

Paper Reference(s) **4SS0/1C**

Pearson Edexcel International GCSE (9–1)

Chemistry

Unit: 4SS0

Science (Single Award)

Paper: 1C

Wednesday 12 June 2019 – Morning

Time: 1 hour 10 minutes plus your additional time allowance

INSTRUCTIONS TO CANDIDATES

Write your centre number, candidate number, surname, other names and your signature in the boxes below. Check that you have the correct question paper.

Centre No.					
Candidate No.					
Surname					
Other names					
Signature					
Paper Reference	4	S	S	0	/ 1 C

- Use **BLACK** ink or ball-point pen.
- Answer **ALL** questions.
- Answer the questions in the spaces provided – there may be more space than you need.
- Calculators may be used.
- Some questions must be answered with a cross in a box ☐. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☐.

MATERIALS REQUIRED FOR EXAMINATION

Calculator

ITEMS INCLUDED WITH QUESTION PAPERS

Periodic Table

INFORMATION FOR CANDIDATES

- The total mark for this paper is 60.
- The marks for **EACH** question are shown in brackets – use this as a guide as to how much time to spend on each question.
- A Periodic Table is provided.

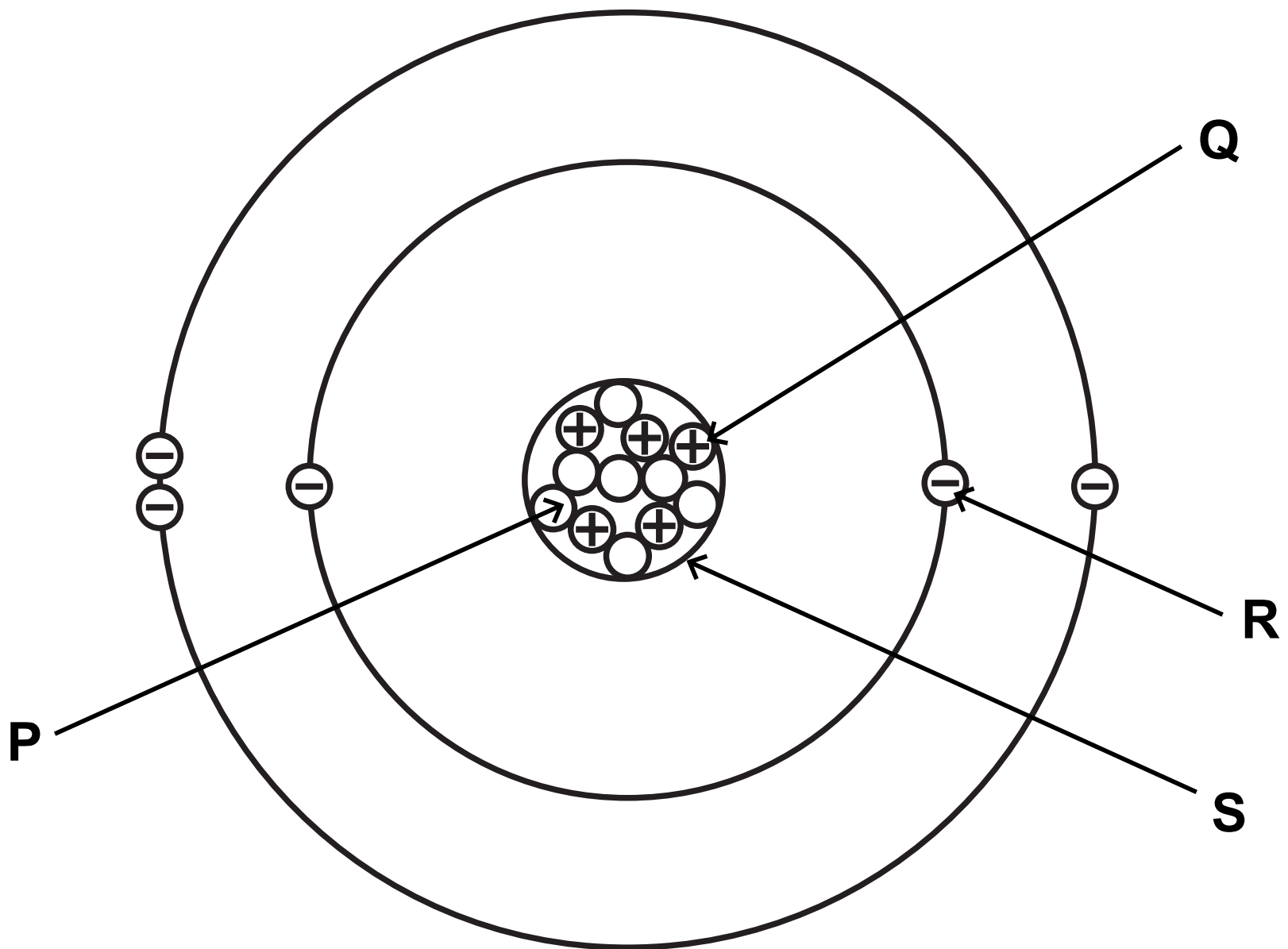
ADVICE TO CANDIDATES

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

(Turn over)

Answer ALL questions.

- 1 The diagram shows the particles in an atom of an element.



- (a) Name the particles labelled P, Q and R. (3 marks)

P _____

Q _____

R _____

(Question continues on next page)

(Turn over)

(b) Name the part of the atom labelled S. (1 mark)

**(c) (i) What is the atomic number of this atom?
(1 mark)**

☐ A 5

☐ B 7

☐ C 12

☐ D 17

**(ii) What is the mass number of this atom?
(1 mark)**

☐ A 5

☐ B 7

☐ C 12

☐ D 17

(Question continues on next page)

(Turn over)

(iii) Identify this element. (1 mark)

(TOTAL FOR QUESTION 1 = 7 MARKS)

(Questions continue on next page)

- 2 Iron reacts with dilute sulfuric acid to form a salt called iron(II) sulfate.**

The formula of iron(II) sulfate is FeSO_4

- (a) (i) How many different elements are there in iron(II) sulfate? (1 mark)**

☐ **A 2**

☐ **B 3**

☐ **C 4**

☐ **D 6**

- (ii) Use information from the Periodic Table to calculate the relative formula mass of iron(II) sulfate. (2 marks)**

relative formula mass = _____

(Question continues on next page)

(Turn over)

**(b) Some iron filings are added to dilute sulfuric acid.
The mixture is warmed and hydrogen gas is given off.**

(i) State why the mixture is warmed. (1 mark)

**(ii) State the observation that shows a gas is being
given off. (1 mark)**

(iii) Give the test for hydrogen gas. (1 mark)

(Question continues on next page)

(Turn over)

(c) When the reaction stops, some iron filings remain.

(i) State why the reaction stops. (1 mark)

(ii) Give a chemical equation for the reaction between iron and sulfuric acid. (1 mark)

(TOTAL FOR QUESTION 2 = 8 MARKS)

(Questions continue on next page)

(Turn over)

3 Sodium chloride is a soluble salt.

(a) Name the acid and the alkali that can be used to make sodium chloride. (2 marks)

acid _____

alkali _____

(Question continues on next page)

- (b) A teacher drops a bottle containing sodium chloride. The bottle breaks when it hits the floor. The teacher sweeps up the mixture of sodium chloride and glass.**

**Describe how the teacher can obtain a pure, dry sample of sodium chloride from the mixture.
(4 marks)**

(Continue your answer on next page)

(Turn over)

(TOTAL FOR QUESTION 3 = 6 MARKS)

(Questions continue on next page)

4 Crude oil is a mixture of hydrocarbons, most of which are alkanes.

**(a) (i) State what is meant by the term
HYDROCARBON. (2 marks)**

**(ii) Give the general formula for the alkanes.
(1 mark)**

**(b) Name the process used to separate crude oil into
fractions. (1 mark)**

(Question continues on next page)

(Turn over)

- (c) One of the fractions obtained from crude oil is fuel oil.

Fuel oil is used to heat homes.

Explain why burning fuel oil in an insufficient supply of oxygen is dangerous. (2 marks)

(Question continues on next page)

- (d) Another fraction obtained from crude oil is gasoline.

Gasoline is used to make petrol for cars.

- (i) Explain why it is dangerous to light a match even when standing several metres away from a petrol spillage. (2 marks)

(Question continues on next page)

- (ii) Suggest why a petrol spillage is more dangerous than a fuel oil spillage. (1 mark)

(TOTAL FOR QUESTION 4 = 9 MARKS)

(Questions continue on next page)

- 5 This question is about metals in Group 1 of the Periodic Table.**

When these metals are added to water, they form hydrogen gas and an alkaline solution.

- (a) A teacher adds a small piece of lithium to a trough of water to form a solution.**

She dips a piece of platinum wire into the solution. She then places the wire into a hot Bunsen flame and the flame changes colour.

- (i) State the new colour of the flame. (1 mark)**
-

- (ii) Give the formula of the ion responsible for the new colour. (1 mark)**
-

(Question continues on next page)

(Turn over)

(iii) The teacher adds a few drops of litmus indicator to the solution.

Explain the colour of the litmus indicator after it is added to the solution. (2 marks)

(Question continues on next page)

- (b) The teacher adds a small piece of sodium to a second trough of water.

The sodium floats and moves around the surface of the water as it reacts.

- (i) Give two other observations that are made as sodium reacts with water. (2 marks)

1 _____

2 _____

(Question continues on next page)

- (ii) Complete the chemical equation for the reaction of sodium with water. (1 mark)



- (c) The teacher adds a small piece of potassium to a third trough of water.

- (i) Give one observation that is different when using potassium instead of sodium. (1 mark)

- (ii) Give a possible pH value for the solution that forms when potassium reacts with water. (1 mark)

(Question continues on next page)

(Turn over)

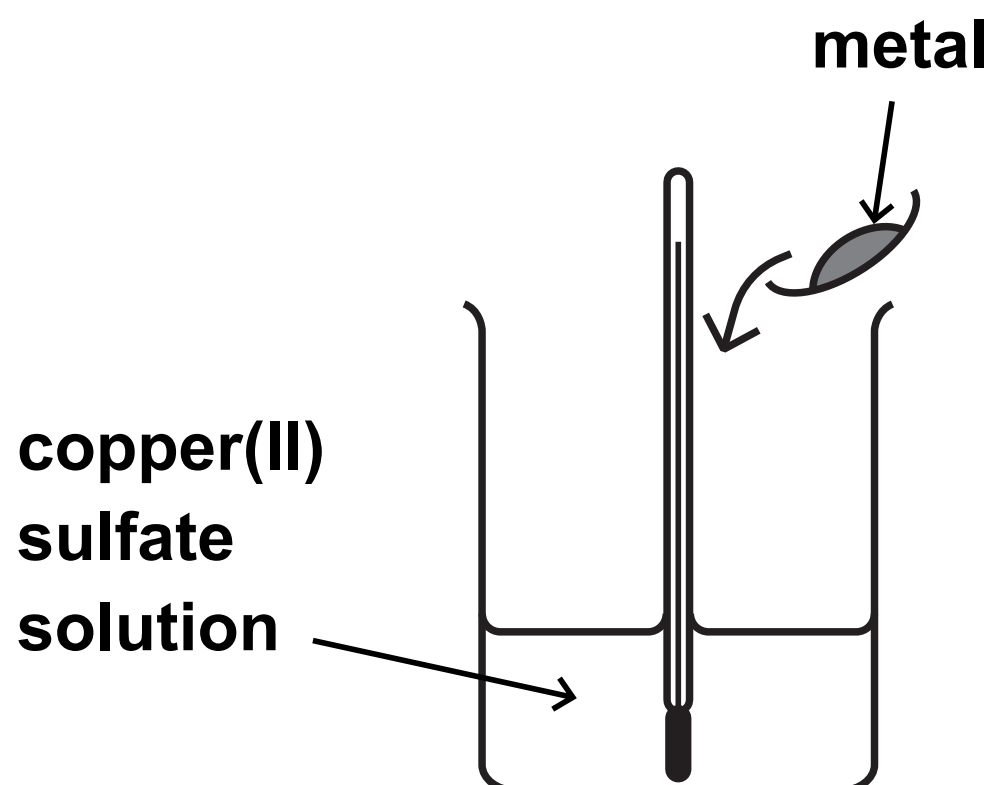
- (d) Explain why the reaction of rubidium with water is more vigorous than the reaction of potassium with water. (2 marks)**

(TOTAL FOR QUESTION 5 = 11 MARKS)

(Questions continue on next page)

(Turn over)

- 6 A student uses this apparatus to investigate the temperature changes that occur when metals are added to copper(II) sulfate solution.



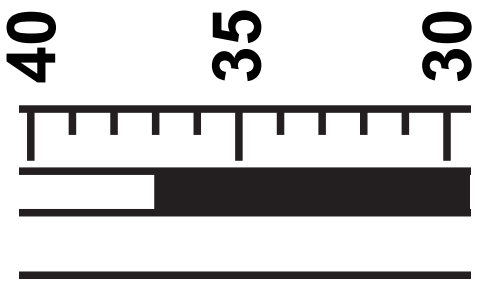
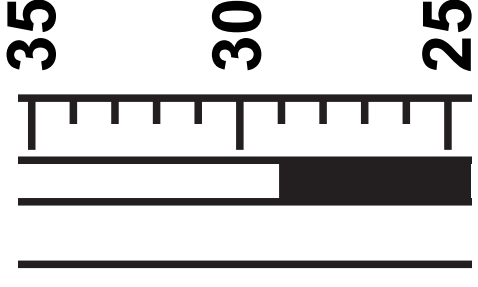
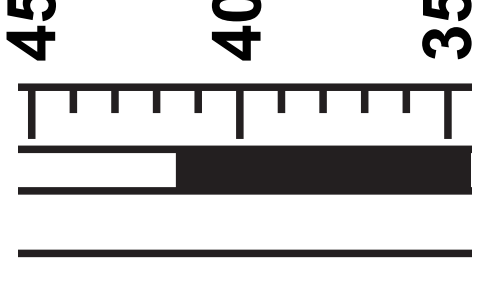
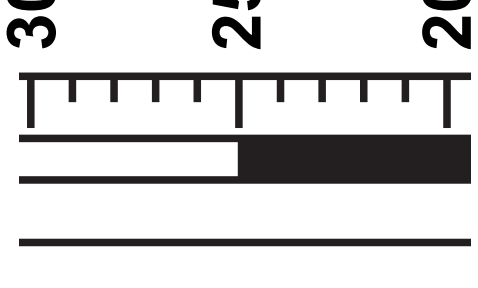
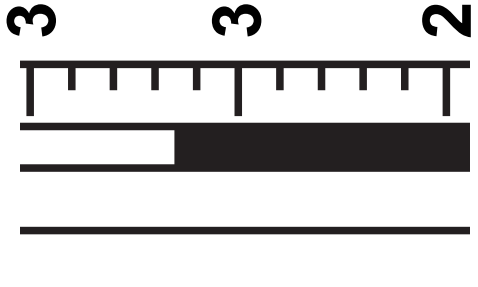
This is the student's method.

- add a sample of aluminium to a beaker containing 25 cm^3 of copper(II) sulfate solution
- stir the mixture and record the highest temperature reached

The student repeats the experiment four times, using the same amount of a different metal each time.

(Question continues on next page)

(a) The table shows the thermometer readings for each metal.

	Aluminium	Iron	Magnesium	Silver	Zinc
Thermometer reading					
Highest temperature reached in °C				25.0	

Complete the table by recording the highest temperature reached for each metal, giving all temperatures to the nearest 0.5°C. (2 marks)

(Question continues on next page)

(b) The initial temperature of the copper(II) sulfate solution in each experiment is 25.0 °C.

(i) Suggest why magnesium produces the largest temperature rise. (1 mark)

(ii) Explain why there is no temperature change with silver. (2 marks)

(Question continues on next page)

(Turn over)

- (c) In the experiment with magnesium, using 25 cm^3 of solution means that the copper(II) sulfate is in excess.

In another experiment, the student uses the same amount of magnesium but adds it to 50 cm^3 of copper(II) sulfate solution.

Explain how the change in volume affects the temperature rise. (2 marks)

(Question continues on next page)

- (d) In another experiment, the student adds a metal to 45 cm^3 of copper(II) sulfate solution and obtains a temperature rise of 15.0°C .

The mass of 1.0 cm^3 of the solution is 1.0 g .

The specific heat capacity, c , of the solution is $4.2\text{ J/g/}^\circ\text{C}$.

Calculate the heat energy, Q , in kilojoules (kJ), released in this reaction. (4 marks)

$Q =$ _____ kJ

(TOTAL FOR QUESTION 6 = 11 MARKS)

(Questions continue on next page)

(Turn over)

7 (a) Table 1 shows the formulae of some ions.

It also shows the formulae of some compounds containing these ions.

	Ca^{2+}	Al^{3+}	NH_4^+
F^-		AlF_3	NH_4F
NO_3^-	$\text{Ca}(\text{NO}_3)_2$		NH_4NO_3
SO_4^{2-}	CaSO_4	$\text{Al}_2(\text{SO}_4)_3$	

Table 1

Complete Table 1 by giving the missing information. (3 marks)

(Question continues on next page)

(Turn over)

(b) Table 2 gives information about aluminium fluoride and aluminium bromide.

	Bonding	Structure	Melting point in °C
Aluminium fluoride	ionic	giant lattice	1290
Aluminium bromide	covalent	simple molecular	98

Table 2

Explain the difference between the melting points of aluminium fluoride and aluminium bromide. Refer to bonding and structure in your answer. (5 marks)

(Continue your answer on next page)

(Turn over)

[illegible][illegible]

(TOTAL FOR QUESTION 7 = 8 MARKS)

TOTAL FOR PAPER = 60 MARKS
END