

## **AQA GCSE Combined Science (Chemistry Units)**

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C1 – sample - page 2 of 4

**C1 - Atomic Structure and the Periodic Table—Elements, Mixtures and Compounds.**

**Define element** and give some examples.


**Define compound** and give some examples.

**Define mixture** and give some examples.

**Filtration**  
Separates \_\_\_\_\_ from liquids. Draw and label the apparatus used for filtration.

**Chromatography**  
A student wants to compare the colours in 2 inks, X and Y, using paper chromatography. Describe a method the students could use. Include a diagram.

Study the chromatogram below. Suggest 3 conclusions that can be drawn from this experiment.




**Conclusions**

- 
- 
- 

Why is the start line drawn in pencil?

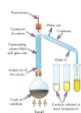
**Simple Distillation** is used to separate a \_\_\_\_\_ from a solution.  
Name the **physical property** by which this method is able to separate mixtures.

**Evaporation** can be used to separate \_\_\_\_\_ from solutions. Label the diagram.



How are evaporation and crystallisation different?

Describe how **Fractional Distillation** can be used to separate a mixture of liquids.




C2 – sample - page 1 of 4





**C2 Bonding, Structure and the Properties of Matter— Covalent Bonding**

**Covalent Bonding**  
Sharing of \_\_\_\_\_ to gain a \_\_\_\_\_ outer shell.  
Involves non-metals

**Simple Molecular Substances**  
Explain why chlorine has a low boiling point.  
Explain why chlorine does not conduct electricity.



**Giant Covalent Substances** have high melting points because ...

Diamond	Graphite	Graphene	Fullerenes
			
Explain why diamond is hard.	Explain why graphite is soft and slippery.	List the properties of graphene.	Explain why fullerenes can be used to deliver drugs into the body.
Explain why diamond does not conduct electricity.	Explain why graphite can conduct electricity.	Additional notes:	Additional notes:

**Polymers**  
Explain why most polymers are solid at room temperature.

C3 – Free Resource .

C4 – sample - page 1 of 3.

**C4 - Chemical Changes—Acids, Bases and Salts.**

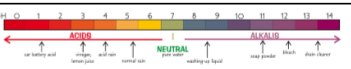
When acids dissolve in water they have a pH of less than \_\_\_\_\_, whereas alkalis would have a pH \_\_\_\_\_ than 7. pH 7 is \_\_\_\_\_.

What colour is universal indicator in a neutral solution?

Give the name of another indicator.

Describe how to make a salt from an acid and a metal.

Describe how to make a soluble salt (copper sulphate) from an insoluble base (copper oxide). Include labelled diagrams for each step.



Acid	Formula	Salt
Hydrochloric acid		Sulphate
	HNO <sub>3</sub>	

Complete the word equations for the neutralisation reactions below

ammonia + \_\_\_\_\_ → ammonium + water nitrate

\_\_\_\_\_ + hydrochloric acid → potassium + chloride

**General Word Equations**

acid + metal carbonate \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_

Acid + Metal \_\_\_\_\_ + \_\_\_\_\_

C5 – Free Resource.

C6 - sample – page 3 of 3

**C6 - Rates of Reaction—Reversible Reactions and Equilibrium**

**Reversible Reactions**  
Draw the symbol that represents a reversible reaction.

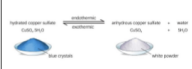
A reversible reaction is one which will go both \_\_\_\_\_ and \_\_\_\_\_.

A reversible reaction is endothermic in one direction and \_\_\_\_\_ in the opposite direction.

**Thermal decomposition of hydrated copper sulphate.**  
Hydrated copper sulphate → anhydrous copper sulphate + water

What colour is hydrated copper sulphate?  
What colour is anhydrous copper sulphate?

The forwards reaction is endothermic, so the backwards reaction must be \_\_\_\_\_.



**Equilibrium**  
Reversible reactions reach e\_\_\_\_\_ when the \_\_\_\_\_ reaction happens at the same \_\_\_\_\_ as the \_\_\_\_\_ reaction.

Equilibrium is only reached in a c\_\_\_\_\_. This means when no reactants or products can e\_\_\_\_\_ or enter the site of the reaction.

If the equilibrium shifts to the r\_\_\_\_\_, the concentration of the p\_\_\_\_\_ is greater than the reactants. If the equilibrium shifts to the l\_\_\_\_\_, the concentration of the r\_\_\_\_\_ is greater than the products.

You can change the direction of a reversible reaction by changing the \_\_\_\_\_ or \_\_\_\_\_.

True or false?  
Equilibrium means there are the same amount of products and reactants.

**Le Chatelier's Principle (HT)**  
D\_\_\_\_\_ the temperature moves the equilibrium in the exothermic direction.

If you increase the \_\_\_\_\_ the equilibrium moves in the direction of the fewest molecules.

If you increase the concentration of the reactants, m\_\_\_\_\_ product will be made.

The Haber Process makes ammonia.  
 $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

The forward reaction is exothermic. Explain the effect of increasing temperature on the yield of ammonia.

Explain the effect of increasing pressure on the yield of ammonia.

State and explain how an increase in pressure would affect the yield of the product in the following reactions (HT).

 $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$   
 $2Mg(OH)_2 + SiO_2 \rightleftharpoons SiO_3(s) + 2MgO$ 

C7 – sample – page 3 of 3

**C7 - Organic Chemistry—Cracking**

Long chain hydrocarbons are in lower d\_\_\_\_\_. These are c\_\_\_\_\_ to produce shorter more useful hydrocarbons.

Long alkane → shorter alkane + alkene

Cracking is a t\_\_\_\_\_ d\_\_\_\_\_ reaction.


There are 2 types of cracking.  
**Catalytic cracking** is carried out under h\_\_\_\_\_ temperatures in the presence of a c\_\_\_\_\_.  
**Steam cracking** is carried out under high temperatures with steam, but does not require a c\_\_\_\_\_.

The equations below represent cracking reactions. Add the missing products.

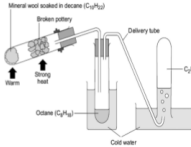
 $C_{10}H_{22}(l) \rightarrow (l) + C_2H_4(g)$   
 decane
 $C_7H_{16} \rightarrow 2C_2H_6 + \dots$   
 $C_8H_{18} \rightarrow C_2H_6 + \dots$ 

**Test for Alkenes (unsaturated hydrocarbons).**  
Orange bromine water becomes c\_\_\_\_\_.

The alkene reacts with the bromine, the new p\_\_\_\_\_ is c\_\_\_\_\_.



Describe the process of cracking that is happening in the diagram.



C8 – Free Resource.

C9 – sample- page 1 of 4.

**C9 - Chemistry of the Atmosphere—The History of the Atmosphere**


The **volcanic atmosphere** was made up of mainly:  
1) C \_\_\_\_\_ 2) W \_\_\_\_\_  
3) M \_\_\_\_\_ 4) A \_\_\_\_\_

The w \_\_\_\_\_ v \_\_\_\_\_ condensed and fell as r \_\_\_\_\_ forming the o \_\_\_\_\_.

C \_\_\_\_\_ d \_\_\_\_\_ dissolved in the o \_\_\_\_\_ and some became trapped as c \_\_\_\_\_ in the shells of sea creatures. Early plants took in c \_\_\_\_\_ d \_\_\_\_\_ and released o \_\_\_\_\_ during p \_\_\_\_\_.

N \_\_\_\_\_ was formed by denitrifying bacteria in the soil. Newly evolved o \_\_\_\_\_ reacted with methane and ammonia removing it from the atmosphere. The reaction between ammonia and oxygen produced more n \_\_\_\_\_ gas.

The pie chart shows the different amount of gases in today's atmosphere.



Match the gas to the correct approximate percentage of gas in today's atmosphere.

Gas	Approximate percentage of gas in the Earth's atmosphere today
Carbon Dioxide	41
Nitrogen	5
Oxygen	10
	20
	50
	80
	100

Why does the percentage of nitrogen remain the same?

Describe and explain how the composition of the Earth's atmosphere was changed by the formation of coal.

The table below details the average temperatures on Earth, Mars and Venus.

	Earth	Mars	Venus
	20	-23	460

Oceans cover most of Earth. Mars and Venus have water vapour in their atmosphere, but it does not form oceans. Why?

C10 – sample page 1 of 4.

**C10 - Resources —Finite and Renewable Resources.**

Natural resources come from the E \_\_\_\_\_ s \_\_\_\_\_ and a \_\_\_\_\_ they are not made by humans.

Some natural resources may run out.

What is the **difference** between a finite resource and a renewable resource?

Give 2 examples of finite resources.

Give 2 examples of renewable resources.

Some natural products can be replaced or improved by man-made products or processes. Give an example of this.

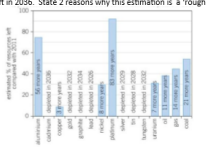
The supply of natural resources can be increased by agriculture. Give an example of this.

Look at the table.

Material	Time to form (years)
Wood	4–18
Coal	$3 \times 10^8$
Cotton	0.7

State one renewable resource. Explain your answer.

The graphs below show estimations of the percentage of finite resources likely to be left in 2050. State 2 reasons why this estimation is a 'tough estimation'.



## **AQA GCSE Chemistry (\*Extension units only)**

\*Extension Units - These units include the Chemistry content which is not part of the Combined Science specification.

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C1 – Free Resource.

C2 – Free Resource.

C7 – sample – page 1 of 4.

**C7—Organic Chemistry—Alkenes, Alcohols, Carboxylic Acids and Esters (Chemistry Only)**

**Alcohol** Structural Formula

$$\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{O}-\text{H} \\ | \\ \text{H} \end{array}$$

ethanol

propanal

Alcohols contain the functional group ...

Alkenes have the general formula ...

List the conditions for fermentation.

List 3 uses of Alcohols.

**Alkenes** Structural Formula

ethene

propene

butene

pentene

Carboxylic acids are weak acids. Define weak acid.

Name the ester. Circle the functional group. Name.

**Carboxylic Acid** Structural Formula

methanoic

ethanoic

propanoic

butanoic

Carboxylic acids contain the functional group ...

General formula for alcohols ...

Formula	Name	Family
CH <sub>3</sub> CH <sub>2</sub> OH		
CH <sub>3</sub> COOH		
CH <sub>3</sub> COOC <sub>2</sub> H <sub>5</sub>		
C <sub>2</sub> H <sub>5</sub> OH		

C8 – sample – page 1 of 2.

**C8—Chemical Analysis (Chemistry Only)**

**Flame Tests**

Ion	Flame Colour
Lithium	Yellow
Potassium	
Copper	Brick red

Explain the following statements:

A nichrome or platinum wire is used in the flame test.

We can not use the flame test if a sample contains a mixture of ions.

List the advantages of using instrumental techniques.

Define cation

Define anion

**Precipitation Test** (adding NaOH)

Ion	Precipitation colour
Al <sup>3+</sup>	White
Ca <sup>2+</sup>	Green
Fe <sup>3+</sup>	
Cu <sup>2+</sup>	

Describe and explain how you would identify between aluminium, magnesium and calcium?

Write an ionic equation, including state symbols, for the precipitation of magnesium from solution by aqueous hydroxide ions.

C10 – sample – page 1 of 5.

**C10—Resources —Using Materials (Chemistry Only)**

Corrosion is the ... of materials by ... reactions with substances in the environment.

The corrosion of iron is called ... Both air ... and ... are needed for rusting.

Complete the word equation to summarise rusting.

Rusting can be prevented by ...

Below are 2 diagrams (A and B). These diagrams represent thermosetting and thermosoftening polymers.

The thermosetting polymer is ... I know this because ...

Thermosetting polymers are ... and ...

iron + oxygen + water →

It ... reacts with oxygen to form an ... coating. This coating ... the aluminium from further corrosion.

**Alloys** Mixture of ...

Brass

Copper and zinc.

Steel

The purity of ... is expressed as ... Pure gold is referred to as ... carat gold.

Gold used for ... usually consist of ... and ...

Describe the differences between soda-lime glass and borosilicate glass.

Steel	Property	Use
High carbon		
Low carbon		
Stainless steel		

Clay ceramics include p ... and b ... They are made by shaping w ... then b ... in f ...