

# Knowledge Revision

## AQA Entry Level Certificate in Science

### Chemistry Topic 3 – Elements, Compounds and Mixtures

You **need to master** and be able to recall the facts so that you can make progress and complete the external assignments to the best of your ability.

You can use Google or revision guides to help you. You can email me any questions or use Zoom if you'd like some immediate face to face help.

You will need to use Zoom when we complete the assignments.

Email: [jdixon@desc.herts.sch.uk](mailto:jdixon@desc.herts.sch.uk)

Zoom:

- Download 'Zoom' app
- Sign up for an account
- Select 'Meet & Chat' on the bottom bar
- Select 'Join' – blue + symbol at the top of the screen
- Enter meeting ID: **960 412 5303**

Name .....

## C1.1 Atoms and Elements

KEY LEARNING POINTS – Assess as you go!

	R	A	G
Substances are made of atoms.			
An element is made up of atoms of only one kind.			
The Periodic Table displays elements – metals on the left, non-metals to the right.			
Elements in the same group (column) of the Periodic Table have similar properties.			

### Essential Questions

1. What is an element? Give five examples.
2. Which of these elements are metals?
  - a. Oxygen
  - b. Mercury
  - c. Sodium
  - d. Phosphorus
3. Using the Periodic Table find the symbols for these elements:
  - a. Lithium
  - b. Nitrogen
  - c. Neon
  - d. Iron
4. By looking at the Periodic Table how do you know that potassium (K) is a metal?

CORE

What do you know about the Periodic Table?

EXTEND

- What are the columns on the Periodic Table called?
- What are the rows on the Periodic Table called?
- What is the name of column 1?
- What is the name of column 7?
- What is the name of column 8?
- What connects all the elements in column 1?

You should be able to give definitions for the following words:

Key word	Definition
Atom	
Boiling point	
Conduct	
Elements	
Melting point	
Metals	
Non-metals	
Periodic table	

## C1.2 Elements and Compounds

KEY LEARNING POINTS – Assess as you go!

	R	A	G
A compound is made when two or more elements chemically join.			
A compound can be made when a metal bonds to a non-metal or when non-metals combine.			
Magnesium reacts with the oxygen in the air to form magnesium oxide.			
Word equations can be used to summarise chemical reactions: Magnesium + oxygen → magnesium oxide			
When elements combine they change their properties.			

### Essential Questions

1. What is a compound? Give five examples.
2. Which of these substances are compounds?
  - a. Carbon dioxide
  - b. Water
  - c. Glucose
  - d. Iron
  - e. Iron sulphide
3. What are the errors in this word equation?

Sodium hydroxide + Hydrochloric acid = Water + Sodium Chlorine

### CORE

A compound formula tells us the relative number of atoms of each element that makes it up.

For each compound state the number and type of each atom:

<i>Compound name</i>	<i>Compound formula</i>	<i>Name and number of each type of atom</i>
Carbon dioxide	CO <sub>2</sub>	Carbon – 1; Oxygen – 2
Iron sulphide	FeS	
Ammonium chloride	AlCl <sub>3</sub>	
Glucose	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	
Calcium hydroxide	Ca(OH) <sub>2</sub>	

### EXTEND

Using circles to represent atoms draw simple diagrams of:

- An element made up of single atoms.
- An element made up of atoms that go around in pairs, e.g. O<sub>2</sub>
- A compound containing two elements, e.g. Water, H<sub>2</sub>O
- A compound containing three elements, e.g. Sodium hydroxide, NaOH

You should be able to give definitions for the following words:

Key word	Definition
Compound	
Equation	
Products	
React	
Reaction	
Reactant	
Word equation	

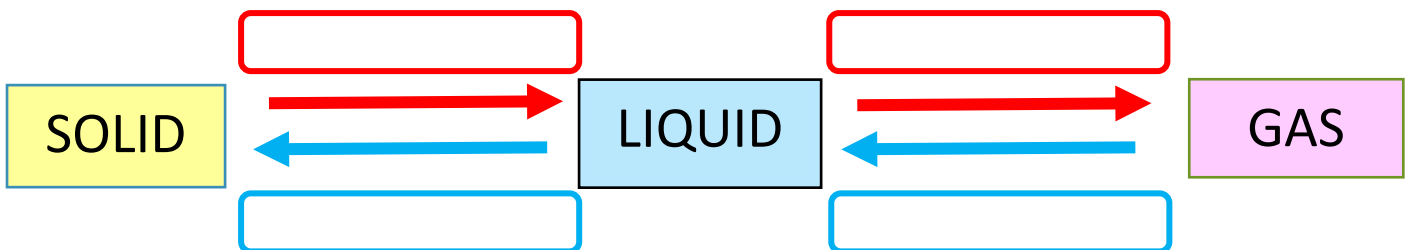
### C1.3 States of Matter

KEY LEARNING POINTS – Assess as you go!

	R	A	G
The three states of matter are solid, liquid and gas.			
When a substance melts it changes from a solid to a liquid.			
When a substance boils it changes from a liquid to a gas.			
When a substance condenses it changes from a gas to a liquid.			
When a substance freezes it changes from a liquid to a solid.			
Particle models can be used to explain the three states of matter.			

#### Progression Questions

Complete the diagram with labels. You could cover the labels to start with and only use them if you get stuck.



<i>Words</i>			
Boil	Freeze	Condense	Melt

## Properties of Solids, Liquids and Gases

	<b>Solid</b>	<b>Liquid</b>	<b>Gas</b>
How are the particles arranged? You could add a simple diagram			
Are particles free to move?			
Will the substance fill the container?			
Can the substance flow?			
Can it be compressed?			
Example			

### CORE

Describe what happens to the particles inside a substance when:

- It turns from a solid to a liquid.
- It turns from a gas to a liquid.

### EXTEND

Explain why gases can fill the space they are in but solids cannot.

You should be able to give definitions for the following words:

Key word	Definition
Gas	
Kinetic theory	
Liquid	
Solid	

### C1.4 Forms of Carbon

KEY LEARNING POINTS – Assess as you go!

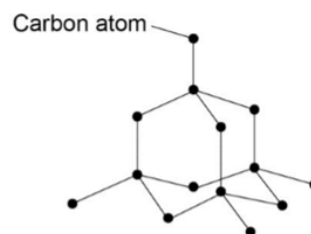
	R	A	G
Carbon is a non-metallic element.			
Diamond and graphite (found in pencils) are both forms of carbon.			
Diamond and carbon have different properties because they have different structures.			

#### Essential Questions

1. Name two different forms of carbon.
2. What are the properties of diamond?
3. What are the properties of graphite?

#### CORE

What is shown in this diagram? What is your evidence?



#### EXTEND

Explain what happens to make a mark when you are drawing with a pencil. You need to refer to the way the atoms are arranged in graphite.

You should be able to give definitions for the following words:

Key word	Definition
Carbon	



## C1.5 and C1.6 Mixtures and Separation Techniques

KEY LEARNING POINTS – Assess as you go!

	R	A	G
A mixture is elements and or compounds mixed together in one place. They are not chemically joined and can be separated by simple techniques.			
Filtration is used to separate a solid from a liquid.			
Chromatography is used to separate mixtures of coloured compounds.			
Distillation is used to separate two liquids that have different boiling points.			
Crystallisation is used to produce a solid from a solution.			

### Essential Questions

- Which of these are mixtures?
  - Air
  - Sodium chloride
  - Oxygen gas, O<sub>2</sub>
  - Sand and salt in a bucket
- When you need to separate sand from water what technique do you use? Why?
- Why can you separate coca cola from water using simple distillation?
- What is a solvent?

### CORE

- Draw and label the simple apparatus needed to separate sand from water. Remember to use a sharp pencil.
- Name the two processes involved in distillation.
- When using chromatography how do you know which colour is most soluble.

### EXTEND

Describe how to work out the R<sub>f</sub> value when carrying out chromatography. Think about the best way to present a clear answer that another student could learn from.

You should be able to give definitions for the following words:

Key word	Definition
Mixture	
Chromatography	
Solvent	

## C1.7a Metals

KEY LEARNING POINTS – Assess as you go!

	R	A	G
On the Periodic Table metals are found to the left and middle; non-metals are found to the right.			
Metals found in the middle block of the Periodic Table are called Transition Metals.			
Transition metals can conduct heat and electricity, are often shiny, hard and strong, can be drawn into wires and beaten into sheets.			
Some metals react more violently than others – you can investigate this using simple experiments.			
The reactivity of a metal is important to consider when finding the right metal for a job.			

### Essential Questions

1. Where are metals located on the Periodic Table?
2. What are the group of metals in the middle block of the Periodic Table called?
3. State four properties of metals.

### CORE

1. On a Periodic Table draw in a line to separate the metals from the non-metals.
2. Why is copper a good choice for making electrical wires?

### EXTEND

Describe an experiment you can carry out with magnesium, calcium, copper and iron to find out which is most reactive. Include a simple method and describe what you are looking for in the results.

## C1.7b Metals and Ores

KEY LEARNING POINTS – Assess as you go!

	R	A	G
Unreactive metals are found in the Earth's crust as metals.			
An ore is a rock that contains enough metal in it to make it worth extracting from the Earth.			
Metals that are less reactive than carbon are extracted by heating them up with carbon, often in a blast furnace.			
Rock has to be quarried and this can cause environmental issues.			
Nearly all metal can be recycled so that it can be used again.			

### Essential Questions

1. State three metals which are unreactive.
2. What name is given to rocks that contain metals? Give an example.
3. If a metal is less reactive than carbon what method can be used to extract it from the ore?
4. Suggest two possible environmental problems caused by mining for and extracting ores.

#### CORE

Where do metals come from?

#### EXTEND

Describe and explain how iron can be extracted from its ore.

You should be able to give definitions for the following words:

Key word	Definition
Unreactive	
Ore	
Recycle	

## C1.8 Properties of Metals

KEY LEARNING POINTS – Assess as you go!

	R	A	G
Metals have giant structures made up of atoms that are held together with strong bonds. Therefore, metals have high melting points.			
Metals can conduct electricity and heat.			
The use of a metal depends on its properties.			

### Essential Questions

1. Why do metals have high melting points?
2. What does the word 'conduct' mean?
3. Why is copper a good choice of metal for electrical wires?

#### CORE

Describe how to carry out an investigation to find out if different materials can conduct electricity.

#### EXTEND

Explain, using diagrams, why metals need a lot of thermal energy to melt them.

You should be able to give definitions for the following words:

Key word	Definition
Alloy	
Aluminium	
Copper	
Corrosion	
Density	

## C1.9 Alloys

KEY LEARNING POINTS – Assess as you go!

	R	A	G
An alloy is produced by combining a metal with small amounts of other elements.			
Steels are alloys made from mixing iron with different amounts of carbon.			
Alloys are needed because most metals in their pure form are too soft for many uses.			

### Essential Questions

1. What is an alloy?
2. Why do we need to use alloys for some jobs rather than pure metals?

#### CORE

Give at least two examples of alloys and state that they are made of.

#### EXTEND

For at least two metals and two alloys research their uses in everyday life.

You should be able to give definitions for the following words:

Key word	Definition
Alloy	
Carbon	
Iron	
Mixture	
Steels	

## C1.10 Polymers

KEY LEARNING POINTS – Assess as you go!

	R	A	G
A polymer is a large molecule made up of small repeating units.			
These single units are called monomers.			
The way polymers are used is linked to their properties.			
All plastics are polymers.			
Polymers do not naturally decay (Not biodegradable) and this causes problems with getting rid of them.			

### Essential Questions

1. Is plastic natural or man-made?
2. What is a polymer?
3. What does the prefix 'poly' mean?
4. Plastics are not biodegradable. What does this mean?

### CORE

1. Name three polymers and state what they can be used for.
2. Give a problem caused by plastics not breaking down when they go to landfill.

### EXTEND

1. How are plastics made? Describe this by referring to monomers.
2. Why should plastic be recycled?

You should be able to give definitions for the following words:

Key word	glands	Definition
Biodegradable		
Incineration		
Landfill sites		
Microorganism		
Moulded		
Polythene		
Recycling		