Mark Scheme (Results)

November 2021

Pearson Edexcel GCSE
In Combined Science (1SC0) Paper 2CF

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November 2021
Publications Code 1SC0_2CF_2111_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

*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.

Paper 2CF Foundation Tier

Question number	Answer	Mark
1(a)	any two from: concentration of acid (1) { size / shape / surface area / length} area of magnesium ribbon (1) mass of magnesium (1)	(2) AO2

Question number	Answer	Mark
1(b)	**B** measuring cylinder **A, C** and **D** do not measure volumes	(1) AO2

Question number	Answer	Mark
1(c)	magnesium has gone / no more bubbles	(1) AO2

Question number	Answer	Additional guidance	Mark
1(d)	(particles) have more energy / (particles) collide more frequently / more successful collisions	allow particles move faster	(1) AO1

Question number	Answer	Additional guidance	Mark
1(e)	$\frac{15.0}{60.0}$ (1) = 0.25 (1) ($cm^3\ s^{-1}$)	$\frac{60}{15}$ = 4 (1)	(2) AO2

Question number	Answer	Mark
2(a)(i)	(outer shell is) full/ complete	(1) AO1

Question number	Answer	Additional guidance	Mark
2(a)(ii)	An explanation linking • hydrogen is flammable / could ignite (1) • krypton is more dense than air (1) • (so krypton) air ship would not float (1)	 allow krypton has a high density	(3) AO3

Question number	Answer	Mark
2(b)	had yet to be discovered / unknown / did not know about them	(1) AO1

Question number	Answer	Additional guidance	Mark
2(c)(i)	neon bar correct (1) argon bar correct (1)	 if no other mark scored, allow 1 for neon -252 **and** argon -192	(2) AO2

Question number	Answer	Mark
2(c)(ii)	allow any value from -152 to -90	(1) AO1

Question number	Answer	Mark
3(a)(i)	halogens	(1) AO1

Question number	Answer	Additional guidance	Mark
3(a)(ii)	astatine	allow At / At_2	(1) AO1

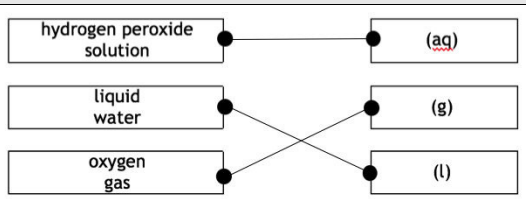
Question number	Answer	Mark
3(a)(iii)	**C** bromine **A** and **B** are not correct as they are gases at room temperature and pressure **D** is not correct as iodine is a solid at room temperature and pressure	(1) AO1

Question number	Answer	Mark
3(a)(iv)	**D** iodine **A** is not correct as fluorine is pale yellow at room temperature and pressure **B** is not correct as chlorine is green at room temperature and pressure **C** is not correct as bromine is red-brown liquid at room temperature and pressure	(1) AO1

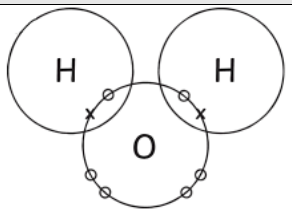
Question number	Answer	Additional guidance	Mark
3(b)	$\frac{1.19}{119}$ and $\frac{1.42}{35.5}$ (1) 0.01 : 0.04 (1) $SnCl_4$ (1)	allow ECF	(3) AO2

Question number	Answer	Additional guidance	Mark
3(c)	An explanation linking fluorine has fewer electron shells (1) (so) electron more easily attracted to nucleus (1)	allow less shielding (1) ignore fewer electrons ignore fewer outer electron shells	(2) AO1

Question number	Answer	Additional guidance	Mark
4(a)(i)	hydrogen peroxide → water + oxygen	allow symbol equation if all symbols and balancing are correct	(1) AO2

Question number	Answer	Additional guidance	Mark
4(a)(ii)	 all correct (2) 1 correct (1)	reject multiple lines	(2) AO1

Question number	Answer	Additional guidance	Mark
4(b)	A description to include glowing splint (1) relights (1)	MP2 is dependent on MP1	(2) AO1

Question number	Answer	Additional guidance	Mark
4(c)	 (2) OR shared pair of electrons between the oxygen and a hydrogen (1) rest of molecule correct (1)	allow dots or crosses or a mixture of both	(2) AO1

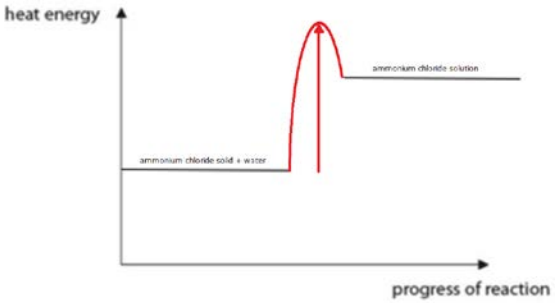
Question number	Answer	Additional guidance	Mark
4(d)(i)	Time in {s/ min}	allow seconds/ minutes	(1) AO3

Question number	Answer	Additional guidance	Mark
4(d)(ii)	A description to include reaction is faster with liver (1) more {gas/ oxygen} produced with liver (1)	allow ORA	(2) AO3

Question number	Answer	Mark
4(d)(iii)	A description to include bung and delivery tube (1) connected to { a gas syringe / upturned burette / upturned measuring cylinder} (1)	**(2)** **AO3**

Question number	Answer	Additional guidance	Mark
5(a)	46.25 / 46 with or without working scores 2 marks $\frac{200}{1000}$ (1)= 0.200 (dm^3) $\frac{9.25}{0.200}$ (1) = 46.25 / 46 OR $\frac{9.25}{200}$ = (0.04625) (1) 0.04625 x 1000 = 46.25 (1)	answer to 2 or more sig fig	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
5(b)(i)	an explanation linking two of: • {ammonium chloride solution/product} has more energy than {ammonium chloride solid and water/reactant} / ORA (1) • heat (energy) has increased / energy change is positive (1) • (therefore) heat energy has been {absorbed/taken in} (1)	ignore arguments about bond making / bond breaking	**(2)** **AO3**

Question number	Answer	Additional guidance	Mark
5(b)(ii)	 (2)	curve from reactants to products with peak higher than product energy (1) arrow labelled activation energy on correct curve (1)	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
5(c)	An explanation linking • ammonium chloride solution conducts electricity and solid ammonium chloride does not conduct electricity (1) • ammonium chloride contains **ions** (1) • in solution **ions** can move / in solid **ions** cannot move (1)	Answer must refer to both solid and solution for full marks	**(3)** **AO3**

Question number	Answer	Mark
5(d)(i)	**D** **A** is incorrect as it is the symbol for flammable substances. **B** is incorrect as it is the symbol for corrosive substances. **C** is incorrect as it is the symbol for substances that are harmful to health.	**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
5(d)(ii)	use a fume cupboard	ignore wear PPE / masks ignore wear goggles / gloves	**(1)** **AO1**

Question number	Answer	Mark
6(a)	**fractional** distillation / fractionation (1)	**(1)** **AO1**

Question number	Answer	Mark
6(b)	**C** they have the same general formula **A**, **B** and **D** not correct as compounds in homologous series have different chemical, empirical and molecular formulae.	**(1)** **AO1**

Question number	Answer	Additional guidance	Mark
6(c)	$N_2 + 2O_2 \rightarrow 2NO_2$ (2) or NO_2 (1)	other incorrect balancing max 1	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
6(d)	An explanation linking • {carbon dioxide / water} produced (1) • (the gases) absorb heat radiated from earth (1) re-radiate heat back into the atmosphere (1)	 allow formula allow traps the heat	**(3)** **AO2**

Question number	Indicative content	Mark
* 6(e)	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. **AO1 (3 marks) AO2 (3 marks)** • sulfur burns at the same time as the hydrocarbon • sulfur reacts with oxygen • sulfur dioxide gas is formed • sulfur dioxide is an acidic gas • sulfur dioxide dissolves in clouds • to form sulfurous acid • which is then oxidised to form sulfuric acid • rain water becomes acidic • acid rain damages buildings / statues • damages plants/trees • runs into rivers / waterways • makes rivers/waterways acidic • kills fish/insects/waterlife • increases corrosion of metals	(6)

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	acid rain damages plants and erodes buildings
Level 2	3–4	sulfur dioxide is formed which dissolves in clouds and then acid rain runs into waterways and kills fish
Level 3	5–6	sulfur burns to form sulfur dioxide which dissolves in clouds to form sulfuric acid, the acid rains can erode limestone statues and will increase corrosion of metals making them weaker.