Pearson Edexcel

Mark Scheme (Results)

Summer 2023

Pearson Edexcel GCSE
In Combined Science (1SC0)
Paper 1CF

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General Marking Guidance

- **All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.**
- **Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.**
- **Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.**
- **There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.**
- **All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.**
- **Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.**
- **When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.**
- **Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.**

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.
Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.
When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

Assessment Objective		Command Word	
Strand	**Element**	**Describe**	**Explain**
AO1		**An answer that combines the marking points to provide a logical description**	**An explanation that links identification of a point with reasoning/justification(s) as required**
AO2		**An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding**	**An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)**
AO3	**1a and 1b**	**An answer that combines points of interpretation/evaluation to provide a logical description**	
AO3	**2a and 2b**		**An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning**
AO3	**3a**	**An answer that combines the marking points to provide a logical description of the plan/method/experiment**	
AO3	**3b**		**An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning**

Chemistry 1SC0/1CF

Question number	Answer	Mark
1(a)(i)	**D** **Z** is the only correct answer. **A**, **B** and **C** are incorrect because they have more than one spot	**AO1-1 (1)**

Question number	Answer	Mark
1(a)(ii)	**C** **Y** is the only correct answer. **A**, **B** and **D** are incorrect because those inks have fewer spots	**AO3-1 (1)**

Question number	Answer	Additional guidance	Mark
1(a)(iii)	0.39 scores 2 marks with or without working $\frac{3.60}{9.20}$ = 0.39(1304…) (1) = 0.39 (1) (rounded to 2dp)	fraction $\frac{9}{23}$ scores 1 mark 1 mark for correct substitution and evaluation $\frac{3.60}{9.20}$ = 0.4 scores only 1 for correct evaluation to 1dp Note: 0.4 alone without working scores 0 1 mark for correct rounding (has to use the numbers 3.60 and 9.20 in the calculation) $\frac{9.20}{3.60}$ = 2.5**6** scores 1 (for 2dp) Note: by default 3.60 x 9.20 = 33.12 has an answer to 2dp, so 2nd mark is given	**AO2-1 (2)**

Question number	Answer	Additional guidance	Mark
1(b)(i)	evaporation / evaporating	allow boiling / vaporisation do not allow boiling point / bpt	**AO1-1 (1)**

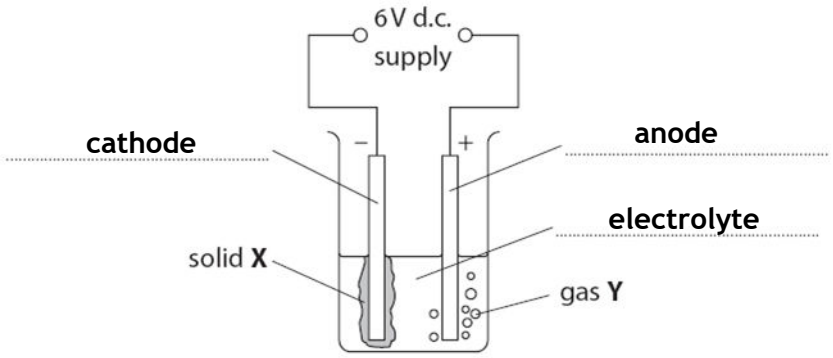
Question number	Answer	Additional guidance	Mark
1(b)(ii)	56 (^{o}C)		**AO3-1 (1)**

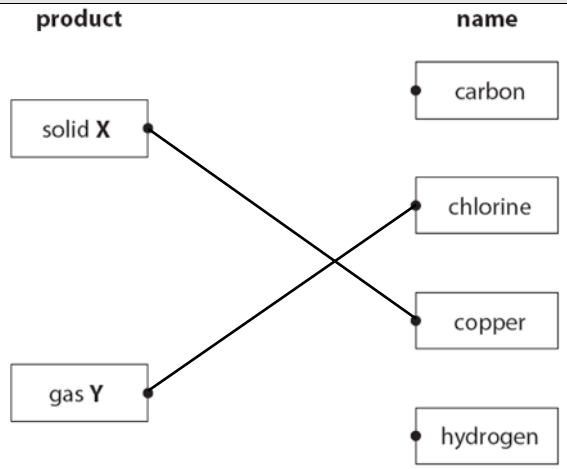
Question number	Answer	Additional guidance	Mark
1(b)(iii)	6 (minutes)		**AO3-1 (1)**

Question number	Answer	Additional guidance	Mark
1(b)(iv)	answers between 49 and 51 score 1 mark with or without working. 75 – 25 = 50 (1)	allow readings between 74 and 76	**AO3-1 (1)**

Total for Question 1 = 8 marks

Question number	Answer	Mark
2(a)	**B** the decomposition of ionic compounds is the only correct answer **A**, **C** and **D** are incorrect statements	**AO1-1 (1)**

Question number	Answer	Additional guidance	Mark
2(b)(i)		All 3 correct scores 2 marks 1 or 2 correct scores 1 mark allow copper chloride **solution** to replace electrolyte	**AO1-2 (2)**

Question number	Answer	Additional guidance	Mark
2(b)(ii)		one mark for each line do not award mark if more than one line is drawn from each box on the left	**AO1-2 (2)**

Question number	Answer	Additional guidance	Mark
2(b)(iii)	An explanation linking the following • no current will flow / solid ionic compounds do not conduct electricity (1) • (because) **ions** can't move / **ions** in a lattice (1)	Allow reverse arguments allow no electricity flows do not accept 'nothing happens' ignore charged particles reject electrons/atoms/molecules can't move if no other mark awarded allow 1 mark for if 'copper chloride isn't dissolved' / 'it will only work if ions are in solution'	**AO1-1 (2)**

Total for Question 2 = 7 marks

Question number	Answer	Mark
3(a)(i)	ON LEFT: potassium chloride **AND** ON RIGHT: potassium nitrate	**AO2-1 (1)**

Question number	Answer	Mark
3(a)(ii)	**D** is the correct answer **A**, **B** and **C** are the hazard symbols for corrosive, flammable and harmful	**AO2-1 (1)**

Question number	Answer	Additional guidance	Mark
3(b)(i)	measuring cylinder	allow burette / pipette / syringe	**AO3-3 (1)**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	2.4 + 2.4 + 2.7 (= 7.5) (1) $\frac{7.5}{3}$ = 2.5 (1)	2.5 with or without working scores 2 marks allow ECF for an incorrect evaluation divided by 3 allow 2.4 + 2.4 = 4.8, 4.8/2 = 2.4 (1) 2.4 + 2.4 + 2.7 ÷ 3 = 5.7 (1) 2.4 + 2.7 + 2.4 ÷ 3 = 5.9 (1)	**AO2-2 (2)**

Question number	Answer	Additional guidance	Mark
3(b)(iii)	a description to include the following points **First mark** Filter (the mixture) (1) **Second and third marks** A description including two of the following Calcium carbonate / the solid / the residue / precipitate is left on (filter) paper / on the funnel (1) Wash / rinse (the solid/residue/calcium carbonate with distilled water) (1) any method of drying the solid (1)	maximum 1 mark if heat or evaporate or crystallisation method used on mixture or filtrate description or diagram of filtering or diagram of filtering ie (filter) funnel and filter paper do not allow sieving/sifting/draining/decanting do not allow separating funnel pour water over/through solid (in filter paper) clean solid with water do not allow this mark if washing is done after drying eg in an oven / on a windowsill / on a radiator / with filter paper warm it heat it (but not with a Bunsen burner) evaporate the water allow 'leave to dry' do not allow just 'dry it (out/off)'	**AO2-2 (3)**

Question number	Answer	Additional guidance	Mark
3(b)(iv)	any one of the following • volume / concentration of {potassium carbonate / carbonate / potassium solution} • concentration of (calcium) nitrate • time allowed for settling	 allow amount of (potassium) carbonate ignore 'volume' alone ignore {amount / volume} of calcium nitrate ignore time (alone) allow temperature allow diameter of test tube	**AO3-3b (1)**

Total for Question 3 = 9 marks

Question number	Answer	Additional guidance	Mark
4(a)(i)	any one of the following • shiny • high {melting / boiling} point • good conductor of {electricity / heat} • malleable / ductile • grey coloured	 allow reflective surface allow easily shaped / can be drawn into wires allow silver **coloured** ignore density / sonorous / solid ignore strength / strong / hard	**AO1-1 (1)**

Question number	Answer	Mark
4(a)(ii)	**D** strontium is the only correct answer **A**, **B** and **C** are incorrect because they are all in a different group to magnesium.	**AO1-1 (1)**

Question number	Answer	Mark
4(b)(i)	2.8.2	**AO1-1 (1)**

Question number	Answer	Additional guidance	Mark
4(b)(ii)	an explanation linking any two of • (chlorine has) 3 shells / 3 numbers in electronic configuration (1) • (so) (chlorine is in) period 3 (1) • number of shells is the period number (1)	 reject '3 outer shells' allow electron configuration diagram for 1st mark	**AO1-1 (2)**

Question number	Answer	Additional guidance	Mark
4(c)	**MP1 for dividing by atomic mass** **Mg : Cl** $\frac{1.20}{24.0}$: $\frac{3.55}{35.5}$ (1) **MP2 for deriving ratio from MP1** 0.05 : 0.1 OR 1 : 2 (1) **MP3 for formula using ratio in MP2** $MgCl_2$ (1)	$MgCl_2$ without working scores 0 allow ECF allow Mg $\frac{24.0}{1.20}$: Cl $\frac{35.5}{3.55}$ (0) 20 : 10 OR 2 : 1 (1) empirical formula Mg_2Cl (1) reject superscript numbers for MP3 only	**AO2-1 (3)**

Question number	Answer	Additional guidance	Mark
4(d)	A description to include ionic (max 2 marks) • (electrostatic) force between (oppositely charged) ions / between anions and cations (2) covalent (max 2 marks) • atoms share a **pair** of electrons (2)	 Other creditable responses (max 1 mark) including any **one** from: • {ions / cations / anions} are charged particles • ionic bonds between metals and non-metals • electrons transferred (from metal to non-metal) • metals lose electrons / non-metals gain electrons reject electrons transferred from non-metal to metals Other creditable responses (max 1 mark) including any **one** from: • covalent bonds are formed when electron(s) are shared • covalent bonds form molecules • covalent bonds between non-metals	**AO1-1 (4)**

Total for Question 4 = 12 marks

Question number	Answer	Additional guidance	Mark
5(a)	stir/ swirl/ shake (the beaker)	allow mix, warm/ heat ignore wait (until reaction over/ until powder disappears)	**AO1-2 (1)**

Question number	Answer	Additional guidance	Mark
5(b)	in either order: calcium chloride (1) water (1)	allow phonetic spellings but reject calcium chlor**ine** allow $CaCl_2$ but formula must be correct for the mark ignore 'solution'/ any state symbols allow H_2O but formula must be correct for the mark if three products given, allow (1) **only** if both correct products are given. four or more products scores (0)	**AO2-1 (2)**

Question number	Answer	Mark
5(c)	**C** s aq is the only correct answer **A, B** and **D** are not correct because the calcium hydroxide is a solid and the acid is an aqueous solution.	**AO2-1 (1)**

Question number	Answer	Additional guidance	Mark
5(d)(i)	1	allow 0.9 or 1.1	**AO3-2 (1)**

Question number	Answer	Mark
5(d)(ii)	0.74 (g)	**AO3-2 (1)**

Question number	Answer	Additional guidance	Mark
5(d)(iii)	An explanation linking: START • solution is acidic / acids have low pH / high {concentration/ amount} of H^+ ions/ excess H^+ ions (1) REACTION • neutralisation/ $H^+ + OH^- \rightarrow H_2O$/ {the hydroxide/ alkali} <u>reacts</u> with the {acid/ H^+} (1) END • {amount/ concentration} of H^+ ions has reduced/ {amount/ concentration} of OH^- ions has increased / excess OH^- ions/ (excess of) hydroxide ions have pH > 7 (1)	allow for low pH: pH less than 7 / pH 1-6 / pH =1 ignore there is no alkali ignore references to 'strong' or weak' allow acid → neutral → alkali (2) allow calcium hydroxide is {an alkali/a base} ignore description of pattern – as calcium hydroxide added pH increases (0) ignore 'becomes alkaline'/ is alkaline/ is less acidic	**AO2-1 (3)**

Question number	Answer	Additional guidance	Mark
5(e)	pH meter / pH probe	allow universal indicator / pH paper ignore pH scale do not allow any other named indicator, or 'indicator' alone.	**AO1-2 (1)**

Question number	Answer	Additional guidance	Mark
5(f)	goggles / gloves / eye protection	allow safety glasses ignore wearing lab coats ignore references to general lab safety, e.g. tie hair back, stand up	**AO1-2 (1)**

Total for Question 5 = 11 marks

Question number	Answer	Mark
6(a)	**A** calcium is the only correct answer **B**, **C** and **D** are incorrect because copper, silver and gold do not react with cold water	**AO1-1 (1)**

Question number	Answer	Additional guidance	Mark
6(b)(i)	MAGNESIUM many bubbles / bubbles produced quickly / bubbles vigorously OR test tube feels hot / warm / warmer than with zinc (1) IRON few bubbles / bubbles produced slowly / some bubbles OR test tube feels <u>very</u> slightly warm (1)	Mark answer lines first, if blank or only contain statements that can be ignored, then look at the table. Ignore hydrogen / gas / reactivity of metal reject incorrect additional observations for each metal allow 'magnesium disappears/ dissolves' ignore steady bubbling / slightly warm ignore steady bubbling / no bubbling allow does not feel warm ignore test tube feels slightly warm	**AO3-2 (2)**

Question number	Answer	Additional guidance	Mark
6(b)(ii)	a description to include the following points • apply lighted splint (to the gas) (1) • (squeaky) pop (1)	 allow apply flame / ignite ignore 'squeaky pop test' reject glowing splint MP2 depends on MP1	**AO1-2 (2)**

Question number	Answer	Additional guidance	Mark
6(b)(iii)	$Mg + 2HCl \rightarrow MgCl_2 + H_2$ H_2 (1) 2 (1)	 reject H2, H^2, 2H, 2h, h_2, h^2	**AO2-1 (2)**

Question number	Indicative content	Mark
***6(c)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlines in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **ALUMINIUM** • extracted by electrolysis • aluminium is more reactive than carbon / ORA • aluminium compound is reduced / redox reaction • as heating with carbon will not work • a more powerful method / more energy is needed • electrolysis is expensive **IRON** • heating with carbon • iron is less reactive than carbon • iron compound is reduced / redox reaction • method cheaper than electrolysis **SILVER** • found uncombined / native state / often just mined • low reactivity • so reduction not needed or • silver is less reactive than carbon • heating with carbon • silver compound is reduced / redox reaction • method cheaper than electrolysis **GOLD** • found uncombined / native state / often just mined • least reactive / low reactivity • so reduction not needed	**AO2-1 (6)**

Level	Mark	Descriptor
	0	• No awardable content.
Level 1	1–2	• The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. • Lines of reasoning are unsupported or unclear.
Level 2	3–4	• The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. • Lines of reasoning mostly supported through the application of relevant evidence.
Level 3	5–6	• The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. • Lines of reasoning are supported by sustained application of relevant evidence.

Level	Mark	Descriptor	Additional Guidance
	0	No rewardable material.	Read whole answer and ignore all incorrect material and any references to other metals / discard any contradictory material then:
Level 1	1–2	Additional Guidance Correctly identifies method to obtain 1 named metal Correctly identifies method to obtain 2 named metals Correctly identified method to obtain 1 named metal with a part explanation	Possible candidate response (all examples, not a definitive list) Aluminium is obtained using electrolysis (1) Gold and silver are obtained as the pure metal (2) Aluminium is obtained using electrolysis because it is very reactive (2)
Level 2	3–4	Additional Guidance Correctly identifies methods for all four metals (with no explanation) Correctly identified method to extract at least 1 named metal with a full explanation Correctly identifies method to extract at least 2 named metals with part explanation for one (3) or two (4)	Possible candidate response Aluminium extracted using electrolysis, iron obtained by heating with carbon, gold and silver are found as pure metals (3) Iron is extracted by heating (the ore) with carbon as iron is less reactive than carbon and is cheaper than electrolysis (3) Silver and gold are obtained as the {pure/unreacted} metals as they are {unreactive/low in reactivity} (4)
Level 3	5–6	Additional Guidance Correctly identifies method to extract at least 2 metals with full explanations Correctly identifies method to extract at least 3 metals with a full explanation for one metal	Possible candidate response Iron is extracted by heating (the ore) with carbon as iron is less reactive than carbon and is cheaper than electrolysis, and aluminium is obtained using electrolysis because it is very reactive and heating with carbon will not work Aluminium is extracted by electrolysis, iron by heating (the ore) with carbon and silver is found as the unreacted metal as it is very unreactive and reduction is not needed

Total for Question 6 = 13 marks