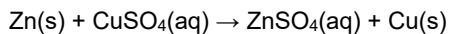


Predicting Chemical Reactions (F)

1. Zinc, Zn, reacts with copper sulfate solution, CuSO₄.



What type of reaction is this?

- A Combustion
- B Displacement
- C Neutralisation
- D Thermal decomposition

Your answer

[1]

2. The table shows the composition of the Earth's early atmosphere compared with the atmosphere today.

	Nitrogen	Oxygen	Argon	Carbon dioxide
Percentage of gas in the early atmosphere	4	0.5	0.5	95
Percentage of gas in the atmosphere today	78	21	0.9	0.04

Which gas has **changed by the largest percentage** from the early atmosphere to the atmosphere today?

- A Nitrogen
- B Oxygen
- C Argon
- D Carbon dioxide

Your answer

[1]

3. Which of these elements is a **transition metal**?

- A Calcium
- B Caesium
- C Carbon
- D Cobalt

Your answer

[1]

4. Lithium, sodium and potassium all react with water.

In all three reactions the same gas is produced.

What is the name of the gas?


- A Carbon dioxide
- B Chlorine
- C Hydrogen
- D Oxygen

Your answer

[1]

5 (a). This question is about elements in the Periodic Table.

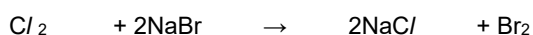
Look at the table. It shows some properties of Group 7 elements.

Element	Molecular formula	State at room temperature	Radius of an atom (nm)	Order of reactivity
Fluorine	F ₂	0.072	most reactive  least reactive
Chlorine	Cl ₂	gas	0.099	
Bromine	Br ₂	liquid	0.114	
Iodine	I ₂	solid	0.133	
Astatine	At ₂	solid	

In the table, the Group 7 elements are listed in order of reactivity.

The equations show a displacement reaction of Group 7 elements.

chlorine + sodium bromide → sodium chloride + bromine



i. Complete the word equation.

bromine + sodium iodide → _____ + _____ [1]

ii. There is no reaction between iodine and sodium bromide.

Explain why.

.....
 [1]

iii. Chlorine reacts with sodium iodide. Sodium chloride and iodine are made.

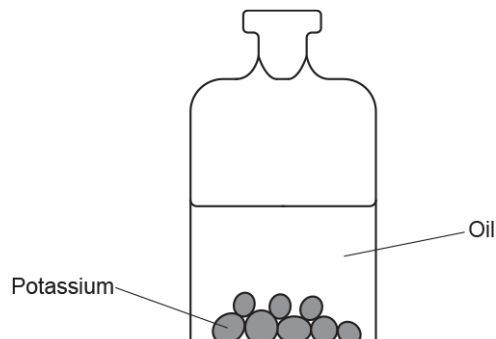
Write the **balanced symbol** equation for this reaction.

..... [2]

(b). Group 1 is a group of elements in the Periodic Table.

i. Potassium is a Group 1 metal.

Potassium is stored under oil because it is very reactive.



What does the oil stop the potassium reacting with?

----- [1]

ii. Sodium is another Group 1 metal.

Sodium reacts in a similar way to potassium.

Explain why.

Use ideas about atomic structure in your answer.

----- [1]

6. A student reacts some metals with different salt solutions.

Table 17.2 shows her results.

	Magnesium	Zinc	Iron	Copper
Copper sulfate	blue solution becomes colourless	blue solution becomes colourless	blue solution becomes green	no reaction
Iron sulfate	green solution becomes colourless	green solution becomes colourless	no reaction	no reaction
Magnesium sulfate	no reaction	no reaction	no reaction	no reaction
Zinc sulfate	black coating on magnesium	no reaction	no reaction	no reaction

Table 17.2

- i. What colour is **iron sulfate** solution?

----- [1]

- ii. Write down the order of reactivity of the four metals copper, iron, magnesium and zinc. Use **Table 17.2** to help you.

..... **most reactive**

.....

.....

..... **least reactive**

[2]

- iii. Magnesium reacts with copper sulfate, CuSO_4 .
Magnesium sulfate, MgSO_4 , and copper are made.
Write the **balanced symbol** equation for this reaction.

----- [1]

7. This question is about elements in the Periodic Table.

Look at the table. It shows some properties of Group 7 elements.

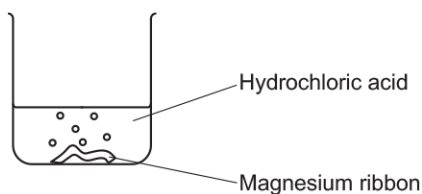
Element	Molecular formula	State at room temperature	Radius of an atom (nm)	Order of reactivity
Fluorine	F ₂	0.072	most reactive ↑ ↓ least reactive
Chlorine	Cl ₂	gas	0.099	
Bromine	Br ₂	liquid	0.114	
Iodine	I ₂	solid	0.133	
Astatine	At ₂	solid	

Complete the table. Use ideas about trends down a Group to help you.

[2]

8 (a). A student investigates the reaction between magnesium and dilute hydrochloric acid, HCl.

The student adds magnesium ribbon to hydrochloric acid in a beaker, as shown in the diagram.



Magnesium chloride, MgCl₂, and hydrogen gas are made.

Write the **balanced symbol** equation for this reaction.

----- [2]

(b). *The student measures the time it takes for all the magnesium to react. This is the reaction time.

The student does five experiments.

This is the student's prediction:

"The smaller the volume of acid and the smaller the mass of magnesium, the shorter the reaction time."

Look at the student's results.

Experiment	Mass of magnesium used (g)	Volume of acid used (cm ³)	Concentration of acid (mol / dm ³)	Reaction time (s)
1	0.05	25	1.0	30
2	0.05	50	1.0	30
3	0.05	50	2.0	15
4	0.10	25	1.0	30
5	0.10	50	2.0	15

9 (a). The Group 7 elements are known as the halogens.

The halogens have similar chemical properties.

Their physical properties vary with increasing atomic number.

Look at the table of information about the halogens.

Halogen	Atomic symbol	Atomic number	Molecular formula	Atomic radius in pm	Reaction of halogen with sodium iodide solution
fluorine	F	9	F ₂	64	Makes iodine and sodium fluoride
chlorine	Cl	17	Cl ₂	99	Makes iodine and sodium chloride
bromine	Br	35	Br ₂	114
iodine	I	53	I ₂	133	No reaction
astatine	At	85	No reaction

i. Predict the molecular formula and atomic radius of astatine.

Put your answers in the table.

[2]

ii. Predict the reaction of bromine with sodium iodide solution.

Put your answer in the table.

[1]

iii. Explain your answer to (ii) in terms of the reactivity of the halogens.

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

(b). All halogens react with alkali metals to make a salt.

i. All halogens have similar chemical reactions.

Explain why in terms of electronic structure.

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

ii. Sodium reacts with bromine to make sodium bromide, NaBr.

Construct the **balanced symbol** equation for this reaction.

[2]

iii. What is the formula of the product of the reaction between astatine and potassium?

[1]

10. A student reacts some metals with different salt solutions and records her results.

She places a tick (✓) in her results table if she sees a chemical change and a cross (x) if there is no reaction.

Some of the boxes are blanked out.

	Magnesium chloride	Silver nitrate	Copper(II) sulfate	Iron(II) sulfate
Magnesium		✓	✓	✓
Silver	x		x	x
Copper	x	✓		x
Iron	x	✓	✓	

What is the order of reactivity (**most** reactive to **least** reactive) of these four metals?

- A. magnesium, copper, iron, silver
 B. magnesium, iron, copper, silver
 C. silver, copper, iron, magnesium
 D. iron, silver, magnesium, copper

Your answer

[1]

11. Which statement is correct for a Group 1 element?

- A. It dissolves in water to form a bleach.
 B. It is a non-metal.
 C. It is an inert gas.
 D. It reacts with water to form hydrogen.

Your answer

[1]

END OF QUESTION PAPER