GCSE

COMBINED SCIENCE: TRILOGY

Foundation Tier Chemistry Paper 1

Mark scheme Practice Paper Series – Set 2 SGC/S2/C/1F

Version 1.1 - reviewed 26 October 2026

This mark scheme is an original resource written for sciencegcse.co.uk to accompany the Set 2 practice paper SGC/S2/C/1F. It is not an AQA mark scheme and has not been produced or endorsed by AQA. It follows the structure and conventions of AQA GCSE science mark schemes so that students and teachers can mark the practice paper in the same way that a real paper is marked.

Marking should be carried out using the Information to Examiners on the following pages. The paper has not been standardised, so raw marks should not be converted into grades using any published grade boundaries.

Specification references are to the AQA GCSE Combined Science: Trilogy (8464) specification, Chemistry section 5.1–5.5. AO = assessment objective; WS = working scientifically; MS = mathematical skills; RP = required practical.

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the answer(s) expected, including alternative acceptable wording, in the **Answers** column
- guidance on which answers are and are not creditworthy in the **Extra information** column
- the assessment objective (AO) and specification reference for each marking point.

Award marks positively. Do not deduct marks for incorrect additional material unless it contradicts a correct answer (see 3.1). Marks are awarded for what the student has written, not for what they might have meant.

2. Emboldening and underlining

2.1 Where a list of acceptable answers is given and more than one mark is available, **any two from** (or similar) is used, followed by the acceptable answers.

2.2 A bold **and** indicates that both parts of the answer are needed to gain the mark.

2.3 Alternative answers acceptable for the same mark are separated by **or**. Different words that are acceptable within a marking point are separated by a forward slash (/).

2.4 Words in bold in the Answers column are the essential words that must be present, or their equivalent, for the mark to be awarded.

3. Marking points

3.1 Marking of lists
When a fixed number of responses is requested but extra responses are given, consider the whole list. Each incorrect response or contradiction cancels one otherwise available correct response, up to the mark limit; the score cannot fall below zero. Neutral material identified by **ignore** does not cancel a correct response. Do not apply this rule as a penalty for extra relevant detail in an extended answer.

3.2 Marking procedure for calculations
A correct final answer can receive the marks indicated in the question-specific scheme without every intermediate step being written. Do not award full marks if the working shown contradicts that answer. Where the question specifically requires a method, demonstration or working, apply that requirement. Credit correct stages when the final answer is wrong, including consequential steps where permitted. A printed unit may only be replaced by another unit when the numerical value is converted consistently.

3.3 Interpretation of 'it'
Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.4 Errors carried forward
Use an earlier incorrect value in a later part where ECF is allowed by the question-specific scheme. Within a calculation, credit later correct stages that use an earlier incorrect value consistently, subject to any stated limits. Do not repeatedly penalise the same error.

3.5 Phonetic spelling
Accept a misspelling when the intended scientific term is clear, including when a term is being recalled. Do not accept wording that could instead name a different scientific term.

3.6 Brackets
Words shown in brackets in the Answers column are not required to gain the mark but help to set the context.

3.7 Allow
Answers that are acceptable but which would not normally be expected are shown as **allow**.

3.8 Ignore
Statements shown as **ignore** are neither creditworthy nor penalised. Mark the rest of the answer normally.

3.9 Do not accept
Statements shown as **do not accept** are incorrect and, where they contradict or replace the expected answer, mean the mark is not awarded.

4. Level of response marking instructions

Extended-response questions (question 05.3 in this paper) are marked using a level of response mark scheme. The scheme has three levels, each covering two marks, plus a level descriptor and indicative content.

Step 1 – Determine a level. Read the whole answer and decide which level descriptor best fits it. Use a 'best-fit' approach: an answer does not need to meet every part of a descriptor to be placed in that level, and a weak part of the answer need not prevent it from reaching the higher level if the overall quality matches the descriptor.

Step 2 – Determine a mark within the level. Award the higher mark in the level if the answer meets the descriptor fully and the points made are well linked; award the lower mark if the answer only just meets the descriptor or contains minor errors or omissions.

The indicative content is not a checklist: students need not include every point to reach the top level, and other relevant, correct points should be credited. An answer that lists points without linking them into a coherent answer should be placed in a lower level than one that develops and connects them.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	The number of protons	if more than one box is ticked, no mark	1	AO1 5.1.2.1
01.2	for elements that had not been discovered (yet)	allow so that he could predict new elements	1	AO1 5.1.2.2
01.3	so that elements with similar (chemical) properties were in the same group	allow to fit the pattern of properties	1	AO1 5.1.2.2
01.4	they have a **full** / stable outer shell (of electrons)	allow eight electrons in the outer shell (two for helium)	1	AO1 5.1.2.4
	so they do not easily lose, gain or share electrons		1	AO1 5.1.2.4
01.5	the boiling point increases (going down the group)	allow the boiling points get less negative	1	AO3 5.1.2.4 WS 3.5
01.6	any value from −140 to −90 (°C)	the actual value is −108 °C	1	AO2 5.1.2.4
01.7	argon is unreactive, so the hot filament does not react with it	allow oxygen in air would react with the hot filament / the filament would burn	1	AO2 5.1.2.4
		Total	**8**	
02.1	graphite	allow carbon / platinum	1	AO1 5.4.3.4
02.2	**supports:** copper chloride / copper sulfate (gives copper) **or** silver nitrate (gives silver)		1	AO3 5.4.3.4 WS 3.5
	does not support: potassium chloride **or** magnesium sulfate (gives hydrogen)		1	AO3 5.4.3.4 WS 3.5
02.3	the solutions do **not** contain halide ions	allow chloride / bromide / iodide ions	1	AO2 5.4.3.4
	so oxygen (from the water / hydroxide ions) is produced instead		1	AO2 5.4.3.4
02.4	both solutions contain copper ions, but the positive-electrode products are different	allow chlorine from copper chloride and oxygen from copper sulfate	1	AO3 5.4.3.4 WS 3.5
	the anions / non-metal ions also affect the positive-electrode product	allow chloride ions give chlorine, whereas sulfate solution gives oxygen from water / hydroxide ions	1	AO3 5.4.3.4 WS 3.5
		Total	**7**	
03.1	each magnesium atom **loses** two electrons		1	AO1 5.2.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	each oxygen atom **gains** two electrons	allow electrons are transferred from magnesium to oxygen for 1 mark	1	AO1 5.2.1.2
03.2	oxide ion with eight electrons in the outer shell: six dots and two crosses		1	AO2 5.2.1.2
	2+ on the magnesium ion, which shows no outer electrons (or eight crosses) and not two	allow +2	1	AO2 5.2.1.2
	2− on the oxide ion	allow −2	1	AO2 5.2.1.2
03.3	MgO	do not accept MgO_2 / Mg_2O / MGO	1	AO1 5.2.1.2
03.4	a giant structure (lattice) with strong electrostatic forces of attraction between oppositely charged ions	allow strong ionic bonds	1	AO1 5.2.2.3
	so a lot of energy is needed to overcome the forces / break the bonds	do not accept intermolecular forces / covalent bonds	1	AO1 5.2.2.3
		Total	**8**	
04.1	H^+	allow hydrogen ion	1	AO1 5.4.2.4
04.2	any **one** from: • gives a more precise / accurate value (to one decimal place) • no need to judge a colour	ignore easier	1	AO3 5.4.2.4 WS 2.3
04.3	25 (cm^3)		1	AO2 5.4.2.4
04.4	the pH increased slowly at first (from 1.0 to 2.0 up to 20 cm^3)		1	AO3 5.4.2.4 WS 3.5
	then increased sharply to 7.0 / neutral (at 25 cm^3) and then to 12 / alkaline	a correct use of data is needed for 2 marks	1	AO3 5.4.2.4 WS 3.5
04.5	sodium chloride		1	AO1 5.4.2.2
04.6	$H_2O(l)$	allow water state symbol not needed	1	AO1 5.4.2.4
04.7	12.5 (cm^3)	allow ECF: half the answer to 04.3	1	AO2 5.4.2.4 MS 1c
		Total	**8**	
05.1	two or more substances (elements or compounds) that are **not chemically combined**		1	AO1 5.1.1.2

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>05.2</td><td>Pure water from sea water → Distillation
Different coloured dyes in ink → Chromatography
Sand from a mixture of sand and water → Filtration</td><td>all three correct = 2 marks
one or two correct = 1 mark
if more than one line is drawn from a mixture, no mark for that mixture</td><td>2</td><td>AO1
5.1.1.2</td></tr>
<tr><td>05.3</td><td colspan="2"><table>
<tr><td>Level 3
(5–6 marks)</td><td>A clear, logical method that would produce pure, dry salt crystals. The salt is dissolved, the sand is removed by filtration, and the salt is obtained from the filtrate by evaporation and crystallisation and then dried.</td></tr>
<tr><td>Level 2
(3–4 marks)</td><td>A method with most of the main steps (dissolving, filtering and evaporating or crystallising), but some steps are missing, unclear or out of order.</td></tr>
<tr><td>Level 1
(1–2 marks)</td><td>Simple statements about one or two relevant steps, for example filter the mixture or heat the solution.</td></tr>
<tr><td>0 marks</td><td>No relevant content.</td></tr>
</table></td><td>6</td><td>AO1 (4)
AO2 (2)
5.1.1.2</td></tr>
<tr><td></td><td colspan="2">Indicative content
• grind / crush the rock salt (with a pestle and mortar)
• add (warm) water to the rock salt and stir
• so that the salt dissolves
• filter the mixture (with a filter funnel and filter paper)
• the sand stays in the filter paper (residue)
• the salt solution passes through (filtrate)
• pour the filtrate into an evaporating basin
• heat (gently) to evaporate some of the water
• until crystals start to form / the solution is concentrated
• leave to cool so that crystals form
• filter off the crystals / pour off the remaining solution
• dry the crystals between filter paper / in a warm oven
To reach Level 3 the answer must include filtration, an evaporation or crystallisation step and drying.</td><td></td><td></td></tr>
<tr><td>05.4</td><td>11.0 ÷ 40.0 × 100</td><td>an answer of 27.5 (%) scores 2 marks</td><td>1</td><td>AO2
5.1.1.2
MS 1c</td></tr>
<tr><td></td><td>= 27.5 (%)</td><td>allow 28 (%)</td><td>1</td><td>AO2
5.1.1.2
MS 1c</td></tr>
<tr><td colspan="3">Total</td><td>11</td><td></td></tr>
<tr><td>06.1</td><td>A liquid
B solid
C gas</td><td>all three correct = 2 marks
two correct = 1 mark</td><td>2</td><td>AO2
5.2.2.1</td></tr>
<tr><td>06.2</td><td>the particles are close together / touching in a random arrangement</td><td></td><td>1</td><td>AO1
5.2.2.1</td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	the particles **move** around each other / slide past each other	ignore vibrate	1	AO1 5.2.2.1
06.3	**B**		1	AO2 5.2.2.1
06.4	poly(ethene) has very **large** molecules		1	AO1 5.2.2.5
	so the intermolecular forces (between the molecules) are relatively strong	do not accept covalent bonds between molecules	1	AO1 5.2.2.5
06.5	melting only overcomes the forces **between** the molecules; the covalent bonds (in the molecules) do not break	allow intermolecular forces are overcome	1	AO2 5.2.2.5
		Total	**8**	
07.1	(2 × 23) + 12 + (3 × 16)	an answer of 106 scores **2** marks	1	AO2 5.3.1.2 MS 1a
	= **106**		1	AO2 5.3.1.2 MS 1a
07.2	sodium nitrate		1	AO2 5.4.2.2
07.3	carbon dioxide	allow CO_2	1	AO1 5.4.2.2
07.4	Na_2CO_3 + **2**HNO_3 → **2**$NaNO_3$ + H_2O + CO_2	both numbers needed	1	AO2 5.3.1.1
07.5	carbon dioxide (gas) escapes from the flask (into the air)	allow a gas is given off and lost	1	AO1 5.3.1.3
07.6	the volume should be in dm^3: 250 cm^3 = 0.250 dm^3	allow the student used the volume in cm^3	1	AO2 5.3.2.5 MS 1c
	5.30 ÷ 0.250	an answer of 21.2 (g/dm^3) scores the last **2** marks	1	AO2 5.3.2.5 MS 1c
	= **21.2** (g/dm^3)		1	AO2 5.3.2.5 MS 1c
		Total	**9**	
08.1	polystyrene is a (thermal) insulator, so it reduces energy transfer from the surroundings	allow it reduces heat gain / heat loss allow glass is a better conductor ignore the beaker stops the cup falling over	1	AO2 5.5.1.1 RP
08.2	7.8 (°C)	(7.9 + 7.7) ÷ 2	1	AO2 5.5.1.1 MS 2b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	point plotted correctly at (4.0, 7.8)	allow ± half a small square allow ECF from 08.2	1	AO2 5.5.1.1 RP MS 4a, 4c
	point plotted correctly at (5.0, 8.7)	allow ± half a small square	1	AO2 5.5.1.1 RP MS 4a, 4c
	a line of best fit: a straight line through the first points, then levelling off	allow a smooth curve that levels off do not accept points joined dot to dot	1	AO2 5.5.1.1 RP MS 4a, 4c
08.4	up to about 4 g, the temperature decrease increases as the mass increases	allow directly proportional / doubling the mass doubles the decrease	1	AO3 5.5.1.1 WS 3.5
	above about 5 g, the temperature decrease stays the same		1	AO3 5.5.1.1 WS 3.5
08.5	all the citric acid had reacted / was used up	allow the citric acid was the limiting reactant	1	AO3 5.5.1.1
	so no more reaction happened / no more energy was taken in		1	AO3 5.5.1.1
08.6	the reaction takes in energy from the surroundings / the solution	ignore endothermic on its own	1	AO1 5.5.1.1
	so the thermal energy store of the solution decreases / its temperature decreases		1	AO1 5.5.1.1
		Total	**11**	
		TOTAL FOR PAPER	**70**	