

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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

Time 1 hour 10 minutes

Paper
reference

1SC0/2CF

Combined Science

PAPER 5

Foundation Tier

You must have:

Calculator, ruler

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.
- There is a periodic table on the back cover of the paper.

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.

Turn over ►

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Q:1/1/




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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 This question is about elements in group 1 of the periodic table.
- (a) Figure 1 shows the symbols of the first three elements in group 1 of the periodic table and their melting points.

symbol	melting point in °C
Li	181
Na	98
K	64

Figure 1

Use the periodic table to answer these questions.

- (i) Give the symbol of **another** element in group 1. (1)

.....

- (ii) Give the atomic number of lithium. (1)

.....

- (iii) Describe the trend in the melting points of the elements in Figure 1. (2)

.....

.....

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(b) The elements in group 1 react very vigorously with water.

A student suggests this method to see what happens when sodium reacts with water.

- step 1** put on safety glasses and a laboratory coat
- step 2** cut a $2\text{ cm} \times 2\text{ cm} \times 2\text{ cm}$ cube of sodium
- step 3** put a few drops of water in the container shown in Figure 2
- step 4** add the sodium to the water in the container and observe the reaction

(i) Figure 2 shows a diagram of the container the student suggested for step 3.



Figure 2

Give the name of the container shown in Figure 2.

(1)

.....



(ii) A teacher says that the method is not safe because the reaction is too vigorous.

Explain changes that could be made to step 2 and to step 3 that would make the method safer.

(3)

step 2: change and explanation

.....

.....

.....

step 3: change and explanation

.....

.....

.....

(Total for Question 1 = 8 marks)

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2 Some reactions are exothermic and some reactions are endothermic.

(a) What does an exothermic reaction always give out?

(1)

- A heat energy
- B light
- C a gas
- D sound

(b) In an experiment, a solid is mixed with a liquid.
The temperature change of the mixture is measured.

Figure 3 shows the apparatus that is used.

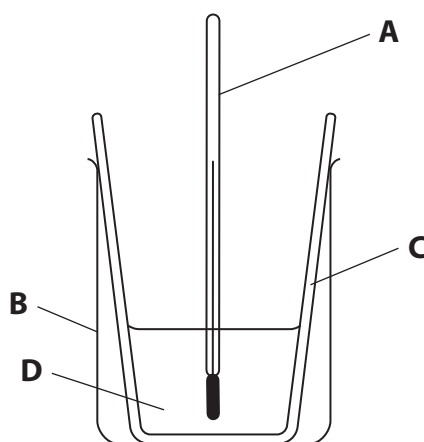


Figure 3

(i) Give the letter of the piece of apparatus, **A**, **B**, **C** or **D**, in Figure 3 that is used to measure the temperature.

(1)

(ii) Give the name of the piece of apparatus **B** shown in Figure 3.

(1)

(iii) The piece of apparatus labelled **C** is made from polystyrene.

State why polystyrene is a better material than glass for this piece of apparatus.

(1)



(iv) The results of the experiment are given in Figure 4.

temperature of liquid at start in °C	18.6
temperature of products at end in °C	16.1

Figure 4

Calculate the change in temperature.

Give a sign and a unit in your answer.

(3)

temperature change =

(v) The solid used in this experiment contained only NH_4^+ ions and NO_3^- ions.

Give the formula and the name of the solid.

(2)

formula

name

(Total for Question 2 = 9 marks)

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P 6 9 4 7 5 A 0 7 2 0

3 (a) Figure 5 shows one molecule of a compound obtained from crude oil.

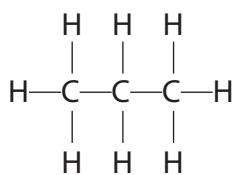


Figure 5

(i) Give the names of the **two** elements in this molecule.

(2)

.....
.....

(ii) What is the molecule in Figure 5?

(1)

- A an oxide
- B a chain molecule
- C a fullerene
- D a ring molecule

(iii) What is the relative formula mass of the compound in Figure 5?

(relative atomic masses: H = 1.0, C = 12)

(1)

- A 13
- B 42
- C 44
- D 96

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(b) Crude oil can be separated into different fractions.

Draw **one** straight line from each fraction to a use of that fraction.

(3)

fraction	use
petrol	fuel for aircraft
kerosene	fuel for ships
bitumen	fuel for cars
	making plastic
	extracting iron
	making road surfaces

(c) Hydrogen chloride gas and sulfur dioxide gas are dissolved in separate test tubes of water.

Blue litmus paper is dipped into each test tube.

State and explain the colour change you would observe in each test tube.

(3)

.....

.....

.....

.....

.....

.....

(Total for Question 3 = 10 marks)



P 6 9 4 7 5 A 0 9 2 0

4 This question is about elements in group 7, the halogens.

(a) Which halogen is a green gas at room temperature and pressure?

(1)

- A bromine
- B chlorine
- C fluorine
- D iodine

(b) Bromine, chlorine and iodine all react with heated iron wool.

Figure 6 shows the speed of these reactions.

halogen	description of reaction with heated iron wool
bromine	reacts quickly
chlorine	reacts very quickly
iodine	reacts slowly

Figure 6

(i) When iron wool is heated with chlorine, iron chloride is formed.

Write the word equation for this reaction.

(2)

.....

.....

(ii) Give the name of the halogen in Figure 6 that is the most reactive with iron.

(1)

.....



(iii) 34.4% of the mass of iron chloride is iron.

Calculate the mass of iron and the mass of chlorine in 125 g of iron chloride.

(3)

mass of iron = g mass of chlorine = g

(c) Alkenes react with halogens.

When iron chloride is added to the reaction mixture, the reaction is much faster but the products are the same.

Use words from the box to complete the sentences.

an acid a catalyst higher lower a reactant unchanged

(2)

The iron chloride speeds up the reaction because it is

After the reaction, the mass of iron chloride is

(Total for Question 4 = 9 marks)

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- 5 A student used the apparatus in Figure 7 to investigate the rate of the reaction between a metal and dilute hydrochloric acid.

Pieces of the metal were placed in dilute hydrochloric acid in the flask, and the total volume of gas produced was measured every minute.

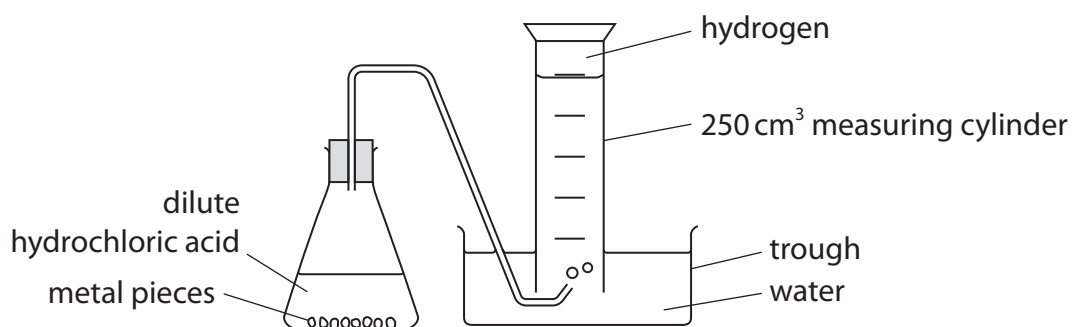


Figure 7

- (a) Figure 8 shows a graph of the student's results.

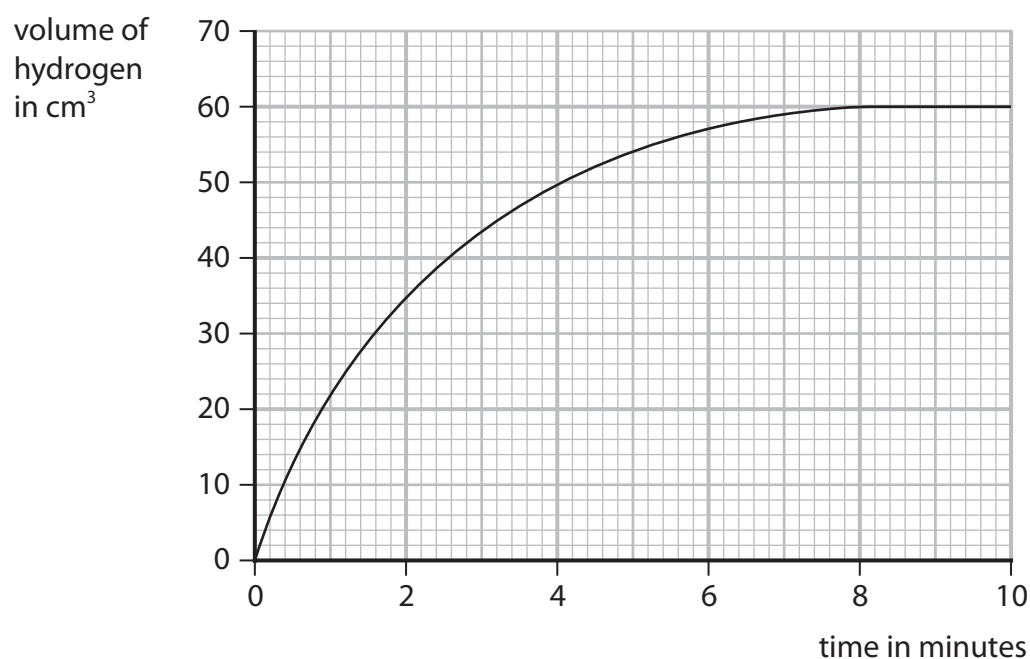


Figure 8



- (i) Name a piece of apparatus that would be better to measure the volume of gas produced, instead of the 250 cm³ measuring cylinder.

Give a reason for your answer.

(2)

name of apparatus

reason

- (ii) Calculate the mean rate of production of hydrogen over the first 90 seconds, in cm³ per second.

(3)

rate = cm³ per second

- (iii) The student measured the volume of gas for 10 minutes.

State why the measurements could have been stopped at 9 minutes.

(1)

- (b) The experiment was repeated, but with acid of a higher concentration.

The rate of reaction was faster.

- (i) Explain why the rate of reaction increases when the concentration of acid is increased.

(2)

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(ii) Another student suggests four other ways of increasing the rate of this reaction.

Which one is correct?

(1)

- A** use the same acid but at a lower temperature
- B** use a larger trough
- C** use a smaller flask
- D** use the same metal but in a powdered form

(c) The apparatus in Figure 7 can be used to measure the rate of the reaction between marble chips and hydrochloric acid.

The student needs different sized marble chips.

Describe how the student can make small and medium sized marble chips from large chips.

(2)

.....

.....

.....

(Total for Question 5 = 11 marks)

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6 This question is about gases.

(a) When sodium is added to water, hydrogen gas is produced.

Which observation shows that a gas has been produced?

(1)

- A a white precipitate forms
- B effervescence is seen
- C the sodium sinks in the water
- D the water changes to a pink colour

(b) Some damp litmus paper is placed in a gas.
The litmus paper is bleached.

Which gas bleaches damp litmus paper?

(1)

- A carbon dioxide
- B chlorine
- C hydrogen
- D oxygen

(c) When calcium carbonate is heated it decomposes.



When 5.000 g of calcium carbonate is heated, the mass of solid remaining is 2.800 g.

Calculate the mass of carbon dioxide that has been released.

Give your answer to three significant figures.

(2)

.....
.....
mass of carbon dioxide = g



(d) A diagram of an atom of helium is shown in Figure 9.

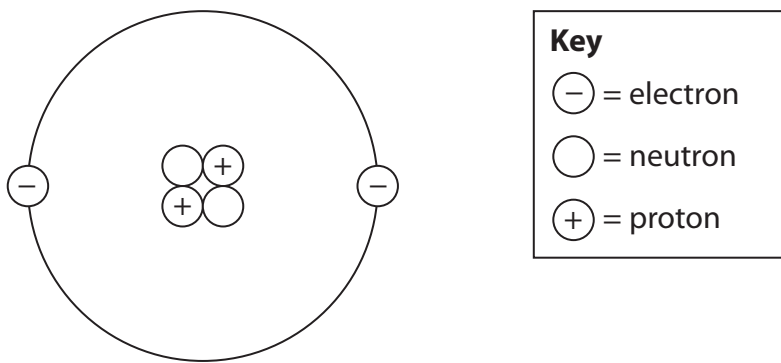


Figure 9

(i) Explain, using Figure 9, why helium is inert.

(2)

(ii) Helium is used to fill balloons.

State one property of helium, apart from it being inert, that makes it suitable for filling balloons.

(1)



- *(e) Figure 10 shows the relative amounts of three gases in the early atmosphere compared to the composition of today's atmosphere.

gas	relative amount in early atmosphere	composition of today's atmosphere
water vapour	large amount	0% to 4%
carbon dioxide	large amount	less than 0.5%
oxygen	little or none	21%

Figure 10

Natural processes and human activities have altered the relative amounts of these gases in the atmosphere.

Explain how the relative amount of each of the gases in Figure 10 has increased or decreased over time.

(6)



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(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS



P 6 9 4 7 5 A 0 1 9 2 0

The periodic table of the elements

	1	2	3	4	5	6	7	0	
	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		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		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		204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
				59 Co cobalt 27	59 Ni nickel 28	65 Zn zinc 30	63.5 Cu copper 29		
				103 Rh rhodium 45	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				192 Ir iridium 77	195 Pt platinum 78	201 Hg mercury 80	197 Au gold 79		
				190 Os osmium 76	195 Pt platinum 78	201 Hg mercury 80	197 Au gold 79		
				186 Re rhenium 75	195 Pt platinum 78	201 Hg mercury 80	197 Au gold 79		
				[98] Tc technetium 43	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				101 Ru ruthenium 44	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				96 Mo molybdenum 42	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				93 Nb niobium 41	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				181 Ta tantalum 73	195 Pt platinum 78	201 Hg mercury 80	197 Au gold 79		
				178 Hf hafnium 72	195 Pt platinum 78	201 Hg mercury 80	197 Au gold 79		
				139 La* lanthanum 57	195 Pt platinum 78	201 Hg mercury 80	197 Au gold 79		
				45 Sc scandium 21	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				48 Ti titanium 22	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				51 V vanadium 23	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				52 Cr chromium 24	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				55 Mn manganese 25	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		
				56 Fe iron 26	106 Pd palladium 46	112 Cd cadmium 48	108 Ag silver 47		

1	H
hydrogen	1

Key
relative atomic mass
atomic symbol
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.

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