Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE (9–1)

Centre Number | | | | | |

Candidate Number | | | | |

Wednesday 12 June 2019

Morning (Time: 1 hour 10 minutes) | Paper Reference **4SS0/1C**

Chemistry
Unit: 4SS0
Science (Single Award)
Paper: 1C

You must have:
Calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- 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 ☒.

Information

- 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.*

Advice

- 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 ▶

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P 6 0 2 5 5 A 0 1 1 6

Pearson

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

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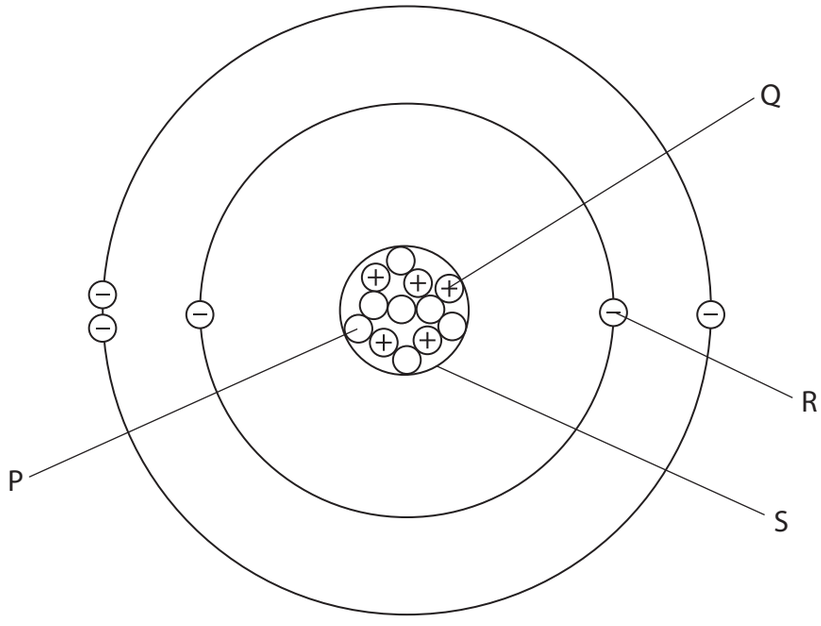
Answer ALL questions.

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



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

(3)

P .....

Q .....

R .....

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

(1)

.....

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

(1)

- ☒ **A** 5
- ☒ **B** 7
- ☒ **C** 12
- ☒ **D** 17

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

(1)

- ☒ **A** 5
- ☒ **B** 7
- ☒ **C** 12
- ☒ **D** 17

(iii) Identify this element.

(1)

.....

(Total for Question 1 = 7 marks)

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)

☒ **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)

relative formula mass = ...

(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)

.....

.....

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

(1)

.....

.....

(iii) Give the test for hydrogen gas.

(1)

.....

.....

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

(i) State why the reaction stops.

(1)

.....

.....

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

(1)

.....

(Total for Question 2 = 8 marks)

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3 Sodium chloride is a soluble salt.

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

(2)

acid .....

alkali .....

(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)

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(Total for Question 3 = 6 marks)

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

(a) (i) State what is meant by the term **hydrocarbon**.

(2)

(ii) Give the general formula for the alkanes.

(1)

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

(1)

(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)

(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)

.....

.....

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.....

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

(1)

.....

.....

(Total for Question 4 = 9 marks)

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)

.....

(ii) Give the formula of the ion responsible for the new colour.

(1)

.....

(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)

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.....

(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)

1 .....

.....

2 .....

.....

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

(1)

..... Na + ... H_2O → ..... NaOH + ... H_2

(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)

.....

.....

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

(1)

.....

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

(2)

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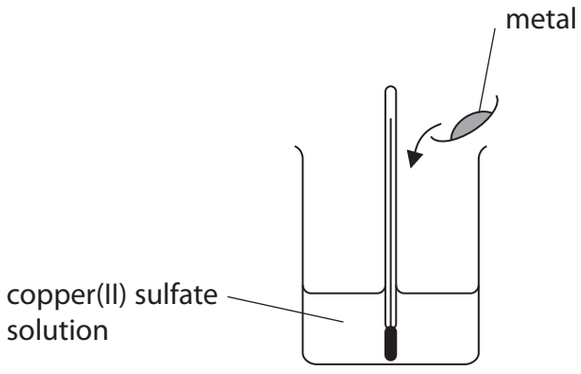
(Total for Question 5 = 11 marks)

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

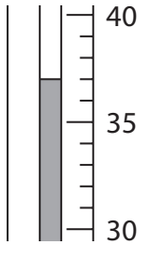
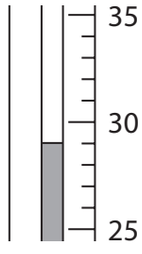
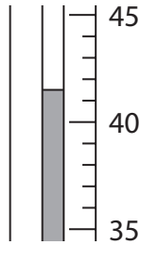
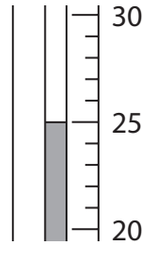
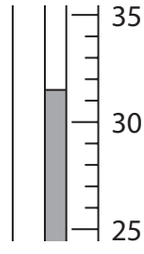


This is the student's method.

- 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.

(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)

(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)

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.....

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

(2)

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.....

(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)

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.....

(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 J/g/°C.

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

(4)

Q = ... kJ

(Total for Question 6 = 11 marks)

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^-	$Ca(NO_3)_2$		NH_4NO_3
SO_4^{2-}	$CaSO_4$	$Al_2(SO_4)_3$	

Table 1

Complete Table 1 by giving the missing information.

(3)

(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)

(Total for Question 7 = 8 marks)

TOTAL FOR PAPER = 60 MARKS

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