

Mark Scheme (Results)

Summer 2019

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

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Summer 2019
Publications Code 1SC0_1CF_1906_MS
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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

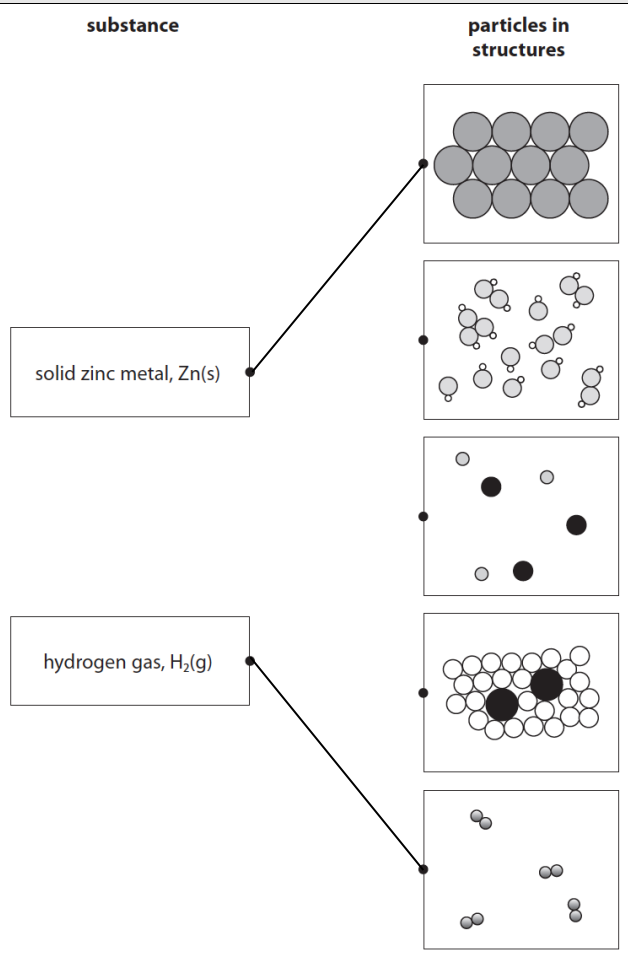
Question number	Answer	Mark
1(a)	**C** freezing The only correct answer is **C**. **A** is incorrect because condensation is when a gas changes into a liquid. **B** is incorrect because evaporation is when a liquid changes into a gas. **D** is incorrect because melting is when a solid changes into liquid.	**(1)**

Question number	Answer	Mark
1(b)(i)	2 / two (minutes)	**(1)**

Question number	Answer	Additional guidance	Mark
1(b)(ii)	6 - 2 (= 4) / 4 / four (minutes)	Any other manipulation of numbers leading to the answer 4 scores 0	**(1)**

Question number	Answer	Additional guidance	Mark
1(c)(i)	**Z**	allow z	**(1)**

Question number	Answer	Additional guidance	Mark
1(c)(ii)	**Y**	allow y	**(1)**

Question number	Answer	Mark
1(d)	 Each line 1 mark Do not award mark if more than one line joins the left hand boxes with those on the right (2)	(2)

(Total for Question 1 = 7 marks)

Question Number	Answer	Mark
2(a)	**A** air The only correct answer is **A**. **B** is incorrect since carbon dioxide is a compound and not a mixture. **C** and **D** are incorrect because gold and titanium are both metallic elements and not mixtures.	**(1)**

Question Number	Answer	Additional guidance	Mark
2(b)(i)	to measure the temperature of the {water vapour / steam / gas} passing into the condenser	to measure the boiling point of the water / the vapour should be at 100 ^{o}C when collected allow does not measure accurate boiling point where thermometer is on the diagram (or words to that effect)	**(1)**

Question Number	Answer	Additional guidance	Mark
2(b)(ii)	beaker not under condenser exit / water entering condenser in wrong place / water flow in condenser wrong way round	ignore references to no Bunsen burner / clamps shown allow beaker not under where (condensed) water comes out / no {anti-bumping granules / chips} allow beaker {is too far away (from the condenser exit)/ too far to the right / is not in the right place / needs to be closer} reject water out (without reference to end of condenser)	**(1)**

Question Number	Answer	Additional guidance	Mark
2(c)(i)	**(2) (3) 6 4 1 5** (2) any **two** in the correct order and adjacent to each other max (1)	64 / 15 / 41 next to each other in this order in any position (1)	**(2)**

Question Number	Answer	Additional guidance	Mark
2(c)(ii)	An explanation linking • mixture **T** (1) • because it gives {the greatest number / 5} spots (1)	 allow dots or other suitable descriptor allow more {spots / separated (coloured) substances} ignore coloured substances (alone) / colours / references to spots moving further up the paper	**(2)**

Question Number	Answer	Additional guidance	Mark
2(c)(iii)	0.29 with or without working scores 2 $R_f = \frac{2.30}{8.00}$ (= 0.2875) (1) = 0.29 (1)	 allow $\frac{8.00}{2.30}$ = 3.5 (1) (other way round for 1 mark) 8.00 + 2.30 = 10 (1) 8.00 – 2.30 = 5.7 (1) (2 sf) 8.00 x 2.3 (= 18) (2 sf)	**(2)**

(Total for Question 2 = 9 marks)

Question Number	Answer	Mark
3(a)(i)	**A** a balance The only correct answer is **A**. **B** is incorrect because a pipette is used to measure out a volume of liquid and is not used to find the mass of a metal. **C** is incorrect because a stopwatch is used to measure time and is not used to find the mass of a metal. **D** is incorrect because a thermometer is used to measure temperature and is not used to find the mass of a metal.	**(1)**

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	Any two from the following • (same) volume of acid (1) • (same) concentration of acid (1) • (same) size of metal (pieces) (1) • (same) temperature (1)	 allow amount / mass of acid allow strength / pH allow surface area ignore references to time	**(2)**

Question Number	Answer	Additional guidance	Mark
3(a)(iii)	copper is {not reacting / no reaction / unreactive / low in reactivity series / not reactive enough}	allow less reactive (than hydrogen) ignore inert (alone)	**(1)**

Question Number	Answer	Additional guidance	Mark
3(a)(iv)	$MgCl_2$ (aq) (1) H_2 (g) (1) $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$	allow AQ allow G	**(2)**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	K_2SO_4	allow SO_4K_2 allow $(K^+)_2SO_4^{2-}$ (1) (both charges needed & allow in reverse) reject incorrect subscript and superscripts	**(1)**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	5.22 with or without working scores 2 $\frac{5.22 + 5.24 + 5.21}{3}$ (= 5.2233) (1) = 5.22 (1)	5.22 + 5.24 +5.21 = 15.67 (MP1 does not score) Allow 15.67 (1) (ie not divided by 3 but MP2 scores as answer to 2dp)	**(2)**

(Total for Question 3 = 9 marks)

Question Number	Answer	Mark
4(a)	**B** gold The only correct answer is **B**. **A**, **C** and **D** are incorrect because calcium , iron and magnesium respectively, are all found chemically combined to other elements in the Earth's crust.	**(1)**

Question Number	Answer	Additional guidance	Mark
4(b)(i)	zinc oxide + carbon → zinc + carbon dioxide zinc oxide + carbon → (1) → zinc + carbon dioxide (1)	allow reactants on LHS or products on RHS in either order allow 2 ZnO + C → 2 Zn + CO_2 (2) unbalanced equation (1) ignore state symbols allow = for →	**(2)**

Question Number	Answer	Mark
4(b)(ii)	reduction	**(1)**

Question Number	Answer	Additional guidance	Mark
4(c)(i)	five / 5 (ions)	Allow 2 + 3	**(1)**

Question Number	Answer	Mark
4(c)(ii)	$2Al_2O_3 \rightarrow 4\ Al + 3\ O_2$	CLER (2)

Question Number	Answer	Additional guidance	Mark
4(d)(i)	**C B D A** (2) any **two** in the correct order and adjacent to each other max (1)	CB / BD / DA next to each other in this order in any position (1)	GRAD (2)

Question Number	Answer	Additional guidance	Mark
4(d)(ii)	Any two from the following • conserves {natural reserves of raw materials/ ore / aluminium ore} (1) • less damage to {landscape / habitats} / less {noise /dust} (pollution) (1) • less {energy / electricity} required (to recycle aluminium waste compared to extracting aluminium from its ore) (1) • less waste metal goes into landfill (1)	{pollution / environment / resources} needs to be qualified Less waste needs to be qualified ignore 'less mining (of ore)' which is in stem ignore references to cost / time / fuel	GRAD (2)

(Total for Question 4 = 11 marks)

Question Number	Answer	Additional guidance	Mark
5(a)(i)	any two from **E, G** and **X**	allow mark if all three given for E allow B / boron for G allow O / O_2 / oxygen for X allow Ar / argon allow use of lower case letters reject answers with any other letters / element names	**(1)**

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	any two from **A, E** and **G**	allow mark if all three given for A allow Li / lithium for E allow B / boron for G allow O / O_2 / oxygen allow use of lower case letters reject answers with any other letters / element names	**(1)**

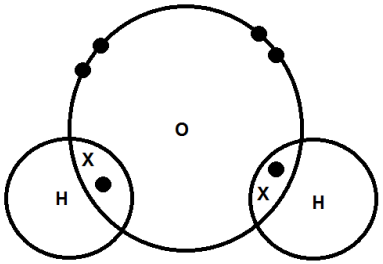
Question Number	Answer	Additional guidance	Mark
5(a)(iii)	**A** / **J**	allow mark if both given for A allow Li / lithium for J allow Na / sodium allow use of lower case letters reject answers with any other letters / element names reject answers with + or – charges	**(1)**

Question Number	Answer	Additional guidance	Mark
5(b)(i)	An explanation linking: • (atoms with) same (number of) protons (1) • (atoms with) different (number of) neutrons (1)	ignore any mention of electrons reject answers in terms of element**s** (plural) but allow element (singular) if no other mark: allow same atomic number **and** different mass number (1)	**(2)**

Question Number	Answer	Mark
5(b(ii)	**A** 5 protons is the only correct answer **B** is not correct because there are 5 or 6 neutrons **C** is not correct because the atomic number is 5 **D** is not correct because there are 5 or 6 neutrons	**(1)**

Question Number	Answer	Additional guidance	Mark
5(c)	2.8.8	allow 2,8,8 2/8/8 2 8 8 or other separator allow correct electron shell diagram	**(1)**

Question Number	Answer	Additional guidance	Mark
5(d)	**MP1 for dividing by atomic mass** **A** : **G** 3.5 : 4.0 (1) 7 16 **MP2 for deriving ratio <u>from MP1</u>** 0.5 : 0.25 OR 2 : 1 (1) **MP3 for ratio in MP2 to formula** empirical formula **A_2G** (1)	A_2G with no relevant working (1) ONLY AG_2 (0) For MP2: If they go on to calculate a different ratio in addition to 0.5:0.25 or 2:1 do not award MP2 ecf on step 1: if inverted, 7 : 16 (0) 3.5 4.0 = 2 : 4 or 1 : 2 (1) AG_2 (1) allow 1 in empirical formula allow Li for A and O for G do not penalise incorrect case in formula	**(3)**

Question Number	Answer	Additional guidance	Mark
5(e)	 (2)	shared pair of electrons in right hand overlap(1) rest of molecule with 4 electrons drawn in outer shell of O only (1) MP2 dependent on MP1 allow x or • or combinations thereof for any electrons ignore inner shells of electrons even if incorrect	**(2)**

(Total for Question 5 = 12 marks)

Question Number	Answer	Additional guidance	Mark
6(a)(i)	(squeaky) pop / gas burns / water forms	allow explosion / bang / flame / fire / energy released ignore: reaction occurs / ignites / set alight ignore references to splints (glowing or lighted)	**(1)**

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	A description to include • *volumes going up:* (oxygen/ hydrogen/ gas) increase (with time) / volume (directly) proportional to time (1) • *quantitative comparing hydrogen and oxygen:* (volume of) hydrogen double (volume of) oxygen / ORA / 2:1 ratio (1)	allow hydrogen goes up by 4 (cm^3) each time / by 2 cm^3 per minute / equivalent for oxygen for MP1 explicit reference needed to a ratio and **not** just quoting 2 figures allow amount in place of volume throughout allow twice as much hydrogen produced as oxygen (1) allow **rate** of hydrogen production double that of oxygen (2)	**(2)**

Question Number	Answer	Mark
6(b)	**C** lead and bromine is the only correct answer **A** is incorrect because lead is produced at the cathode **B** is incorrect because lead and bromine are produced **D** is incorrect because bromine is produced at the anode	**(1)**

Question Number	Answer	Additional guidance	Mark
6(c)	An explanation linking: • (calcium) nitrate {is soluble/ dissolves}/ (calcium) carbonate {is insoluble/ does not dissolve} (1) • so **ions** {free to move in solution / not free in solid} (1)	calcium nitrate dissolves so ions can move (2) or reverse argument for calcium carbonate	**(2)**

Question Number	Indicative content	Mark
***6(d)**	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. **AO1.2** • copper atoms form copper ions at anode • (copper atoms are oxidised / lose electrons) • $Cu \rightarrow Cu^{2+} + 2e$ • copper ions pass into solution • copper ions move to / are attracted by the cathode • cathode increases in size / gains mass • pink/ brown colour on the surface of the cathode • solid copper deposited on the cathode • (copper ions are reduced/gain electrons) • copper ions form copper atoms • $Cu^{2+} + 2e \rightarrow Cu$ • copper sulfate solution is blue colour • colour remains same since for every copper ion entering the solution at the anode, one is removed from the solution at the cathode • concentration of copper sulfate (solution) remains the same • solid is the insoluble impurities falling from the anode	**(6)**

Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of chemical understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) • Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3-4	• Demonstrates chemical understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) • Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) • Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

Marker Guidance

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 further detail will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance A simple statement about one of the three observations	Possible candidate responses • the cathode increases in size and anode decreases in size • solid beneath the anode is the impurities • the amount of copper in solution stays the same / same blue colour throughout
Level 2	3–4	Additional guidance Explains at least one of the observations OR gives two or more partial explanations	Possible candidate responses • solid copper deposits on the cathode, so size increases • solid beneath the anode is the insoluble impurities • copper ions moving and direction from anode to cathode
Level 3	5–6	Additional guidance Explains at least two observations OR at least one in detail	Possible candidate responses • the ions move to the correct electrodes linked with the correct change in size • colour does not change since copper ions enter solution at anode copper ions removed from solution at cathode • copper atoms form copper ions at the anode and pass into the solution, so size of anode decreases; copper ions in the solution are attracted to the cathode

(Total for Question 6 = 12 marks)

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