromatography was used to analyse some soluble inks. The results are shown below.



(i) A purple ink is a dissolved mixture of the red dye and the blue dye.

On the right of the diagram draw the pattern you would expect to see for purple ink.

1 mark

(ii) Which **three** inks contain only one dye?

.....

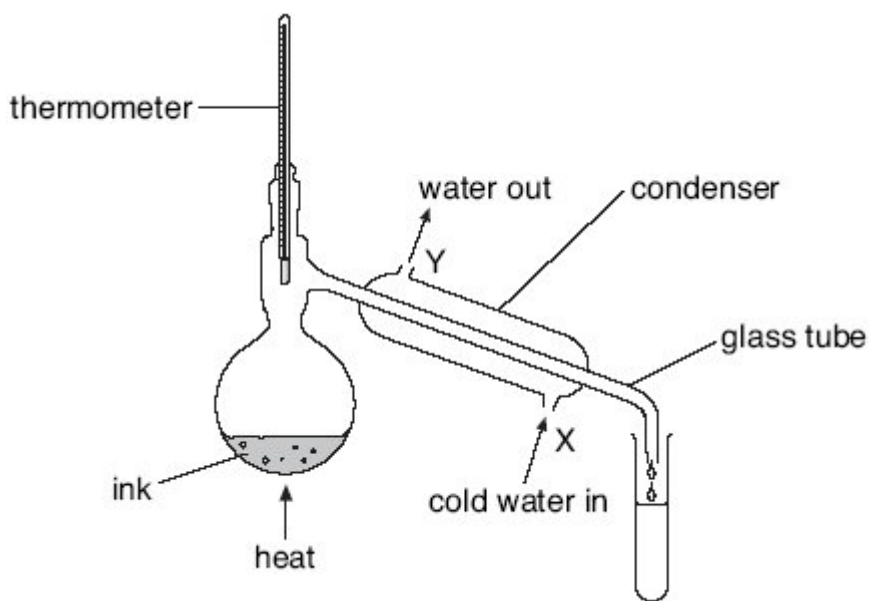
1 mark

(iii) What colour is spot **X**?

.....

1 mark

Rema used the apparatus below to distil 100 cm<sup>3</sup> of water-soluble ink.



**apparatus A**

(d) Which processes occur during distillation? Tick the correct box.

condensation then evaporation

☐

evaporation then condensation

☐

melting then boiling

☐

melting then evaporation

☐

1 mark

(e) Give the name of the colourless liquid that collects in the test-tube.

.....

1 mark

(f) What would the temperature reading be on the thermometer when the ink has been boiling for two minutes?

.....°C

1 mark

(g) (i) Water at 15°C enters the condenser at X.

Predict the temperature of the water when it leaves the condenser at Y.

.....°C

**Explain why** the temperature changes.

.....

.....

1 mark

(ii) Give **two** ways in which the water vapour changes as it passes down the glass tube in the condenser.

1. ....

1 mark

2. ....

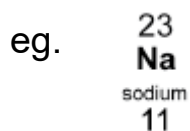
1 mark

### Homework 3

Use your periodic table to complete the table below

The first example, sodium, has been done for you

You can find the name, symbol, mass number and proton number for each element in your periodic table



Remember that the number of protons ( $p^+$ ) and electrons ( $e^-$ ) is always the same in neutral atoms, and that the number of neutrons is the mass number (top) minus the proton number (bottom)

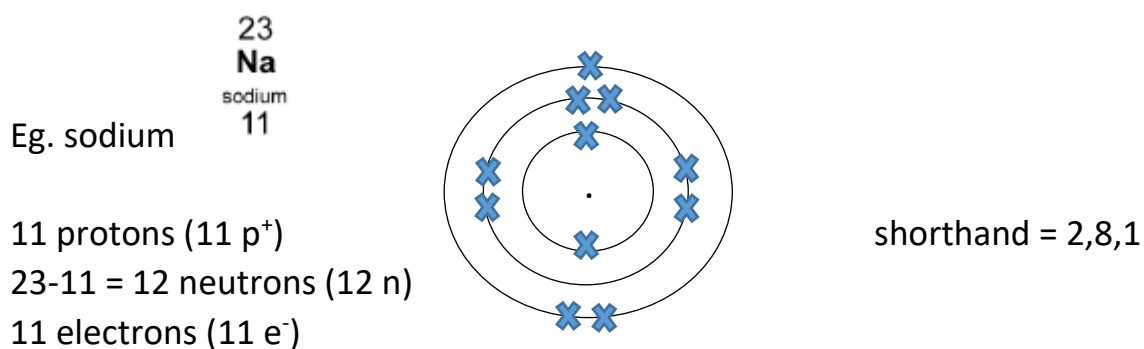
Element	Symbol	Proton no	Mass no	protons $p^+$	neutrons $n$	electrons $e^-$
Sodium	Na	11	23	11	12	11
	Be					
Potassium						
		13				
Vanadium						
	Kr					
			85			
				53		
Silver						
						33
					7	

## Homework 4

Work out the number of protons, neutrons and electrons in the following atoms

Then draw the correct electron configuration for the atom, and show this in shorthand form

The first example has been done for you



3. Lithium

7
<b>Li</b>
<small>lithium</small>
3

4. Calcium

40
<b>Ca</b>
<small>calcium</small>
20

5. Argon

40
<b>Ar</b>
<small>argon</small>
18

6. Phosphorus

31
<b>P</b>
<small>phosphorus</small>
15