

Chapter 10: Proton Number and the Periodic Table

Element and Compound:

Element is made up of one type of atom. Compound is made from different types of atoms. For example, H_2 is an element but H_2O is a compound.

Molecule:

A substance having two or more atoms in it, is called Molecule. Molecule only talks about the number of atoms, not the type of atoms. An Element(e.g H_2) could be a molecule as well as a Compound(e.g H_2O) could be a molecule.

Proton Number:

The number of protons in an atom is called Proton Number.

Atomic Number:

It is the same as the proton number

Exam Tip:

In exam, you might see a diagram of atom showing circles without labels. You don't know which of them are electrons, protons and neutrons.

Remember, electrons always move in the circle outside the nucleus. Protons reside inside the nucleus and they don't move. Also, in any neutral atom, the number of protons is equal to the number of electrons. So you can see those circles which have the same count as electrons, are the protons.

Periodic Table:

Periodic tables is a list of elements arranged according to the their increasing **atomic number**.

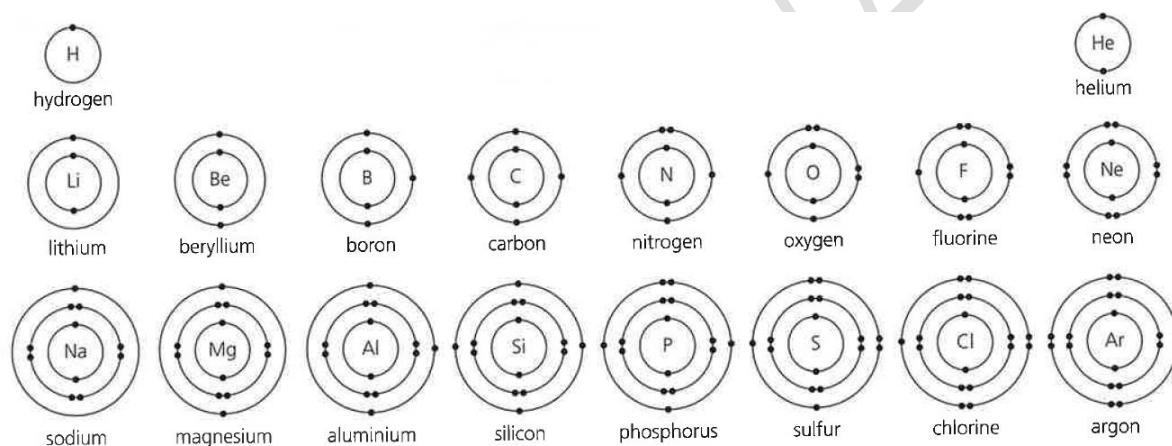
Exam tip: you must know the element symbols of some basic elements.

Element	Symbol
Lithium	Li
Sodium	Na
Potassium	K
Magnesium	Mg
Iron	Fe

Nickel	Ni
Copper	Cu
Zinc	Zn
Calcium	Ca
Carbon	C
Oxygen	O
Nitrogen	N
Sulfur	S
Phosphorus	P
Chlorine	Cl
Helium	He
Hydrogen	H

Exam Tip:

You might be given with the number of protons of an element, the examiner might ask you to draw the **electronic configuration** of an element. Remember, you can draw circles or dots to represent electrons. Some electronic configurations are give here.



In an electronic configuration, how would you know how many shells you are supposed to draw? How many electrons are to be placed in which shell?

Answer. The first shell can only contain 2 electrons. The second shell only contain 8 electrons. The third shell only contain 18 electrons. The fourth shell(not needed) can only contain 32 electrons. Once, the first shell is filled, you start filling the next one and so on.

Ions:

Positively or negatively charged atoms are called IONS.

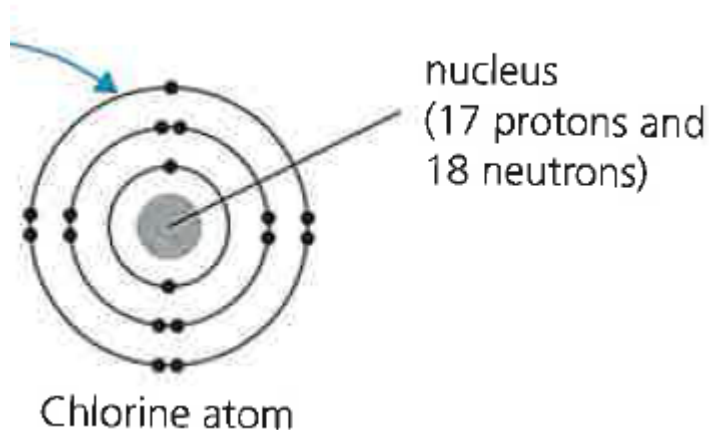
Remember: Generally an atom is neutral.

How is an ION formed?

When an atom loses or gains electrons. If an atom loses an electron, it makes a positive ion. If an atom gains an electron, it makes a negative ion.

Remember: In an ION, the protons and electrons are never equal.

Exam Tip: You are given with the atomic structure of an element. How will you figure if it is an ION or not? Check the number of protons, if they are not equal to number of electrons then the given atom is an ION.



What is the Charge on an ION?

The charge of an ION is the difference between the number of protons and electrons.

Chemical Bonds:

The forces which hold the atoms together are called Chemical Bonds.

Ionic Bonds:

The bond formed between IONS is called Ionic Bond. In this bond, the electrostatic force of attraction holds the compound together.

Ionic Compounds:

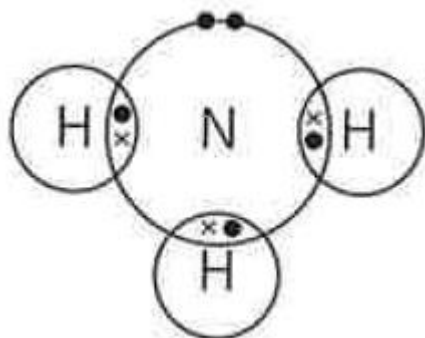
The compounds which are formed due to ionic bonding, are called Ionic compounds. Ionic compounds have high melting points and they are brittle.

Exam Tip:

How would you know by looking at the formula if it is an Ionic bond or something else? Remember, Ionic bond is always formed between one metal and one non-metal. So, in the compound, if it has one metal and one non-metal, this is ionic bond

Covalent bond:

The bond formed between the elements by sharing a pair of electrons. An example of ammonia(NH_3) is given below.

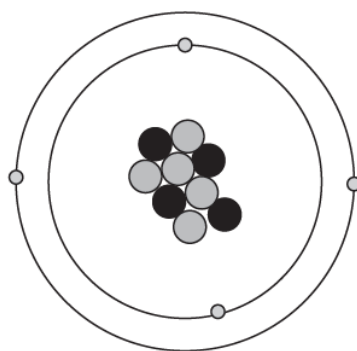
**Exam Tip:**

How would you know if it covalent bond? Remember, the covalent bond is formed between either two non-metal elements(NH_3) or two atoms of the same element(H_2). If you see the non-metal elements, this is covalent bond

Giant Metallic Structures:

Metals exist in the form of Giant Metallic Structures. Giant Metallic Structures are made from long chains of ionic bonds.

- 8 Look at the diagram of a beryllium atom.



- (a) (i) How many **electrons** are in the atom?

..... [1]

- (ii) How many **neutrons** are in the atom?

..... [1]

- (b) Write down the chemical symbol for beryllium.

..... [1]

- (c) Lithium is the third element in the Periodic Table.

Beryllium is the fourth element.

Lithium has fewer neutrons than beryllium.

Describe **two other** ways in which the structure of a lithium atom is **different** from a beryllium atom.

1

2 [2]

- (d) Which one of these scientists did research on the structure of an atom?

Circle the correct answer.

Darwin

Galileo

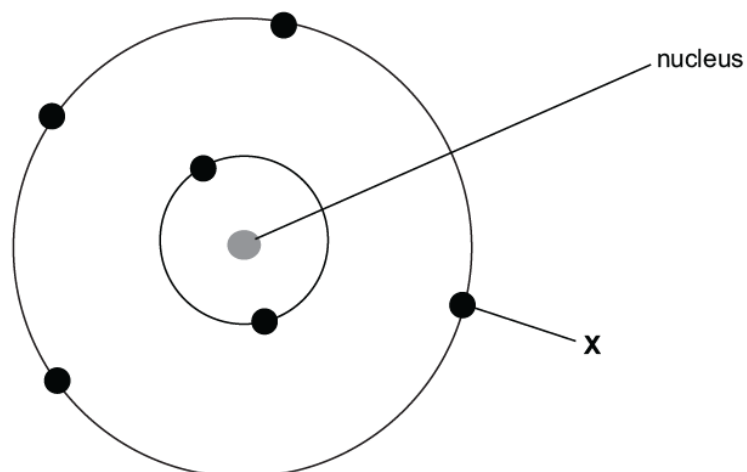
Newton

Rutherford

[1]

Question number			8	CSS00379
Part	CF	Skill	Mark	Answer
(a) (i)	9Cp1	A	1	4
(ii)	9Cp1	A	1	5
(b)	8Cp2	K	1	Be
(c)	9Cp2	A	2	Any two from different number of protons / less protons / fewer protons / has 3 protons / lower atomic number / atomic number is 3 smaller number of particles in nucleus / smaller mass number / smaller nucleon number / 7 particles in nucleus / mass or nucleon number is 7 different number of electrons / less electrons / fewer electrons / 3 electrons / lithium is 2,1 / different electronic structure
(d)	9Cp1	K	1	Darwin Galileo Newton <u>Rutherford</u>
Total			6	

11 The diagram shows a model of an atom of an element.



(a) Name the part of the atom labelled X.

..... [1]

(b) Describe how you can tell that the element is in Group 4 of the Periodic Table.

Use information from the diagram.

..... [1]

(c) What happens to the size of atoms as you move down Group 4?

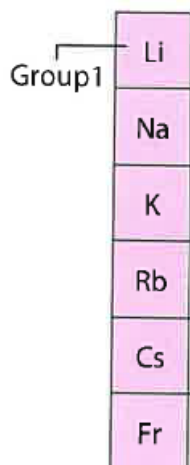
..... [1]

Question	Answer	Marks
11(a)	electron(s)	1
11(b)	has 4 electrons in outer shell	1
11(c)	get bigger / gets larger / increases	1

Chapter 11 Patterns in Periodic Table

Most of the contents of this chapter have been covered in Physics. So I shall focus on the ones which have not been covered.

Group 1 Elements:



A vertical column of six pink boxes representing the Group 1 elements. To the left of the top box (Li), the text 'Group 1' is written with a bracket pointing to the column.

Li
Na
K
Rb
Cs
Fr

They are metals.

They conduct electricity

They are shiny when freshly cut

The melting points decrease down the group.

When they react with water, they form hydroxide +hydrogen. (e.g Sodium Hydroxide, Lithium Hydroxide)

The reactivity of the Group 1 elements increases down the group

Density of the Group 1 elements increases down the group.

Group 2 Elements:

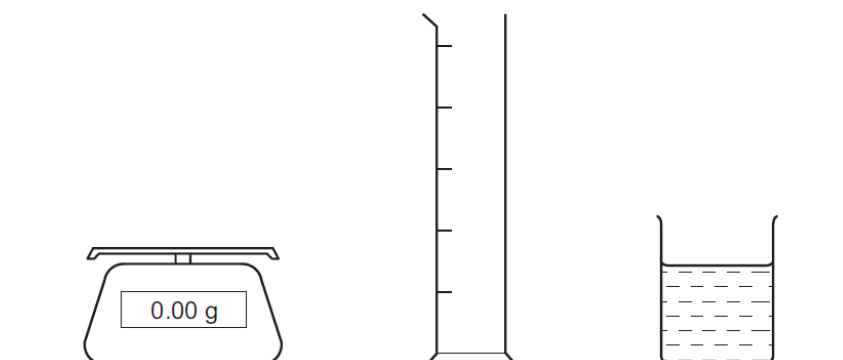
Group 2

Be
Mg
Ca
Sr
Ba
Ra

They are metals

Their melting points decrease down the group. But melting point of Magnesium does not fit the pattern.

10 Amulu uses this apparatus to measure the density of water.



The sentences describe his experiment for measuring the density of the water, but they are not in the correct order.

A Pour 50 cm³ water into the measuring cylinder.

B Divide the mass of the water by 50.

C Remove the empty measuring cylinder from the scales.

D Place the empty measuring cylinder on the scales.

E Subtract the mass of the measuring cylinder from the mass of the measuring cylinder and water.

F Note the mass of the empty measuring cylinder.

G Note the mass of the measuring cylinder and water.

H Place the measuring cylinder and water on the scales.

Write the correct order in the boxes. The first one has been done for you.

D							
---	--	--	--	--	--	--	--

[5]

Question	10	
Part	Mark	Answer
	5	F C A H G E B

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9 Sodium is in Group 1 of the Periodic Table.

(a) Write down the chemical symbol for sodium.

..... [1]

(b) Sodium is a metal.

Tick (✓) the boxes next to the **two** correct properties of sodium.

Sodium conducts electricity.

☐

Sodium does **not** conduct heat.

☐

Sodium has a low boiling point.

☐

Sodium is ductile.

☐

Sodium is **not** malleable.

☐

[2]

(c) Sodium reacts with water. A gas is formed.

(i) Name the gas that is formed.

..... [1]

(ii) Potassium is another element in Group 1.

Potassium is below sodium in the Periodic Table.

Complete the sentence.

The rate of reaction of potassium with water is than

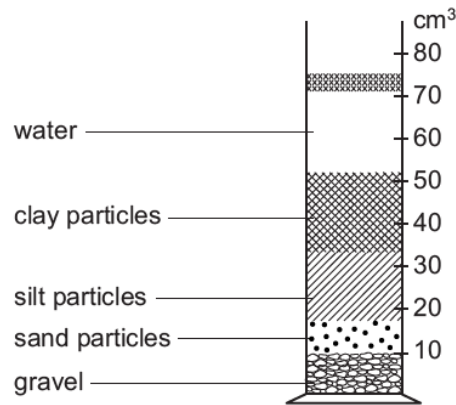
the rate of reaction of sodium with water. [1]

Question number		9		CSS00277
Part	CF	Skill	Mark	Answer
(a)	8Cp2	K	1	Na
(b)	8Cp1	K	2	Sodium conducts electricity. <input checked="" type="checkbox"/> Sodium does not conduct heat. <input type="checkbox"/> Sodium has a low boiling point. <input type="checkbox"/> Sodium is ductile. <input checked="" type="checkbox"/> Sodium is not malleable. <input type="checkbox"/>
(c) (i)	9Cc2	K	1	hydrogen
(ii)	9Cp3	K	1	faster / greater / bigger / more / quicker
Total			5	

2 Carlos investigates soil.

He mixes a sample of soil with water in a measuring cylinder.

He then leaves the mixture to settle out into layers.



(a) Which layer is made up of the **largest** particles?

..... [1]

(b) What is the volume of gravel in the soil sample?

..... cm³ [1]

(c) Which particles are smaller in size, clay or silt?

clay ☐ silt ☐

Explain how you can tell from the diagram of the measuring cylinder.

..... [1]

(d) Different types of soils have different amounts of sand, clay, gravel and silt particles.

These give the soils different properties.

Circle the correct words to complete the sentences about clay soils and sandy soils.

Sandy soils have **fewer** / **more** sand particles than clay soils.

Between the sand particles there are **large** / **small** air spaces.

Sandy soils are **more** / **less** likely to become waterlogged. [2]

Question number	2	
Part	Mark	Answer
(a)	1	gravel
(b)	1	10 (cm ³)
(c)	1	clay and higher up (the measuring cylinder) / above silt
(d)	2	<p>Sandy soils have more sand particles than clay soils.</p> <p>Between the sand particles there are large air spaces.</p> <p>Sandy soils are less likely to become waterlogged.</p>
Total	5	

5 Look at the diagram.

It shows some of the elements in the Periodic Table.

		H						He	
Li	Be			B	C	N	O	F	Ne
Na	Mg			Al	Si	P	S	Cl	Ar
K	Ca	transition elements							

(a) Use the Periodic Table to answer these questions.

(i) Write down the chemical symbol of the most reactive element in Group 7.

..... [1]

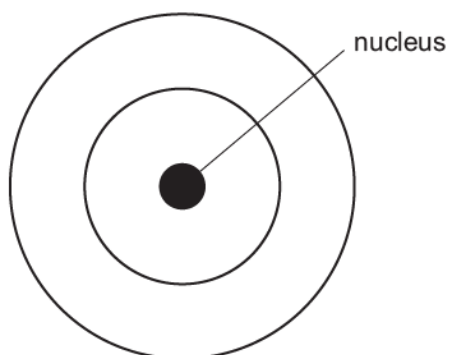
(ii) Write down the chemical symbol of the element with only three protons inside its nucleus.

..... [1]

(iii) Write down the chemical symbol of the element in Group 2 and Period 3.

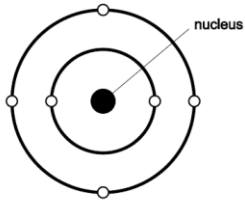
..... [1]

(b) Look at the diagram.



Complete the diagram to show the arrangement of electrons in an atom of carbon.

[2]

Question number	5			
Part	Mark	Answer	Further Information	
(a) (i)	1	F	Accept fluorine	
(ii)	1	Li	Accept lithium	
(iii)	1	Mg	Accept magnesium	
(b)	2			<p>two electrons on inner ring = 1 mark</p> <p>four electrons on the outer ring = 1 mark</p> <p>Accept x or circles or e</p>
Total	5			

11 Pierre investigates a type of reaction.

He reacts different metals with different salt solutions.

Here are his results.

metal	salt solution	observation
copper	tin nitrate	no reaction
iron	tin nitrate	reaction
tin	iron sulfate	no reaction
magnesium	zinc sulfate	reaction
zinc	iron sulfate	reaction

(a) Put the **metals** in order of reactivity.

One has been done for you.

most reactive

.....

iron

.....

least reactive

[1]

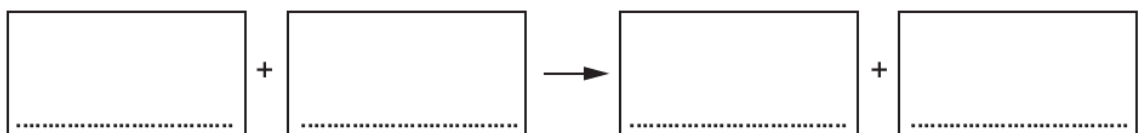
(b) What type of reaction does Pierre investigate?

..... [1]

(c) Magnesium reacts with zinc sulfate solution.

This reaction has two products.

Write the word equation for this reaction.



[2]

Question	Answer	Marks
11(a)	(most reactive) magnesium zinc (iron) tin (least reactive) copper	1
11(b)	displacement (reactions)	1
11(c)	<div> <div>magnesium</div> <div>+</div> <div>zinc sulfate</div> <div>→</div> <div>zinc</div> <div>+</div> <div>magnesium sulfate</div> </div>	2

- 9 (a) Atoms are made up of three different particles.

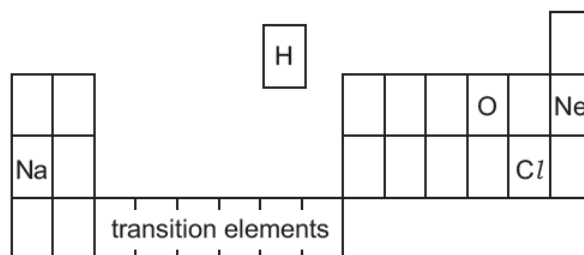
Complete the sentences about the different particles in an atom.

The nucleus of an atom contains and

The nucleus is surrounded by particles called _____.

[3]

- (b) The diagram shows part of the Periodic Table.



- (i) What is the chemical symbol for the **smallest** atom?

Choose from H, O, Ne, Na or Cl.

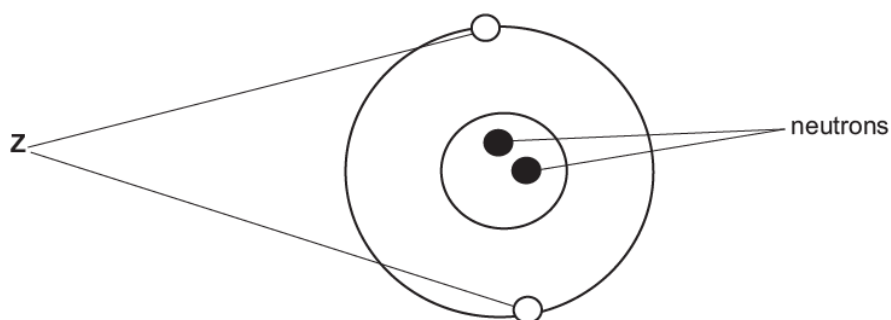
..... [1]

- (ii) Which chemical symbol shows a metal?

Choose from H, O, Ne, Na or Cl.

Question	Answer	Marks
9(a)	The nucleus of the atom contains protons and neutrons . The nucleus is surrounded by particles called electrons .	3
9(b)(i)	H	1
9(b)(ii)	Na	1

7 The diagram shows part of the structure of an atom of helium.



(a) There are three types of particle in an atom.

This diagram shows only two of the types of particle.

(i) Name the particles labelled **Z**.

..... [1]

(ii) Name the particles that are missing from the diagram.

.....

Draw on the diagram the correct position and number of the missing particles.

[2]

(b) The diagram shows the group of the Periodic Table that contains helium.

The elements are in the same order as they appear in the Periodic Table.


helium
neon
argon
krypton
xenon
radon

(i) Which element in the group has the **largest** atomic number?

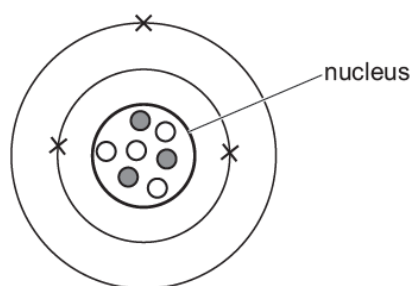
..... [1]

(ii) Describe how the radius of the atom changes as you go down the group.

..... [1]

Question	Answer	Marks
7(a)(i)	electrons	1
7(a)(ii)	protons two circles drawn inside the inner circle 	2
7(b)(i)	radon	1
7(b)(ii)	increases	1

8 Look at the diagram of the structure of a lithium atom.



(a) There are three electrons in a lithium atom.

(i) How many protons are there in a lithium atom?

..... [1]

(ii) How many neutrons are there in a lithium atom?

..... [1]

(b) A sodium atom contains 11 protons.

Draw the structure of a sodium atom.

Question	Answer	Marks
8(a)(i)	3	1
8(a)(ii)	4	1
8(b)	2.8.1 or <p>The diagram shows a central nucleus with 11 protons (grey circles) and 11 neutrons (white circles). There are 11 electrons (x marks) in three concentric shells: 2 in the inner shell, 8 in the middle shell, and 1 in the outer shell.</p>	2

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Chapter 12: Chemical Reactions

A balanced chemical equation:

A chemical equation in which the number of atoms in reactants is equal to the number of atoms in products. The number of atoms of individual elements are same in reactants and products

Note: If the equation is balanced, the mass is conserved that is the mass in reactants is equal to mass of products

Balancing a Chemical equation:

Kindly read the page 204 and 205 of the chemistry eBook provided earlier.

Displacement reaction:

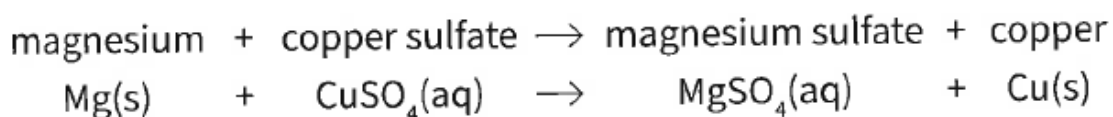
The reaction in which a more reactive metal displaces a less reactive metal from a compound. In this reaction, less reactive metal is set free. This is one of the way we extract metals.

Exam Tip:

You must remember the reactivity series.

Reactivity series of metals		
K	Potassium	<div>Most reactive</div> <div>↑</div> <div>Increasingly reactive</div> <div>↓</div> <div>Least reactive</div>
Na	Sodium	
Ca	Calcium	
Mg	Magnesium	
Al	Aluminium	
Zn	Zinc	
Fe	Iron	
Sn	Tin	
Pb	Lead	
Cu	Copper	
Hg	Mercury	
Ag	Silver	
Au	Gold	

Look at the reaction given below:



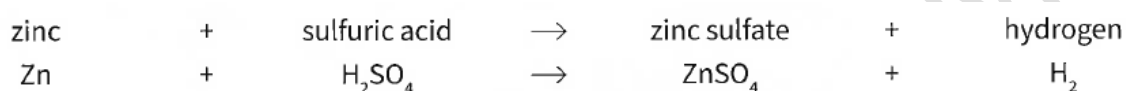
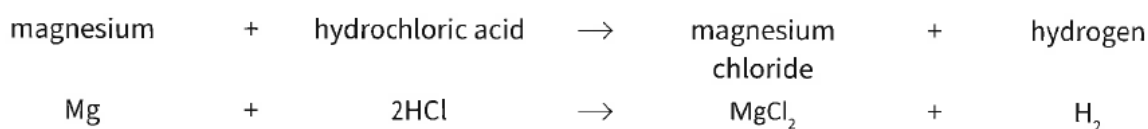
Magnesium replaces copper because magnesium is more reactive than copper. Magnesium is up in the reactivity series.

Making Salts from Acids and Metals:

When the metals react with acids, salts are produced with a gas. In the case of Hydrochloric Acid and Sulfuric acid, this gas is Hydrogen

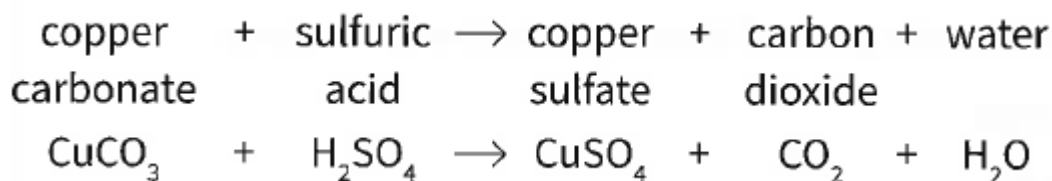
When the acid is Hydrochloric Acid, Chloride salt is formed

When acid is Sulfuric Acid, Sulphate salt is formed. Some examples are given below



Making Salts from Carbonates and Metals:

When Carbonates react with acids, they give out Salt, Carbon dioxide and water. An example is given below

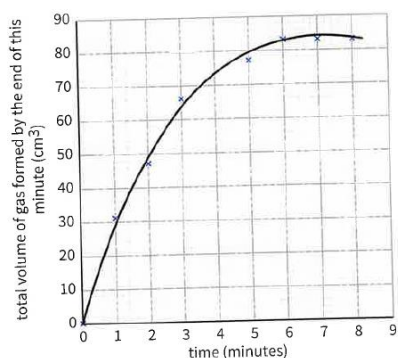


Rate of Reaction:

How quickly a reactant is used up to give products is called Rate of Reaction. More fast the reactants get used up, higher the rate of reaction is

How can you follow the rate of reaction?

By measuring the gas formed during the chemical reaction. When the rate of reaction is high, more gas is produced per minute. As the rate slows down, the gas produced per minute is decreased. Look at the graph below, If the slope of graph is increasing, the rate of reaction is increasing. If the slope is decreasing, the rate of reaction is decreasing.

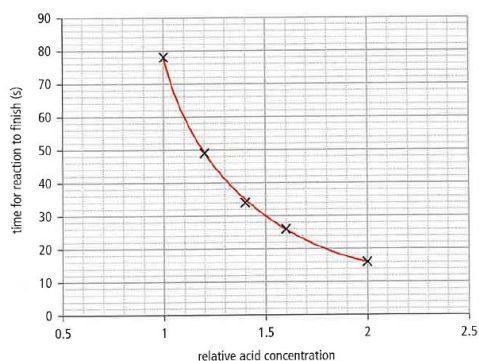


▲ Graph showing total volume of gas made by the end of each minute.

th.

Concentration and Rate of Reaction:

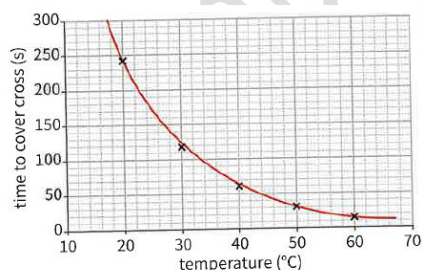
If the concentration of reactants is increased, the rate of reaction is increased and the reactions happens in less time. Look at the graph below.



▲ Graph showing the effect of acid concentration on the time for magnesium to finish reacting.

Temperature and Rate of Reaction:

More temperature increases the rate of reaction and less time is needed for the reaction to happen. Look at the graph below.



▲ Graph showing time to cover cross at different temperatures.

Surface Area of reactants:

If you increase the surface area of reactants by making powder of them, the rate of reaction is increased.

A powdered reactant reacts faster than the solid lump of the same reactant.

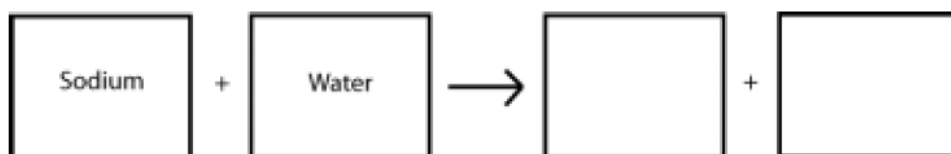
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- 9 (a) When sodium is added to water, a new compound is formed, a gas is produced and heat is given out in the reaction.

- (i) Write the correct scientific word that is used to indicate that heat is given out in a reaction.

..... [1]

- (ii) Complete the word equation.



[2]

- (b) Put a tick (✓) if heat is given out in the process.

burning	evaporation	melting	neutralisation

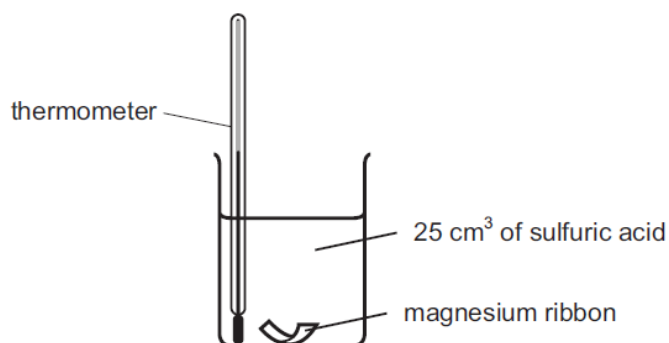
[2]

Part	Mark	Answer
(a) (i)	1	exothermic
(ii)	2	sodium hydroxide hydrogen
(b)	2	burning neutralisation
Total	5	

11 Safia investigates the reaction between magnesium ribbon and dilute sulfuric acid.

In each experiment Safia uses 25 cm^3 of sulfuric acid.

She records the temperature of the acid and then adds some magnesium ribbon.



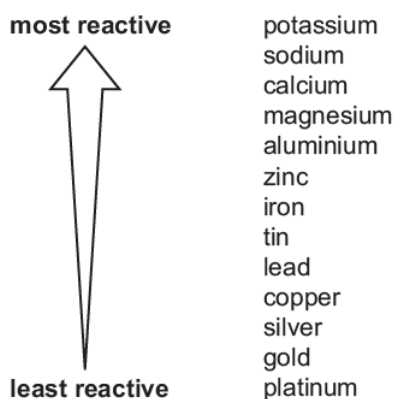
When the magnesium has finished reacting she records the temperature of the acid again.

Safia does this experiment six times.

Each time she uses a different length of magnesium ribbon.

11 Look at the diagram of the reactivity series.

It shows some metals in order of reactivity.



Use the diagram to answer these questions.

(a) (i) Which **three** metals react with cold water?

- 1
- 2
- 3 [1]

(ii) Which gas is produced when metals react with acids?

..... [1]

(b) It is possible to predict if a displacement reaction will happen using the reactivity series.

Tick (✓) **two** displacement reactions that will happen.

aluminium and silver nitrate ☐

calcium and zinc sulfate ☐

copper and sodium chloride ☐

lead and iron nitrate ☐

tin and magnesium chloride ☐

[2]

Question number			11	CSS00372
Part	CF	Skill	Mark	Answer
(a) (i)	9Cc2	K	1	potassium / K sodium / Na calcium / Ca
(ii)	9Cc2	K	1	hydrogen
(b)	9Cc4	A	2	<div>aluminium and silver nitrate <input checked="" type="checkbox"/></div> <div>calcium and zinc sulfate <input checked="" type="checkbox"/></div> <div>copper and sodium chloride <input type="checkbox"/></div> <div>lead and iron nitrate <input type="checkbox"/></div> <div>tin and magnesium chloride <input type="checkbox"/></div>
Total			4	

8 Aiko and Mike want to make the salt copper sulfate.

They react copper oxide with an acid.

(a) (i) What is the name of the acid they use?

..... [1]

(ii) What type of reaction takes place?

Circle the correct reaction.

- burning
- condensation
- fermentation
- neutralisation
- oxidation

[1]

(b) The sentences **A–F** describe the method they use.

They are in the wrong order.

- A** The filtrate is left for several days for the crystals to grow.
- B** The filtrate is heated until the first crystals appear.
- C** The reaction mixture is filtered to remove the excess copper oxide.
- D** Excess copper oxide is added to the acid.
- E** The filtrate is put into an evaporating dish.
- F** The reaction mixture is heated carefully for three minutes.

Fill in the boxes to show the correct order.

One box has been done for you.

			E		
--	--	--	----------	--	--

[2]

(c) Look at sentence **F**.

Write down **one** safety precaution Aiko and Mike should obey.

..... [1]

Question number	8		
Part	Mark	Answer	Further Information
(a) (i)	1	sulfuric (acid)	Accept H_2SO_4
(ii)	1	burning condensation fermentation <div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">neutralisation</div> oxidation	Accept other ways of indicating correct answer e.g. ticking or underlining but circle takes precedence more than one answer circled = 0 marks
(b)	2	D F C (E) B A	DFC in correct place = 1 mark BA in correct place = 1 mark
(c)	1	eye protection / tie (long) hair back / (heat proof) gloves / (idea of) apron or lab coat / standing up / use clamps or equivalent to hold apparatus	Accept common names for eye protection
Total	5		

8 Safia and Carlos do some displacement reactions.

(a) The sentences **A – D** describe the method they use.

The sentences are in the wrong order.

- A** They look to see if there is a reaction.
- B** They place different metals into five test-tubes.
- C** They add copper nitrate solution to each test-tube.
- D** They repeat the method with different solutions.

Complete the boxes to show the correct order.

One box has been done for you.

B			
----------	--	--	--

[1]

(b) The table shows their results.

✓ = a reaction takes place

✗ = there is no reaction

solution	metal			
	zinc	iron	lead	magnesium
zinc nitrate	✗	✗	✗	✓
iron nitrate	✓	✗	✗	✓
lead nitrate	✓	✓	✗	✓
magnesium nitrate	✗	✗	✗	✗

Use the information in the table to put the metals into the order of reactivity.

most reactive

↓

least reactive

[2]

(c) Complete the word equation for the reaction between zinc and lead nitrate.



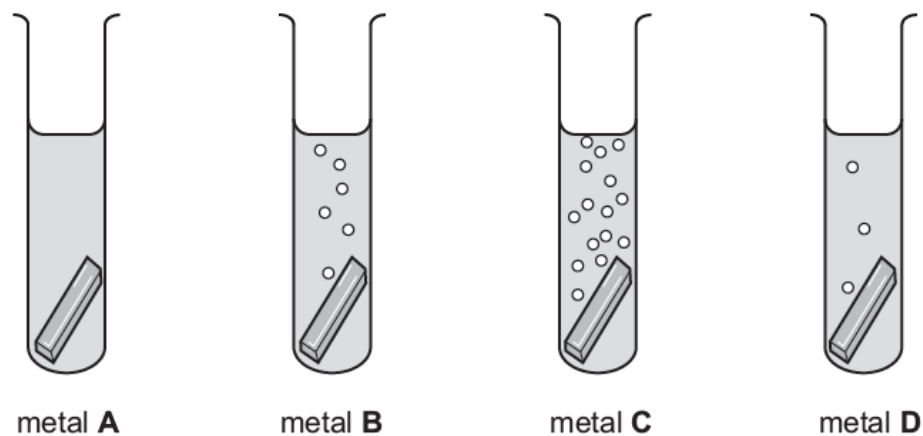
[2]

Question	Answer	Marks				
8(a)	<table><tr><td>(B)</td><td>C</td><td>A</td><td>D</td></tr></table>	(B)	C	A	D	1
(B)	C	A	D			
8(b)	magnesium zinc iron lead	2				
8(c)	zinc nitrate lead	2				

5 Yuri investigates the reaction of metals with acids.

He adds different metals to dilute hydrochloric acid.

The diagram shows his results.



(a) Complete the column heading and table to show Yuri's results.

metal
A	0
B	6
C
D

[2]

(b) Describe how Yuri could improve his method to find the volume of gas produced.

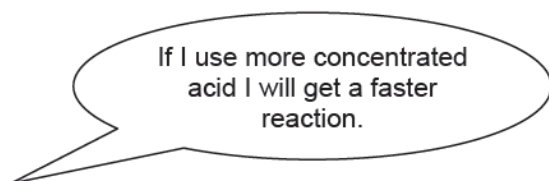
Tick (✓) the box next to the correct method.

- collect the gas in a measuring cylinder ☐
- collect the gas in a test tube ☐
- repeat the experiment the same way ☐
- use a smaller piece of metal ☐

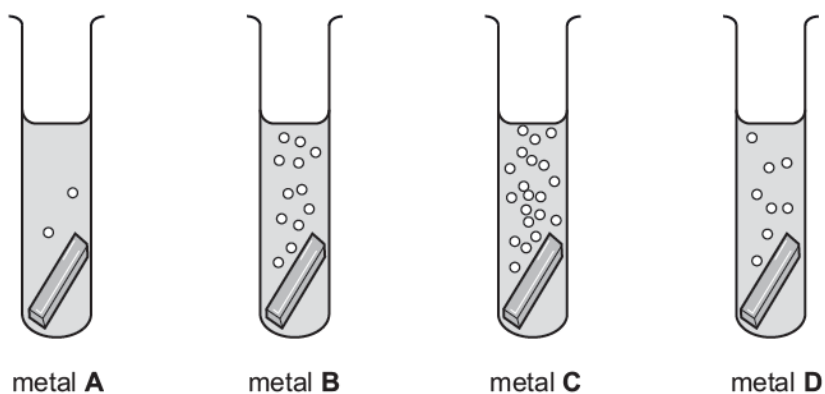
[1]

(c) Yuri repeats his experiment using more concentrated acid.

Yuri makes this prediction.



The diagram shows his results for his second experiment.



Is Yuri's prediction supported by his results?

yes ☐

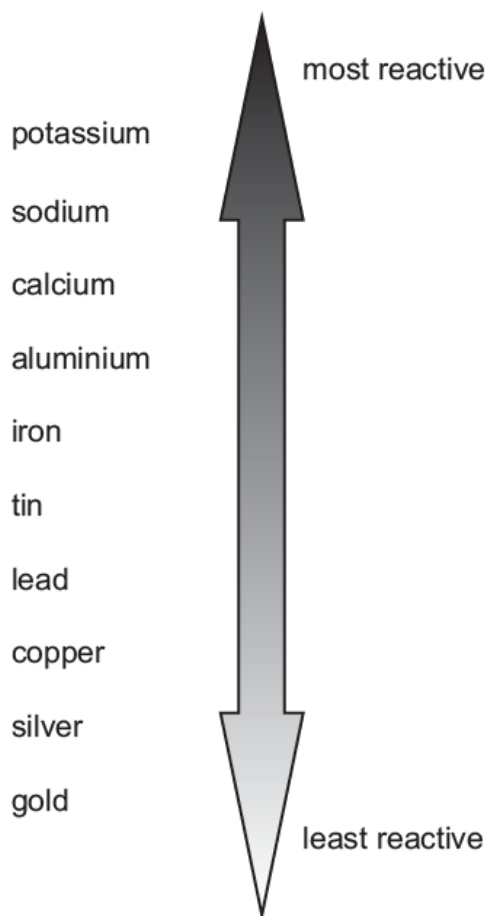
no ☐

Explain your answer.

.....
..... [1]

Question	Answer	Marks										
5(a)	<table><tr><th>metal</th><th>number of bubbles</th></tr><tr><td>A</td><td>(0)</td></tr><tr><td>B</td><td>(6)</td></tr><tr><td>C</td><td>15</td></tr><tr><td>D</td><td>3</td></tr></table>	metal	number of bubbles	A	(0)	B	(6)	C	15	D	3	2
metal	number of bubbles											
A	(0)											
B	(6)											
C	15											
D	3											
5(b)	<div>collect the gas in a measuring cylinder<input checked="" type="checkbox"/></div> <div>collect the gas in a test tube<input type="checkbox"/></div> <div>repeat the experiment the same way<input type="checkbox"/></div> <div>use a smaller piece of metal<input type="checkbox"/></div>	1										
5(c)	<div>yes</div> <div>and</div> <div>there were more bubbles in the tubes</div>	1										

16 The diagram shows some of the metals in the reactivity series.



(a) Iron reacts with dilute acid but not cold water.

Write down one metal that reacts with **both** dilute acid **and** cold water.

Choose your answer from the list in the diagram.

..... [1]

(b) Copper reacts with silver nitrate but **not** with lead nitrate.

Explain why.

.....
..... [2]

(c) When copper reacts with silver nitrate two products are made.

Write down the names of these **two** products.

..... and [1]

16(a)	potassium/sodium/ calcium	1
16(b)	(copper is) more reactive than silver / silver is lower in the reactivity series (than copper) (copper is) less reactive than lead / lead is higher in the reactivity series (than copper)	2
16(c)	copper nitrate and silver	1

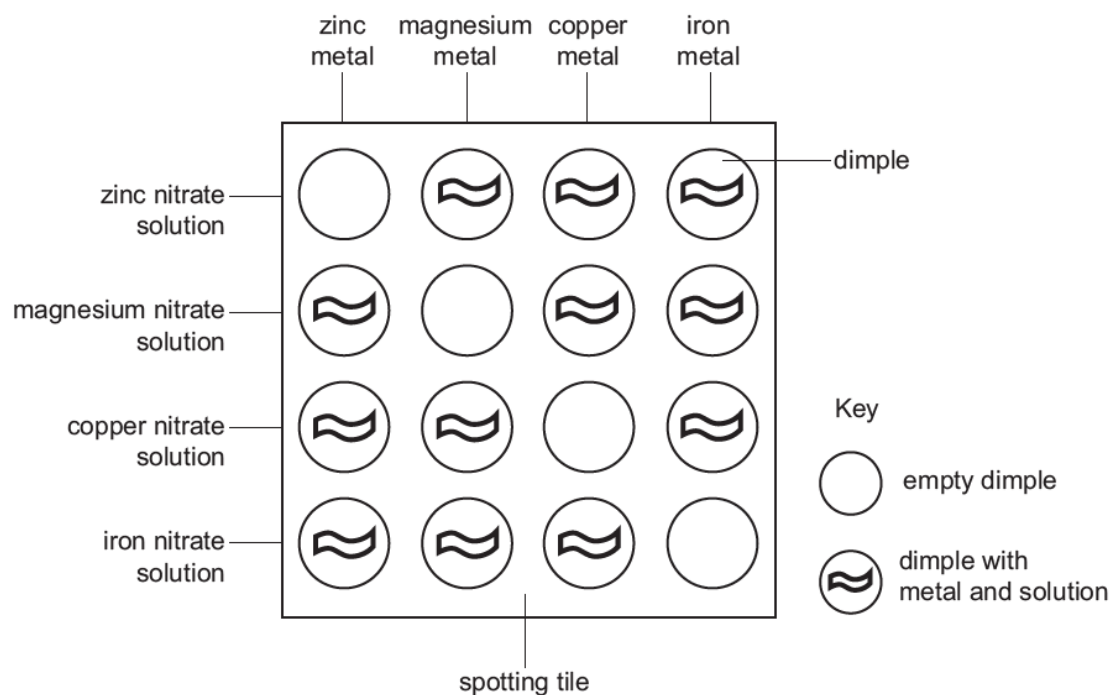
Compiled by Rafay Zia Mir

11 Jamila and Ahmed investigate displacement reactions.

They put drops of different solutions into the dimples of a spotting tile.

They then add metals to each solution.

The diagram shows their experiment.



(a) Jamila and Ahmed look to see if a reaction takes place.

Suggest what they might see if a reaction takes place.

[1]

(b) They record their results in a table.

They put a

- tick (✓) if there is a reaction
- cross (x) if there is no reaction.

Here are some of their results.

solution	metal			
	zinc	magnesium	copper	iron
zinc nitrate		✓	X	X
magnesium nitrate				
copper nitrate	✓	✓		✓
iron nitrate	✓	✓	X	

(i) Complete the table to predict the results for magnesium nitrate. [1]

(ii) The reactivity series shows the metals in order of reactivity.

Which of the four metals is the **lowest** in the reactivity series?

..... [1]

Question	Answer	Marks						
11(a)	colour change / fizzing / bubbles / new substance forms / some form of coating	1						
11(b)(i)	<table><tr><td>magnesium nitrate</td><td>X</td><td></td><td>X</td><td>X</td><td></td></tr></table>	magnesium nitrate	X		X	X		1
magnesium nitrate	X		X	X				
11(b)(ii)	copper	1						

2 Aiko wants to increase the rate of reaction between sodium carbonate and dilute nitric acid.

(a) Match the **way** that she can do this to **why it works**.

Draw only **two** straight lines.

way	why it works
increase the temperature of nitric acid	more crowded particles so more collisions
	particles have less energy so more collisions
increase the concentration of nitric acid	particles move faster so more collisions
	has bigger particles so that there are more collisions

[2]

(b) Lumps of sodium carbonate react more slowly with dilute nitric acid than powdered sodium carbonate.

Use ideas about collisions to explain why.

.....

.....

.....

[2]

Question	Answer	Marks
2(a)	<div> <div>increase the temperature of nitric acid</div> <div>increase the concentration of nitric acid</div> <div>more crowded particles so more collisions</div> <div>more surface area so more collisions</div> <div>particles move faster so more collisions</div> <div>has bigger particles so that there are more collisions</div> </div>	2
2(b)	<p>any two from</p> <p>(idea that) larger pieces have smaller (surface) area / ora</p> <p>reaction occurs at the surface</p> <p>so fewer collisions / ora</p>	2

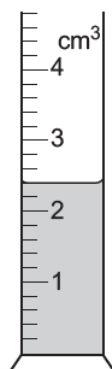
11 Mia investigates the temperature change during some reactions.

In each experiment Mia adds a solid to a liquid.

She measures the temperature of the liquid before and after adding the solid.

(a) Mia uses a measuring cylinder to measure the volume of liquid.

The diagram shows part of her measuring cylinder of liquid.



What is the volume of liquid in the measuring cylinder?

..... cm³

[1]

(b) Here are Mia's results.

liquid added	temperature of liquid	solid(s) added	temperature of the liquid after solid is added	change in temperature	is the reaction exothermic or endothermic?
water	17	copper sulfate	20	+3
water	17	citric acid and sodium hydrogencarbonate	14
copper sulfate solution	18	zinc	22

- (i) She does not include some important information in the headings of the table.

Which unit is missing from the headings?

..... [1]

- (ii) Calculate the change in temperature for each experiment.

One has been done for you.

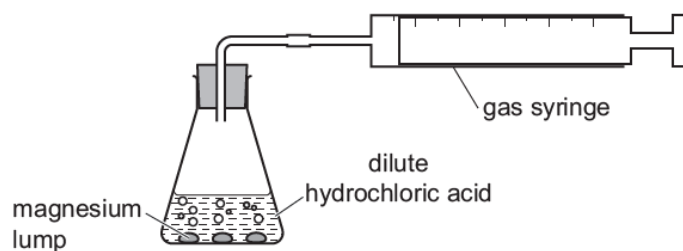
Write your answers in the table. [1]

- (iii) Complete the table by writing endothermic or exothermic in the last column. [1]

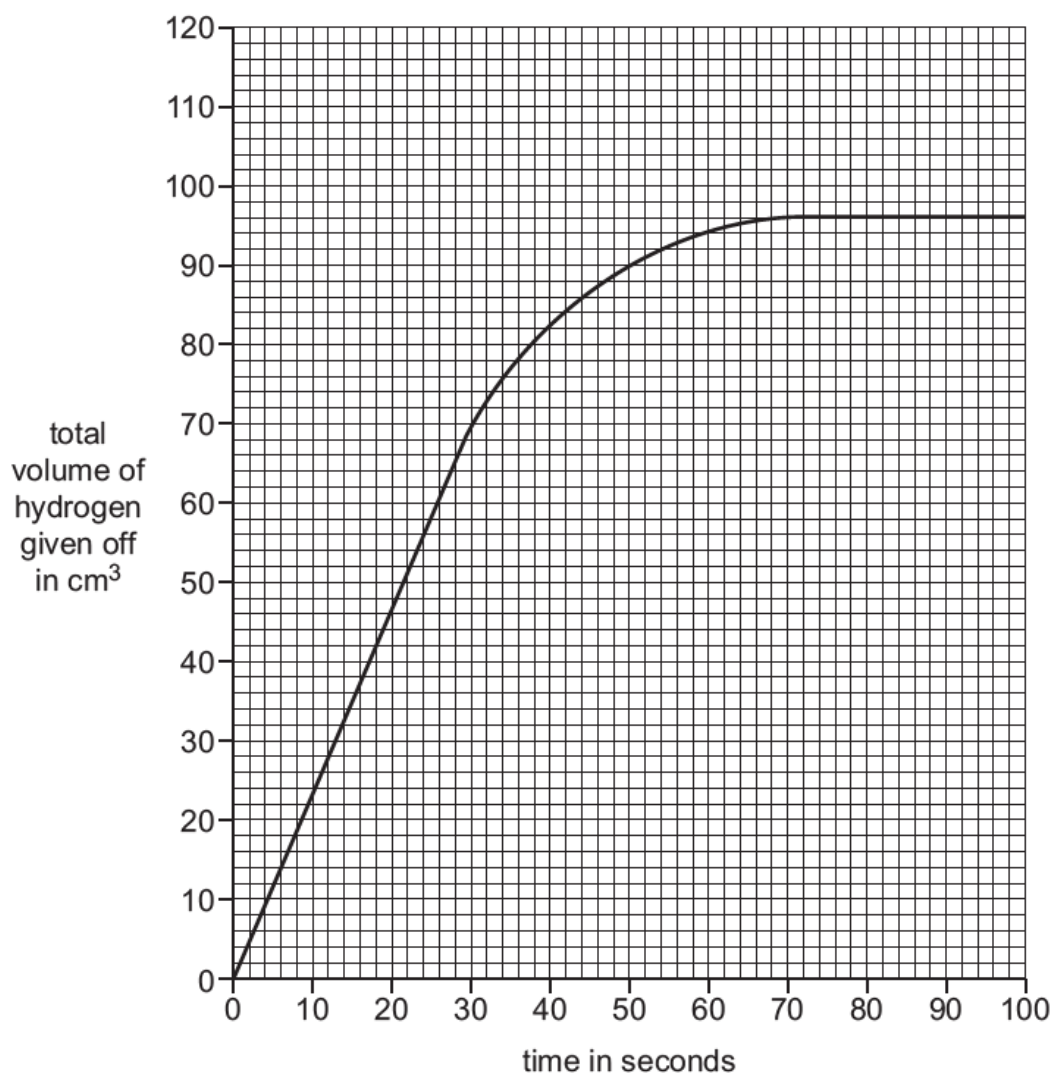
Question	Answer	Marks				
11(a)	2.4 (cm ³)	1				
11(b)(i)	°C	1				
11(b)(ii)	<table><tr><td>change in temperature</td></tr><tr><td>(+3)</td></tr><tr><td>-3</td></tr><tr><td>+4</td></tr></table>	change in temperature	(+3)	-3	+4	1
change in temperature						
(+3)						
-3						
+4						
11(b)(iii)	<table><tr><td>type of reaction</td></tr><tr><td>exothermic</td></tr><tr><td>endothermic</td></tr><tr><td>exothermic</td></tr></table>	type of reaction	exothermic	endothermic	exothermic	1
type of reaction						
exothermic						
endothermic						
exothermic						

12 Ahmed investigates the reaction between magnesium **lumps** and dilute hydrochloric acid.

Look at the diagram. It shows the apparatus he uses.



Look at the graph of Ahmed's results.



(a) How long (in seconds) does it take to make 50 cm³ of hydrogen?

..... seconds

[1]

(b) Ahmed repeats the experiment with magnesium powder.

Predict what will happen to the rate of the reaction.

.....

Explain why.

.....

.....

.....

[3]

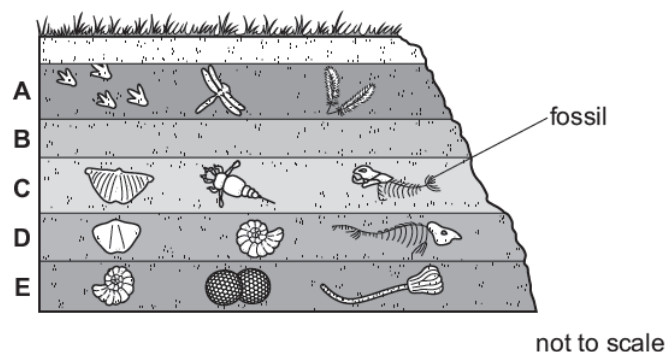
Question	Answer	Marks
12 (a)	any value between 21 and 22 (seconds)	1
(b)	rate of reaction increases / gets larger / gets faster idea that smaller pieces have larger (surface) area / ora so more collisions / ora	3

Continental Drift, Evidence of fossils, Evidence of seafloor spreading

Kindly refer to pages 228 to 235 of the chemistry book. It is all story, so you can read it by yourself. One past paper question is added here.

- 2 Sedimentary rocks are formed in layers.

Look at the diagram of layers of sedimentary rocks.



- (a) Which layer has the **youngest** fossils?

[1]

- (b) Metamorphic rocks do not normally contain fossils.

Tick (✓) the box next to the correct explanation.

Animals did not live in areas where metamorphic rocks were formed.

☐

Metamorphic rocks are formed when molten rock cools.

☐

Metamorphic rocks were formed before there was life on Earth.

☐

Metamorphic rocks were formed under high temperatures and pressures.

☐

[1]

Question	Answer	Marks
2(a)	A	1
2(b)	<div>Animals did not live in areas where metamorphic rocks were formed. <input type="checkbox"/></div> <div>Metamorphic rocks are formed when molten rock cools. <input type="checkbox"/></div> <div>Metamorphic rocks were formed before there was life on Earth. <input type="checkbox"/></div> <div>Metamorphic rocks are formed under high temperatures and pressures. <input checked="" type="checkbox"/></div>	1

Compiled by Rafay Zia Mir