



Pearson

Mark Scheme (Results)

November 2020

Pearson Edexcel GCSE
In Combined Science (Chemistry) (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.

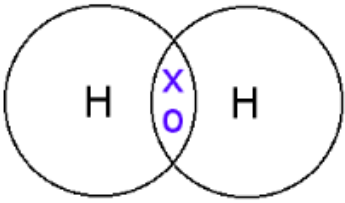
Assessment Objective		Command Word	
Strand	Element	Describe	Explain
AO1*		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide 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

*there will be situations where an AO1 question will include elements of recall of knowledge directly from the specification (up to a maximum of 15%). These will be identified by an asterisk in the mark scheme.

Question number	Answer	Mark
1(a)	C dissolving A, B, D – these answers are about different processes	1

Question number	Answer	Additional guidance	Mark
1(b)(i)	sodium + hydrochloric acid (1) → sodium chloride + hydrogen (1)	allow reactants either way round allow products either way round reject 'sodium chlorine' allow Na + HCl → NaCl + H ₂ (1) 2Na + 2HCl → 2NaCl + H ₂ (2)	2

Question number	Answer	Mark
1(b)(ii)	B flammable A corrosive has a different hazard symbol C oxidising has a different hazard symbol D toxic has a different hazard symbol	1

Question number	Answer	Additional guidance	Mark
1(b)(iii)		allow dots or crosses or mixture allow other suitable symbols	1

Question number	Answer	Additional guidance	Mark
1(c)(i)	pH meter	allow universal indicator / pH paper ignore datalogger alone ignore pH scale / pH strip	1

		ignore indicator alone	
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Question number	Answer	Additional guidance	Mark
1(c)(ii)	7 / seven	allow pH7 / PH7	1

Total for Question 1 = 7 marks

Question number	Answer	Mark
2(a)(i)	C 2.8.7 A, B, D do not represent electronic configurations	1

Question number	Answer	Additional guidance	Mark
2(a)(ii)	An explanation linking <ul style="list-style-type: none"> • in {outer / 3rd} shell (1) • seven electrons (1) or <ul style="list-style-type: none"> • number of electrons in outer shell (1) • is the same as group number (1) 	allow last shell / outer ring MP2 depends on MP1 allow 7 is the last number of the electronic configuration / OWTTE (1)	2

Question number	Answer	Additional guidance	Mark
2(b)(i)	An explanation linking <ul style="list-style-type: none"> • same number of electrons and protons (1) • so charges {cancel / balance one another} (1) 	allow same number of positive and negative charges	2

Question number	Answer	Additional guidance	Mark
2(b)(ii)	37 – 17 (1) (= 20) (neutrons)	allow 20 without working reject ‘– 20’	1

Question number	Answer	Additional guidance	Mark
2(b)(iii)	An explanation linking	ignore electrons	2

	<ul style="list-style-type: none"> atoms {of same element / with same number of protons} / same atomic number (1) different number of neutrons / different mass number (1) 	reject neutrons reject protons /electrons	
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Total for Question 2 = 8 marks

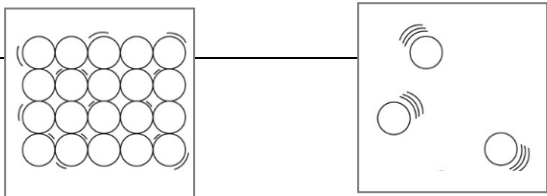
Question number	Answer	Additional guidance	Mark
3(a)	arranged by order of (relative) atomic mass / (in Mendeleev's early periodic table) gaps / missing elements / fewer elements / noble gases were not present	assume answer refers to Mendeleev's table unless specifically referred to modern table so reverse arguments apply	1

Question number	Answer	Additional guidance	Mark
3(b)(i)	aluminium chloride	reject 'aluminium chlorine'	1

Question number	Answer	Additional guidance	Mark
3(b)(ii)	neutralisation	allow acid + base allow 'acid-base' allow 'exothermic'	1

Question number	Answer	Additional guidance	Mark
3(c)(i)	Ga_2O_3	allow Ga_2O_3 / GA_2O_3 reject Ga^2O^3	1

Question number	Answer	Mark
3(c)(ii)	B ionic A giant covalent structures do not conduct electricity at all C metallic structures conduct when solid D simple molecular structures do not conduct electricity when molten and have low melting points	1

Question number	Answer	Additional guidance	Mark
3(d)(i)			2

	<p style="text-align: center;">solid (1) gas (1) (regular arrangement (widely spaced, fewer shown) and touching)</p>		
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Question number	Answer	Additional guidance	Mark
3(d)(ii)	condensing / condensation		1

Question number	Answer	Additional guidance	Mark
3(e)	<p>An explanation linking</p> <ul style="list-style-type: none"> • electrons (1) • can move / are delocalised (1) 	<p>MP2 depends on MP1</p> <p>allow charged particles can move / are delocalised (1)</p>	2

Total for Question 3 = 10 marks

Question number	Answer	Mark
4(a)	B gold A, C, D – these metals too reactive to exist as uncombined elements	1

Question number	Answer	Additional guidance	Mark
4(b)	Any two from preserves ore reserves / reduces waste / reduces energy needed for metal extraction / preserves {habitats/ landscape / resources}	allow reduces carbon emissions ignore cheaper	2

Question number	Answer	Mark
4(c)	$2\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 4\text{Fe} + 3\text{CO}_2$	1

Question number	Answer	Additional guidance	Mark
4(d)	$\frac{42.5}{5000} (1) \times 100 (1) (= 0.85)$	0.85 alone scores 2	2

Question number	Answer	Additional guidance	Mark
4(e)	An explanation linking <ul style="list-style-type: none"> carbon / C (1) gained oxygen (to form carbon dioxide) (1) 	reject other elements for MP1 allow oxidation is gain of oxygen / oxidation is loss of electrons (1)	2

Question number	Answer	Additional guidance	Mark
4(f)	Ti $\frac{12}{48} = 0.25$ and O $\frac{8.0}{16} = 0.5$ (1) simplest ratio 1:2 (1) empirical formula TiO_2 (1)	working must be shown to gain full marks allow TE Ti $\frac{48}{12} = 4$ and O $\frac{16}{8.0} = 2$ (0) simplest ratio 2:1 (1) empirical formula Ti_2O (1) allow (1) for formula with numbers obtained from 1 st step with no simplest ratio	3

Total for Question 4 = 11 marks

Question number	Answer	Additional guidance	Mark
5(a)(i)	A description including <ul style="list-style-type: none"> • apply lighted splint (1) • gas burns / (squeaky) pop (1) 	allow flame / ignite gas ignore 'squeaky pop test' / glowing splint second mark is dependent on first	(2)

Question number	Answer	Mark
5(a)(ii)	B oxygen The only correct answer is B A, C & D these gases are not produced in the electrolysis of sodium sulfate solution	(1)

Question number	Answer	Additional guidance	Mark
5(a)(iii)	<ul style="list-style-type: none"> • electrical energy / electricity (1) • {decomposes / breaks down / splits} {electrolytes / (ionic) compounds / substances} (1) 	allow electric current allow separates ions reject decomposing elements for MP2	(2)

Question number	Answer	Additional guidance	Mark
5(b)	final answer of 114 (g dm ⁻³) with or without working (3) OR <u>28.4</u> (1) (= 0.1136) 250 0.1136 x 1000 (1) (= 113.6) = 114 (g dm ⁻³) (1)	allow ECF throughout <u>250</u> (dm ³) (1) (= 0.250 (dm ³)) 1000 <u>28.4</u> (1) (= 113.6) 0.250 OR <u>1000</u> (1) = 4 250 4 x 28.4 (1) (= 113.6) Must have 3sf for MP3 0.114 scores 2 Lose MP1 if rounded incorrectly e.g, to 0.11 or 0.113 but mark on	(3)

Question number	Answer	Additional guidance	Mark
5(c)	Na ₂ SO ₄	allow SO ₄ Na ₂ allow upper case A ignore any charges on ions reject non-subscript 2 & 4	(1)

Question number	Answer	Additional guidance	Mark
5(d)(i)	measuring cylinder(s)	allow alternative apparatus eg graduated test-tube, burette, Hofmann voltameter, gas syringe	(1)

Question number	Answer	Additional guidance	Mark
5(d)(ii)	light bulb / lamp / ammeter	allow alternative equipment eg buzzer ignore voltmeter / data-logger alone	(1)

Total for Question 5 = 11 marks

Question number	Answer	Additional guidance	Mark
6(a)(i)	Left : H_2SO_4 (1) Right : CuSO_4 (1)	reject superscript numbers reject superscript numbers incorrect balancing max 1	(2)

Question number	Answer	Mark
6(a)(ii)	$63.5 + 12 + 3 \times 16$ (1) $= 123.5$ (1)	(2)

Question number	Answer	Mark
6(a)(iii)	A bubble gas through limewater, limewater turns cloudy The only correct answer is A B is not correct because test shows only an acidic gas C is not correct because test shows only that the gas does not support combustion D is not correct because test shows only an acidic gas	(1)

Question number	Answer	Additional guidance	Mark
6(b)(i)	Any TWO from <ul style="list-style-type: none"> no more bubbles / fizzing (1) no further change in colour (1) {solid / copper carbonate} remains at bottom of flask / no more {solid / copper carbonate} dissolves (1) 	ignore references to pH allow cloudy/opaque liquid ignore no more copper carbonate will react	(2)

Question number	Indicative content	Mark
*6(b)(ii)	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <p>AO2 and A03 (6 marks)</p> <ul style="list-style-type: none"> • filter mixture • using filter funnel and paper • collect filtrate / copper sulfate solution • in conical flask / suitable (named) container • pour into an evaporating basin • heat on water bath / on tripod over Bunsen • until half volume / concentrated / partially evaporated / crystals start to appear around the edge • remove from heat and cover with filter paper • allow to cool • and crystallise • separate crystals using a suitable method • put/place crystals onto absorbent/filter paper • dry in a warm place 	(6)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels Eg - At each level, as well as content, the scientific coherency of what is stated backed up by planning detail will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	<u>Additional guidance</u> Identifies relevant practical operations	<u>Possible candidate responses</u> <ul style="list-style-type: none"> • filter the mixture (alone) • allow solution to crystallise (alone) • filter mixture using filter paper - upper part of level
Level 2	3–4	<u>Additional guidance</u> Some correct sequencing of correct operations	<u>Possible candidate responses</u> <ul style="list-style-type: none"> • filter mixture and collect solution/liquid • evaporate solution and leave to cool • sequence with detail – upper part of level
Level 3	5–6	<u>Additional guidance</u> Sequence of operations to include two from filter to remove excess copper carbonate, crystallise (includes heating & cooling), separate crystals & dry	<u>Possible candidate responses</u> <ul style="list-style-type: none"> • filter mixture then cool and crystallise • evaporate/heat solution then allow to cool and crystallise • sequence with detail – upper part of level

Total for Question 6 = 13 marks

