



Additional Assessment Materials  
Summer 2021

Pearson Edexcel GCSE in Chemistry (1CH0)  
Higher

Resource Set Topic J: Groups in the periodic  
table

Questions

(Public release version)

## **Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

## General guidance to Additional Assessment Materials for use in 2021

### Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

### Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

2

(b) Describe what you would **see** if damp, blue litmus paper is placed into chlorine gas.

(2)

---

---

---

---

2

(d) When the gas hydrogen chloride, HCl, is dissolved in water, a solution forms.  
Blue litmus paper dipped in this solution turns red.

State why the litmus paper turns red.

(1)

---

---

3

(b) Sodium reacts with water to form sodium hydroxide solution and hydrogen.

Complete the balancing of the equation for this reaction and add the state symbols for each substance.

(3)



(c) In an experiment equal-sized pieces of lithium, sodium and potassium are added to separate samples of water.

A flame is produced only with potassium because potassium

(1)

- A** is the softest metal
- B** has the lowest melting point
- C** is the most reactive
- D** is the only flammable metal

(d) Explain, in terms of electronic configurations, the increase in reactivity from lithium to sodium to potassium.

(2)

---

---

---

---

---

---

---

---

7 (a) Describe what is **seen** when chlorine water is added to potassium bromide solution and the mixture shaken.

(2)

---

---

---

---

---

(b) Chlorine reacts with potassium bromide to form potassium chloride and bromine. In this reaction chlorine forms chloride ions



(i) In this reaction, chlorine has been reduced.

Explain, using the equation, how you know that chlorine has been reduced.

(2)

---

---

---

---

---

---

---

---

(ii) Write the half equation for the formation of bromine from bromide ions.

(2)

---

---

(c) Aluminium reacts with chlorine to form aluminium chloride.

Write the balanced equation for this reaction.

(3)

---

3

(c) Chlorine reacts with hydrogen to form hydrogen chloride.

Write the balanced equation for this reaction.

(3)

6

(b) Lithium, potassium and rubidium are alkali metals.

(i) Describe what you would see when a small piece of rubidium is dropped on to water.

(2)

(ii) The electronic configuration of lithium is 2.1  
The electronic configuration of potassium is 2.8.8.1  
Lithium is less reactive than potassium.

Explain, in terms of their electronic configurations, why lithium is less reactive than potassium.

(3)

9 Fluorine, chlorine, bromine, iodine and astatine are elements in group 7.

(a) Describe the test to show that a gas is chlorine.

(2)

---

---

---

---

(b) Bromine reacts with hydrogen to form hydrogen bromide.

Hydrogen bromide dissolves in water to form a solution.

State the name of the solution formed.

(1)

---

(c) There is a trend in the colour and the state of the halogens at room temperature.

Predict the colour and state of astatine at room temperature.

(2)

colour .....

state .....



- (d) Bromine, chlorine and iodine are dissolved in water to make aqueous solutions. Potassium iodide solution is added to each of these solutions.

Figure 6 shows the observations.

halogen	initial colour of aqueous solution	final colour of mixture
bromine	orange	brown
chlorine	pale green	brown
iodine	brown	brown

**Figure 6**

Explain the observations shown in the table.

(4)

---

---

---

---

---

---

---

---

---

---

- (e) Fluorine reacts vigorously with iron to produce iron(III) fluoride,  $\text{FeF}_3$ .

Write the balanced equation for this reaction.

(2)

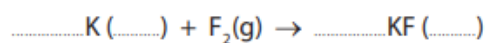
---

2

- (d) Potassium reacts with fluorine to form potassium fluoride.  
Potassium fluoride is a solid.

Complete the balanced equation for this reaction and add the state symbols.

(3)



6

- (b) Sodium iodide solution is colourless.

When a solution of bromine is added to sodium iodide solution, a reaction occurs.



- (i) The mixture turns brown.

Give the name of the substance causing the brown colour.

(1)

- (ii) Explain which substance has been reduced in this reaction.

(2)

---

---

---

---

---

7

(b) The density of a gas can be found using the equation

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

A student carried out an experiment to find the density of argon.

The mass of a stopper and flask, containing no gas, was known.  
The flask was completely filled with argon and its mass measured.

Figure 4 shows the results the student wrote down.

mass of stopper and flask in g	78.639
mass of stopper and flask full of argon in g	79.120
volume of flask in cm <sup>3</sup>	250.0

**Figure 4**

(i) Use the results to calculate the density of argon in g cm<sup>-3</sup>.

(2)

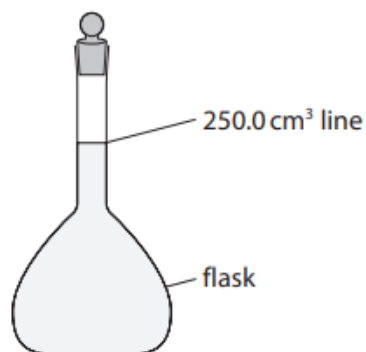
.....

.....

.....

density of argon = ..... g cm<sup>-3</sup>

- (ii) The flask used for the experiment is shown in Figure 5.  
The flask holds  $250.0\text{ cm}^3$  when filled up to the line.



**Figure 5**

There is an error in the volume the student has used in the calculation.  
This would give an incorrect value for the density of argon.

Identify this error and state what should be done to correct it.

(2)

error .....

what should be done to correct it .....

7

- (c) Four of the noble gases are argon, helium, krypton and neon.

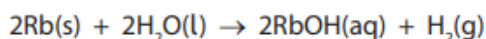
Give these gases in order of increasing density.

(2)

.....  
.....

8 The first four elements in group 1 are lithium, sodium, potassium and rubidium.

(a) Rubidium reacts with water to form rubidium hydroxide and hydrogen.



(i) Predict what you would **see** when a small piece of rubidium is placed in a large volume of water.

(3)

.....

.....

.....

.....

.....

(ii) Why is rubidium more reactive than potassium?

(1)

- A the metallic bonds in rubidium are weaker than those in potassium
- B rubidium is a softer metal than potassium
- C the outer electron of a rubidium atom is further from the nucleus than potassium's
- D rubidium has a more exothermic reaction with water than potassium does

(iii) 8.5g of rubidium are reacted completely with water.

The reaction makes a solution of rubidium hydroxide.

The volume of this solution is 2.5 dm<sup>3</sup>.

Calculate the concentration of the rubidium hydroxide solution in g dm<sup>-3</sup>.

(relative atomic mass: Rb = 85; relative formula mass: RbOH = 102)

(4)

.....

.....

.....

.....

.....

concentration = ..... g dm<sup>-3</sup>

---

**TOTAL FOR PAPER IS 57 MARKS**