Please check the examination details below before entering your candidate information

Candidate surname	Other names

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

Centre Number | Candidate Number

Thursday 14 May 2020

Morning (Time: 1 hour 10 minutes) | Paper Reference **1SC0/1CF**

Combined Science

Paper 2

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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1/

P 6 2 0 9 5 A 0 1 1 6

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 (a) When solid sodium chloride is mixed with water, sodium chloride solution forms.

What name is given to the process of mixing a solid with water to form a solution?

(1)

☒ **A** crystallising

☒ **B** diluting

☒ **C** dissolving

☒ **D** melting

(b) Sodium reacts with hydrochloric acid to form sodium chloride and hydrogen.

(i) Write the word equation for this reaction.

(2)

..... → .....

(ii) The hazard symbol shown in Figure 1 is used on containers of sodium.

Figure 1

What is the meaning of this hazard symbol?

(1)

☒ **A** corrosive

☒ **B** flammable

☒ **C** oxidising

☒ **D** toxic

(iii) Hydrogen has one electron in its electron shell.
Figure 2 shows the incomplete dot and cross diagram of a hydrogen molecule.

Complete Figure 2 to show the electrons in the covalent bond between the two atoms of hydrogen.

(1)

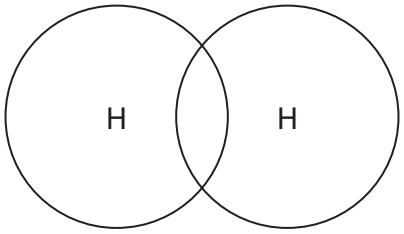

Figure 2

(c) The pH of a sodium chloride solution was measured.

(i) State what could be used to measure the pH of a solution.

(1)

.....

(ii) Sodium chloride solution is neutral.

Give the pH of this solution.

(1)

.....

(Total for Question 1 = 7 marks)

2 Chlorine has an atomic number of 17.

(a) Figure 3 shows the arrangement of electrons in an atom of chlorine.

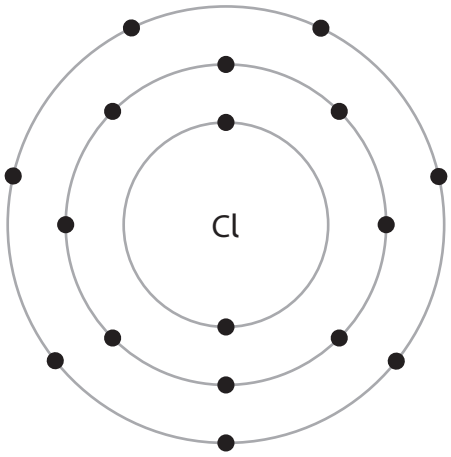

Figure 3

(i) What is the electronic configuration of this atom?

(1)

☒ **A** 10.7

☒ **B** 17

☒ **C** 2.8.7

☒ **D** 7.8.2

(ii) Explain, using Figure 3, why chlorine belongs to group 7 of the periodic table.

(2)

.....

.....

.....

.....

(b) The nucleus of an atom is made up of protons and neutrons.
Atoms of chlorine contain 17 protons.

Figure 4 shows some information about a proton, a neutron and an electron.

	relative mass	relative charge
proton	1	+1
neutron	1	0
electron	very small	−1

Figure 4

(i) Explain, using the information in Figure 3 and Figure 4, why atoms of chlorine have no overall charge.

(2)

.....

.....

.....

.....

(ii) Atoms of chlorine-37 have a mass number of 37.

Calculate the number of neutrons in atoms of chlorine-37.

(1)

.....

number of neutrons = ...

(iii) There are two isotopes of chlorine, chlorine-35 and chlorine-37.

Explain the meaning of the term **isotopes**.

(2)

.....

.....

.....

.....

(Total for Question 2 = 8 marks)

3 (a) In the 19th century, Mendeleev arranged the elements known at the time to form his periodic table.
Mendeleev's periodic table is different from the modern periodic table.

State **one** difference between Mendeleev's periodic table and the modern periodic table.

(1)

.....

.....

(b) Aluminium oxide reacts with hydrochloric acid to form a salt and water.

(i) State the name of the salt formed.

(1)

.....

(ii) In this reaction aluminium oxide is a base.

State the type of reaction that takes place when an acid reacts with a base.

(1)

.....

(c) Gallium, Ga, is in the same group of the modern periodic table as aluminium.

The formula of aluminium oxide is Al_2O_3.

(i) Predict the formula of gallium oxide.

(1)

.....

(ii) Gallium oxide has a very high melting point.
Gallium oxide does not conduct electricity when solid but does conduct electricity when molten.

What type of substance is gallium oxide?

(1)

☒ **A** giant covalent

☒ **B** ionic

☒ **C** metallic

☒ **D** simple molecular

(d) Figure 5 shows the changes of state for gallium and the arrangement of particles in liquid gallium.

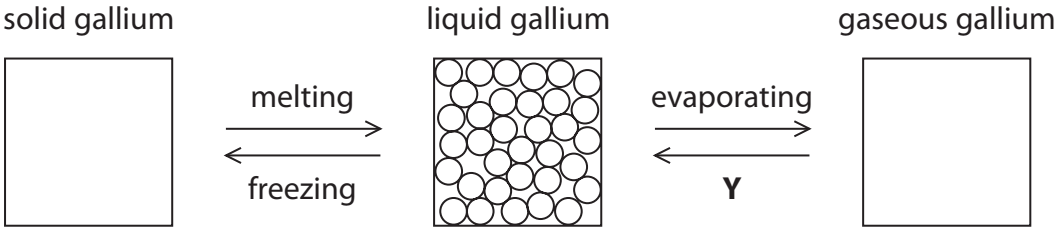

Figure 5

(i) Complete the boxes for solid gallium and gaseous gallium by drawing the arrangement of the particles in each of these physical states.

(2)

(ii) Give the name of the change of state labelled **Y** in Figure 5.

(1)

.....

(e) Gallium metal is a conductor of electricity.

Explain how metals conduct electricity.

(2)

.....

.....

.....

.....

(Total for Question 3 = 10 marks)

4 Some metals are found in the Earth's crust as uncombined elements.
Reactive metals are found in ores.

In ores, metals are combined with other elements.

(a) Which of these metals is found as the uncombined element in the Earth's crust?

(1)

☒ **A** aluminium

☒ **B** gold

☒ **C** potassium

☒ **D** zinc

(b) Give **two** advantages of recycling metals rather than extracting metals from their ores.

(2)

1 .....

.....

2 .....

.....

(c) An ore of iron is mostly iron oxide, Fe_2O_3.
Iron can be extracted from this iron oxide by heating it with carbon.

Balance this equation for the reaction that takes place.

(1)

$$2Fe_2O_3 + \text{.....}C \rightarrow \text{.....}Fe + \text{.....}CO_2$$

(d) Most copper ores are described as low grade.
This means that the percentage of copper in the ore is very small.

5000 kg of one copper ore was found to contain 42.5 kg of copper.

Calculate the percentage of copper in this ore.

(2)

.....

.....

.....

percentage of copper in ore = ...

(e) In one stage of the extraction of lead from its ore, lead oxide is heated strongly with carbon.

The equation for the reaction is

$$2PbO + C \rightarrow 2Pb + CO_2$$

Explain, using this equation, which substance has been oxidised in this reaction.

(2)

(f) A titanium ore was analysed and found to contain 12 g of titanium atoms combined with 8.0 g of oxygen atoms.

Calculate the empirical formula of this titanium compound.
(relative atomic masses: Ti = 48, O = 16)

You must show your working.

(3)

empirical formula = ...

(Total for Question 4 = 11 marks)

5 Figure 6 shows the apparatus that can be used to electrolyse sodium sulfate solution using inert electrodes.

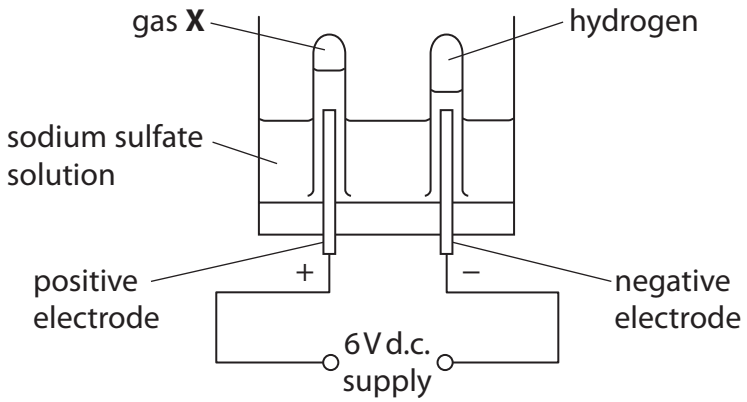

Figure 6

(a) Hydrogen is produced at the negative electrode during electrolysis.

(i) Describe the test to show the gas is hydrogen.

(2)

.....

.....

.....

.....

(ii) What is the name of gas **X** that forms at the positive electrode?

(1)

☒ **A** ammonia

☒ **B** oxygen

☒ **C** nitrogen

☒ **D** sulfur dioxide

(iii) State what is meant by the term **electrolysis**.

(2)

.....

.....

.....

.....

(b) The sodium sulfate solution was made by dissolving 28.4 g of sodium sulfate in water to make 250 cm^3 of solution.

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

Give your answer to three significant figures.

(3)

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

(c) The ions present in sodium sulfate are

sodium	Na^+
sulfate	SO_4^{2-}

Write the formula of sodium sulfate using this information.

(1)

.....

(d) (i) In Figure 6, the gases given off at the electrodes are collected in test-tubes. However, the actual volume of gases cannot be measured using these test-tubes.

Suggest what apparatus could be used in place of the test-tubes in Figure 6 to measure the volume of gases given off.

(1)

.....

(ii) State what could be added into the circuit to show a current is flowing during electrolysis.

(1)

.....

(Total for Question 5 = 11 marks)

6 The word equation for the reaction between copper carbonate and dilute sulfuric acid is

$$\text{copper carbonate} + \text{sulfuric acid} \rightarrow \text{copper sulfate} + \text{carbon dioxide} + \text{water}$$

(a) (i) Complete the balanced equation for this reaction.

(2)

$$CuCO_3 + \ldots\ldots\ldots\ldots \rightarrow \ldots\ldots\ldots\ldots + CO_2 + H_2O$$

(ii) Calculate the relative formula mass of copper carbonate, $CuCO_3$.
(relative atomic masses: C = 12.0, O = 16.0, Cu = 63.5)

(2)

.....

.....

.....

relative formula mass of $CuCO_3$ = ...

(iii) What is the chemical test to show that a gas is carbon dioxide?

(1)

☒ **A** bubble the gas through limewater, limewater turns cloudy

☒ **B** put damp blue litmus paper in the gas, litmus paper turns red

☒ **C** put a lighted splint into the gas, splint is extinguished

☒ **D** measure the pH of the gas, pH = 4

(b) Figure 7 shows a conical flask containing dilute sulfuric acid.
Copper carbonate is added to the acid in the flask.
The copper carbonate is added one spatula measure at a time until the reaction has finished.

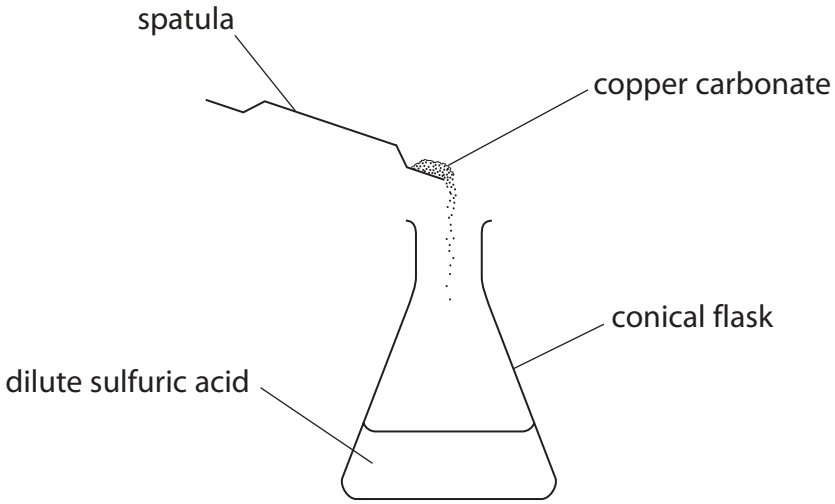

Figure 7

(i) State **two** observations that would show the reaction has finished.

(2)

1 .....

.....

2 .....

.....

*(ii) Describe how you would obtain a solution of copper sulfate from the mixture and how you would obtain pure, dry copper sulfate crystals from this solution.

Your description should include the apparatus you would use.

You may wish to use diagrams in your answer.

(6)

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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.