Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Friday 17 May 2024

Morning (Time: 1 hour 10 minutes)

Paper reference **1SC0/1CF**

Combined Science

PAPER 2

Foundation Tier

You must have:
Calculator, ruler, Periodic Table (enclosed)

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.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

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*.
- In questions marked with an **asterisk** (*), marks will be awarded for your ability to structure your answer logically, showing how the points that you make are related or follow on from each other where appropriate.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

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P 7 4 4 3 5 A 0 1 2 0

Pearson

Answer ALL questions. Write your answers in the spaces provided.

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 ☒.

1 Figure 1 shows a test tube being heated in a beaker of water.

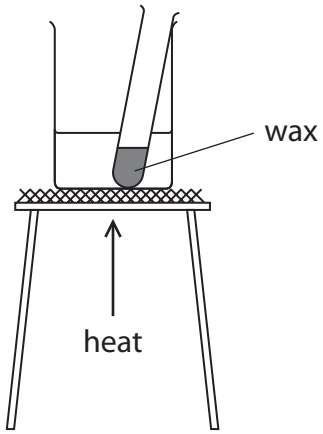

Figure 1

The test tube contains solid wax.

As the test tube was heated, the solid wax changed to liquid wax.

After heating, the wax was allowed to cool to room temperature.

(a) Figure 2 shows the arrangement of particles in liquid wax.

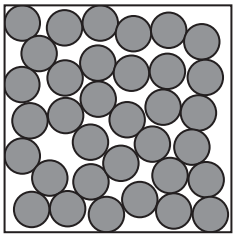

Figure 2

Draw the arrangement of particles in solid wax in the box in Figure 3.

(1)

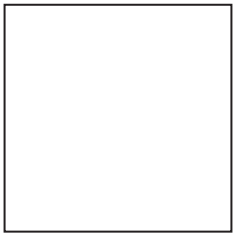

Figure 3

(b) When the wax cools, it changes from a liquid back to a solid.
This change is a **physical change**.

(i) What name is given to the change of a liquid to a solid?

(1)

- ☒ **A** condensing
- ☒ **B** evaporating
- ☒ **C** freezing
- ☒ **D** melting

(ii) Explain why the change from a liquid to a solid is a physical change rather than a chemical change.

(2)

(c) Another physical change is when a liquid changes into a gas.

(i) Which row shows the movement and arrangement of the particles in a gas?

(1)

	movement of particles	arrangement of particles
☒ **A**	slow	regular
☒ **B**	slow	random
☒ **C**	fast	regular
☒ **D**	fast	random

(ii) Suggest why the wax did **not** change into a gas when the test tube was heated in the beaker of water.

(1)

(Total for Question 1 = 6 marks)

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2 Water treatment is needed to make most sources of water suitable for drinking.

(a) Water treatment includes the processes of **chlorination**, **filtration** and **sedimentation**.

Place these processes in the order that they take place during water treatment.

(2)

first		last

(b) Some tap water contains chloride ions.

(i) Explain, in terms of electrons, how a chlorine atom, Cl, forms a chloride ion, Cl^-.

(2)

.....

.....

.....

.....

(ii) Why is chlorine added to water during water treatment?

(1)

☒ **A** to clean the water

☒ **B** to dissolve insoluble substances in the water

☒ **C** to increase the pH of the water to 11

☒ **D** to kill any bacteria in the water

(iii) State why tap water is not suitable for use in chemical analysis.

(1)

.....

.....

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(c) A student was asked to distil a sample of tap water.
Figure 4 shows the apparatus the student used.

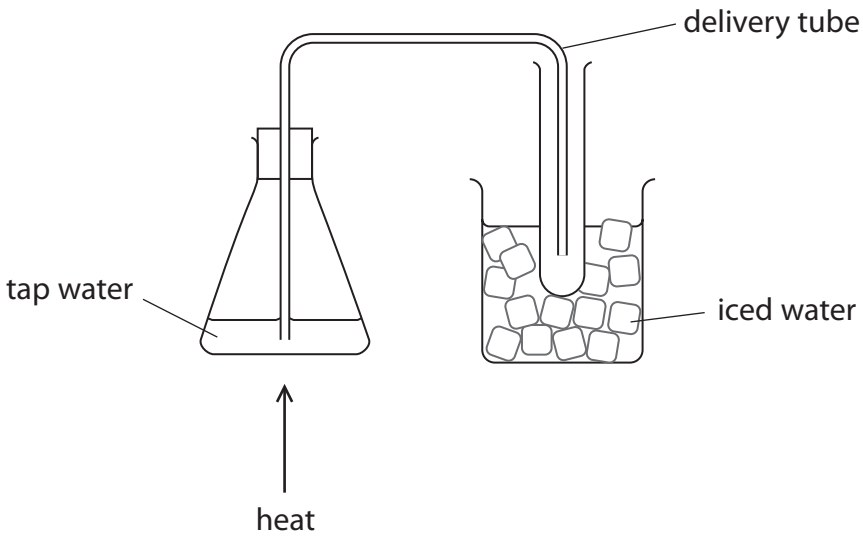

Figure 4

(i) The student made an error when setting up the apparatus in Figure 4.

This error meant that pure water could **not** be collected in the test tube.

Explain what the student needs to change so that pure water can be collected in the test tube.

(2)

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.....

.....

.....

.....

(ii) State what the student should use to heat the water.

(1)

.....

(Total for Question 2 = 9 marks)

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3 (a) Figure 5 shows some information about an atom of chlorine.

$$^{35}_{17}Cl$$

Figure 5

State the number of protons, neutrons and electrons in this atom.

(3)

number of protons = ...

number of neutrons = ...

number of electrons = ...

(b) Chlorine reacts with silicon to form silicon chloride.

A sample of silicon chloride contains 1.4 g of silicon atoms and 7.1 g of chlorine atoms.

Calculate the empirical formula of this sample of silicon chloride.

(relative atomic masses: Si = 28, Cl = 35.5)

(3)

.....

.....

.....

.....

.....

.....

empirical formula = ...

(c) The modern periodic table is organised into groups and periods.

State in which group and in which period of the periodic table silicon is found.

You should use the periodic table to help you answer this question.

(2)

group = ...

period = ...

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(d) Describe **two** differences between Mendeleev's periodic table and the modern periodic table.

(2)

1 .....

.....

2 .....

.....

(Total for Question 3 = 10 marks)

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4 (a) A 250 cm^3 solution of copper sulfate contains 6.52 g of dissolved solid.

Calculate the concentration of this copper sulfate solution in g dm^{-3}.

$$\text{concentration (g dm}^{-3}) = \frac{\text{mass of solid (g)}}{\text{volume of solution (dm}^3)}$$

(2)

concentration = ... g dm^{-3}

(b) Sodium hydroxide solution and copper sulfate solution were reacted together completely.

The result was a mixture of a precipitate of copper hydroxide in a solution of sodium sulfate.

Describe how to obtain

- a pure sample of solid copper hydroxide from the mixture
- a pure sample of solid sodium sulfate from the mixture.

(4)

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(c) Figure 6 shows the equipment used to electrolyse a sample of sodium sulfate solution.

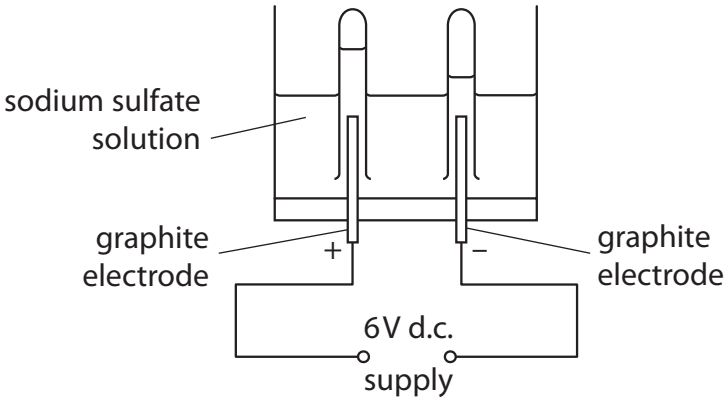


Figure 6

Graphite electrodes are used in the electrolysis.

(i) Give **two** reasons why graphite is a suitable material for the electrodes.

(2)

1 .....

2 .....

(ii) Sodium sulfate solution contains ions.

Which ions are attracted to the positive electrode during the electrolysis?

(1)

☒ **A** H^+ ions only

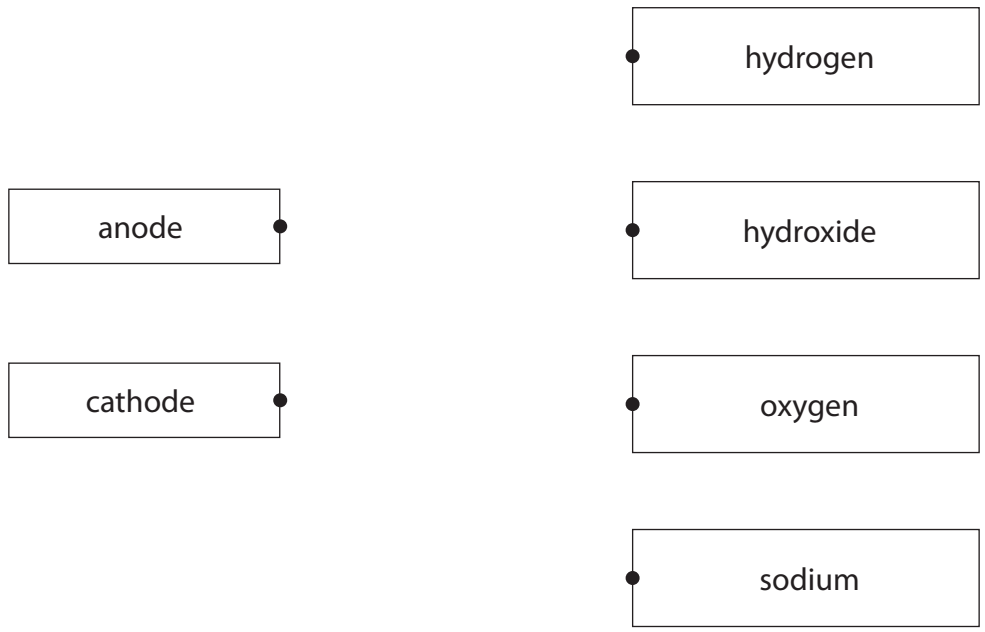
☒ **B** OH^- ions only

☒ **C** H^+ and Na^+ ions

☒ **D** SO_4^{2-} and OH^- ions

(iii) Draw **one** straight line from each electrode to the product formed at that electrode during the electrolysis of sodium sulfate solution.

(2)



(Total for Question 4 = 11 marks)

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5 Barium hydroxide reacts with dilute hydrochloric acid to form barium chloride solution and water.

(a) (i) Complete the balanced equation for the reaction by adding a **number** in front of HCl(aq).

(1)

$$Ba(OH)_2(s) + \ldots\ldots HCl(aq) \rightarrow BaCl_2(aq) + 2H_2O(l)$$

(ii) State what you would **see** during the reaction.

(1)

.....

.....

(b) A student investigated how the pH of the mixture changed as barium hydroxide was added to dilute hydrochloric acid.

The student used this method.

step 1 measure out 50 cm^3 of dilute hydrochloric acid into a beaker using a measuring cylinder

step 2 use a glass rod to place a drop of the acid onto a piece of universal indicator paper and record the pH

step 3 add one spatula measure of barium hydroxide to the acid in the beaker and stir

step 4 use the glass rod to place a drop of the mixture onto a new piece of universal indicator paper and record the pH again

step 5 repeat steps 3 and 4 until there is no further change in the pH.

(i) Name a piece of equipment that could be used to measure the pH of a substance more accurately than universal indicator paper.

(1)

.....

(ii) Explain why, in step 3, the mixture was stirred after adding the barium hydroxide.

(2)

.....

.....

.....

.....

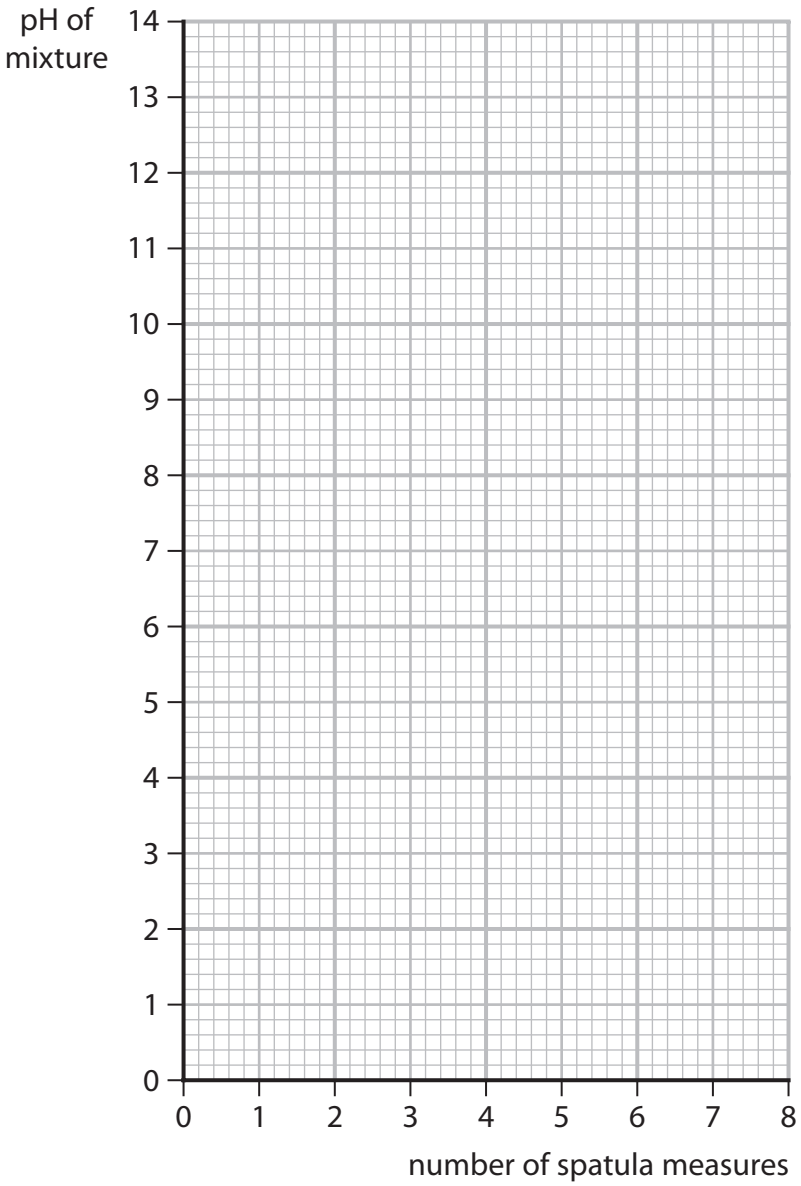
(iii) Figure 7 shows the student's results.

number of spatula measures of barium hydroxide	pH of mixture
0	1
1	1
2	1
3	1
4	3
5	8
6	12
7	13
8	13

Figure 7

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)



(iv) Use the graph to find the pH of the mixture when 4.5 spatula measures of barium hydroxide are added.

(1)

pH of the mixture = ...

(c) Figure 8 shows a hazard symbol on the container of barium hydroxide.

Figure 8

What is the meaning of the hazard symbol in Figure 8?

(1)

- ☒ **A** corrosive
- ☒ **B** health hazard
- ☒ **C** oxidising
- ☒ **D** toxic

(d) The barium hydroxide was measured in spatulas.

State **one** way that the measuring of the barium hydroxide could be improved.

(1)

.....

.....

.....

(Total for Question 5 = 11 marks)

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6 Sodium carbonate has the formula Na_2CO_3.

(a) Sodium carbonate contains Na^+ ions and CO_3^{2-} ions.

(i) The atomic number of sodium is 11.

What is the electronic configuration of the Na^+ ion?

(1)

☒ **A** 1

☒ **B** 2.8

☒ **C** 2.8.1

☒ **D** 2.8.2

(ii) Explain why solid sodium carbonate **cannot** conduct electricity but a solution of sodium carbonate **can** conduct electricity.

(3)

(b) Calculate the percentage by mass of sodium in sodium carbonate, Na_2CO_3.

$$\text{percentage by mass of element} = \frac{\text{total relative atomic mass of element}}{\text{relative formula mass of compound}} \times 100$$

(relative atomic masses: C = 12, O = 16, Na = 23)

(3)

percentage by mass of sodium = ...

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*(c) A student has three solids, **A**, **B** and **C**.

The solids are sodium carbonate, powdered zinc and copper oxide, but the student does not know which solid is which.

The student reacted each solid with dilute sulfuric acid.

Figure 9 shows the student's observations and the results of tests on any gases produced.

	observations and results		
	reaction with dilute sulfuric acid	**gas bubbled through limewater**	**gas tested with a lit splint**
solid **A**	bubbles seen colourless solution formed	no change	squeaky pop
solid **B**	blue solution formed some black solid remains at bottom of test tube	no gas produced	no gas produced
solid **C**	bubbles seen colourless solution formed	limewater turned cloudy	puts out lit splint

Figure 9

Use the observations and results in Figure 9 to identify which solid is which.

Your answer should include

- how each test result helps you to identify the solid
- word equations to support your answer.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Friday 17 May 2024

Paper reference 1SC0/1CF

Combined Science

PAPER 2

Foundation Tier

Periodic Table Insert

Do not return this Insert with the question paper

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P 7 4 4 3 5 A

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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

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The elements with atomic numbers from 58 to 71 are omitted from this part of the periodic table.

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