Pearson Edexcel

Mark Scheme (Results)

Summer 2025

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

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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 ma
- 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.

Combined Science- Chemistry 1SC0_2CH

Question number	Answer	Additional Guidance	Mark
1(a)	measuring cylinder	allow (graduated) pipette/ burette reject dropping pipette	**(1)** **AO3-3** **Cler**

Question number	Answer	Additional Guidance	Mark
1(b)(i)	any **one** from • (same) volume • (same) (conical) flask • (same) cross	 allow (same) amount of solution allow (same) surface area of liquid allow (same) person observing / distance of observer ignore amount of {stirring / mixing} ignore room temperature / same conditions ignore beakers ignore same solutions reject same time	**(1)** **AO3-3**

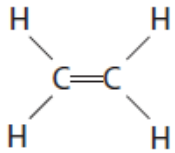
Question number	Answer	Additional guidance	Mark
1(b)(ii)	an explanation linking any three from • time taken decreases (1) • (because) particles have more energy (1) • more <u>frequent</u> collisions (1) • more particles have the activation energy / more successful collisions (1)	 allow idea of time less than 10 s allow cross appears quicker allow rate increases / it would be fast**er** allow particles move more/fast**er**	**(3)** **AO2-1**

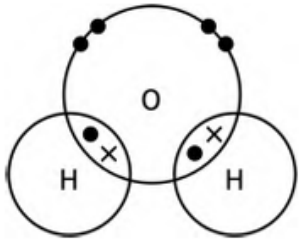
Question number	Answer	Additional guidance	Mark
(c)	0.67 with or without working scores 2 $25\ cm^3 = \frac{25}{1000} = 0.025\ dm^3$ (1) 0.025 x 26.8 = 0.67 (1) or 26.8 x 25 = 670 (1) $\frac{670}{1000} = 0.67$ (1) or 1000/25 = 40 (1) 26.8 / 40 = 0.67 (1)	0.67 to any other power of 10 scores 1 e.g. 6.7 allow with working (26.8 / 0.025 =) 1072 (1) (0.025/26.8 =) 0.0009328… correctly rounded (1)	**(2)** **AO2-1**

Question number	Answer	Additional guidance	Mark
1(d)	an explanation linking • increases (rate) (1) • (because) lowers activation energy (1)	allow speeds up (rate) / faster reaction / takes less time (1) allow alternative {pathway / route} (1) allow more {frequent/successful} collisions (1) ignore catalyst doesn't get used up reject particles speed up / have more energy for MP2	**(2)** **AO1-1**

Total for Question 1 = 9 marks

Question number	Answer	Additional guidance	Mark
2(a)(i)	alkane(s)	ignore saturated hydrocarbons reject alkenes reject unsaturated hydrocarbons	**(1)** **AO1-1**

Question number	Answer	Mark
2(a)(ii)	**B**  is the only correct answer **A**, **C** and **D** are not correct because they are not hydrocarbons	**(1)** **AO2-1**

Question number	Answer	Additional guidance	Mark
2(b)	 a shared pair of electrons (1) rest of molecule correct including correct atomic symbols, if given (1)	allow all dots / all crosses allow unlabelled atoms ignore inner electrons even if incorrect if no circles present, atomic symbols must be present ignore double / triple bonds MP2 depends on MP1	**(2)** **AO1-1**

Question number	Answer	Additional guidance	Mark
2(c)	CH_4 **without** working (0) carbon $\frac{0.96}{12}$ (= 0.08) **and** hydrogen $\frac{0.32}{1}$ (= 0.32) (1) simplest whole number ratio 1 : 4 (1) empirical formula CH_4 (1)	marks awarded for working using the masses from the question MP2 for MP1 converted to simplest whole number ratio MP3 for whole number ratio from MP2 correctly converted to formula allow C_1H_4 / CH4 (3 with working) allow C_4H / C_4H_1 (2 with working, scores MP2 and 3 only)	**(3)** **AO2-1**

Total for Question 2 = 7 marks

Question number	Answer	Mark
3(a)	**C** soft, low is the only correct answer **A**, **B** and **D** are incorrect because alkali metals are soft with low melting points	**(1)** **AO1-1**

Question number	Answer	Additional guidance	Mark
3(b)(i)	an answer including any **two** from • metal melts / forms a ball (1) • effervescence / fizzing / bubbles (1) • metal floats (1) • metal moves (1) • metal ignites (1) • metal disappears (1) • metal explodes (1) • (lilac / purple) flame (1) • white smoke (1)	 ignore (named) gas(es) allow metal dissolves allow spits allow 'coloured' flame reject incorrect colours ignore sparks ignore any temperature changes	**(2)** **AO1-2**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	an explanation linking any three from • lithium has fewer (electron) shells (1) • (because) **outer** electron clos**er** to nucleus (1) • (because) (outer electron) more strongly attracted to nucleus / has greater electrostatic attraction to nucleus • (because) (outer) electron hard**er** to remove (1) • (because) less shielding in lithium (than K) (1)	allow reverse argument for potassium **correct** electronic configurations score MP1 for Li **and** K reject '**outer** shells' for mp1 allow outer shell is clos**er** to nucleus allow small**er** atom (for Li) allow 'attractive forces' in place of electrostatic attraction reject any incorrect forces or intermolecular forces for MP3&4	**(3)** **AO1-1**

	Answer	Additional guidance	Mark
3(b)(iii)	$2\ OH^- + CO_2 \rightarrow CO_3^{2-} + H_2O$ (2) both formulae of CO_2 **and** H_2O (1) balancing correct formulae only (1)	allow multiples reject equation if Na^+ in front of OH^-	**(2)** **AO2-1**

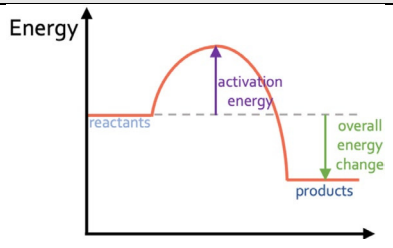
Question number	Answer	Additional guidance	Mark
3(c)	$\frac{132.905}{6.02 \times 10^{23}}$ (1) $= 2.208 \times 10^{-22}$ (g) (1)	an answer of $2.20772425249 \times 10^{-22}$ to 2 or more sig figs with or without working (2) allow 2 or more sig fig allow $\frac{6.02 \times 10^{23}}{132.905} = 4.5296 \times 10^{21}$ (1) allow $132.905 \times 6.02 \times 10^{23} = 8.000881 \times 10^{25}$ (1)	**(2)** **AO2-1**

Total for Question 3 = 10 marks

Question number	Answer	Additional Guidance	Mark
4(a)	an explanation linking • atoms have full <u>outer</u> (electron) shell (1) • (so) do not need to { gain / lose / share } **electron(s)** (1)	allow (electron) shells are full ignore hard to remove electrons	**(2)** **AO1-1**

Question number	Answer	Additional Guidance	Mark
4(b)(i)	$Xe + 2F_2 \rightarrow XeF_4$ (1)	allow multiples ignore any state symbols even if incorrect reject non-subscripted {2 / 4} and 'E' reject Fl / f for fluorine	**(1)** **AO2-1**

Question number	Answer	Additional Guidance	Mark
4(b)(ii)	an answer linking • structure: simple / molecular (1) • bonding: covalent (1) • (because) non-conductor **AND** low melting point / low melting point because of weak intermolecular forces / does not conduct because no {ions/delocalised electrons} present (1)	score 0 for whole answer if 'ionic' is mentioned in structure or bonding ignore 'free electrons'	**(3)** **AO3-2**

Question number	Answer	Additional Guidance	Mark
4(c)	 (3) <u>y axis:</u> 'energy' (1) <u>shape:</u> products line below reactants line with activation energy peak (1) <u>labels:</u> {energy change / ΔH / -400} **and** activation energy labelled with arrows (1)	<u>axis:</u> allow heat energy / energy level. Ignore any units. reject 'energy change' <u>shape:</u> can consist of straight lines energy levels do not need labelling but penalise if reactants & products are the wrong way round <u>labels:</u> allow any unambiguous labelling of activation energy and energy change. ignore direction of arrows. endothermic graph can score MP1 and MP3	**(3)** **AO1-1**

Total for Question 4 = 9 marks

Question number	Answer	Additional guidance	Mark
5(a)(i)	an explanation linking: • graphite has layer**s** (1) • (because) (layers) slide over each other (1)	 allow sheet**s** of atoms / carbon / graphene ignore weak (intermolecular) forces (between layers)	**(2)** **AO1-1**

Question number	Answer	Additional guidance	Mark
5(a)(ii)	12 x 60 x 5 = 3600 (1) 3600/1000 = 3.6 (1)	3.6 with or without working scores 2 allow ecf throughout allow with working: 12 x 60 /1000 = 0.72 (1) 60 x 5 /1000 = 0.30 (1) 5 x 12 / 1000 = 0.06 (1) each error loses a mark in the calculation	**(2)** **AO2-1**

Question number	Answer	Mark
5(b)	**B** $C_{10}H_{23}N$ is the only correct answer **A, C** and **D** are incorrect because $C_{10}H_{23}N$ is the only correct answer	**(1)** **AO2-1**

Question number	Answer	Additional guidance	Mark
5(c)	an explanation linking: • open the air hole (slightly) of the Bunsen / use a roaring / blue flame (1) • (because) to ensure complete combustion (1)	allow more oxygen in / can mix with {methane / gas} allow to release carbon dioxide instead of carbon allow to prevent incomplete combustion	**(2)** **AO3-3**

Question number	Indicative content	Mark
***5(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 (3 marks) AO3 (3 marks) • carbon dioxide molecules absorb heat energy • likely carbon dioxide increase has caused temperature increase NATURAL PROCESSES • photosynthesis removes carbon dioxide • carbon dioxide dissolves into oceans • forming carbonate rocks • volcanoes release carbon dioxide HUMAN ACTIVITIES • burning fossil fuels releases carbon dioxide • deforestation means less carbon dioxide removed by trees • respiration DATA EVALUATION • from 1960-2000 steady increase in amount of carbon dioxide • from 1960-2000 general increase in mean temperature • correlation between carbon dioxide amount and temperature • increased mean temperature leads to a change in climate	**(6)** **AO1-1** **AO3-1**

Level	Mark	Descriptor	Additional Guidance
	0	No rewardable material.	Read whole answer and ignore all incorrect material/ discard any contradictory material then:
Level 1	1–2	Additional Guidance Identifies processes that change atmospheric carbon dioxide **OR** Simple description of processes / global warming **OR** Simple statement about the data	Possible candidate response • Plants remove carbon dioxide from the atmosphere (1) • Plants, volcanoes and burning fossil fuels all change levels of carbon dioxide in the atmosphere (2) • As carbon dioxide levels have increased so has the temperature of the Earth (2) • Carbon dioxide levels have increased between 1960 and 2000 (1) • Carbon dioxide is emitted from volcanoes when they erupt (2)
Level 2	3–4	Additional Guidance Describes at least **two** processes that change levels of carbon dioxide **OR** Describes at least one process that change levels of carbon dioxide **AND** describes global warming **OR** uses the data in the graph to provide an evaluation	Possible candidate response • Burning fossil fuels and respiration of living things both release carbon dioxide into the atmosphere (3) • Photosynthesis removes carbon dioxide from the atmosphere and carbon dioxide dissolved in the oceans (3) • Plants remove carbon dioxide from the atmosphere during photosynthesis. Combustion of fossil fuels releases carbon dioxide into the atmosphere (4) • Deforestation means more carbon dioxide because less is absorbed by photosynthesis. As carbon dioxide levels have increased so has the temperature of the Earth (4) • Carbon dioxide absorbs IR, traps heat and reradiates it which links with the graphs showing increase of CO_2 and an increase in temperature (4)
Level 3	5–6	Additional Guidance Describes at least **two** processes that change levels of carbon dioxide **AND** uses the data in the graph to provide an evaluation **OR** Describes at least one process that change levels of carbon dioxide **AND** describes global warming **AND** uses the data in the graph to provide an evaluation	Possible candidate response • Increase in population has led to an increase in carbon dioxide levels through respiration, and the increase in population has also resulted in the increased burning of fossil fuels in cars. This has resulted in an increase in carbon dioxide levels from 1960 to 2000 (5) • Deforestation means more carbon dioxide because less is absorbed by photosynthesis, but carbon dioxide is removed when it dissolves in the oceans and forms carbonate rocks. The graphs show that carbon dioxide has increased over time AND so has the temperature which is a correlation (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 ideas lacks detail. (AO1) • Interpretation and evaluation of the information attempted but will be limited with a focus on mainly just one variable. Demonstrates limited synthesis of understanding. (AO3)
Level 2	3–4	• Demonstrates chemical understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Interpretation and evaluation of the information on both variables, synthesising mostly relevant understanding. (AO3)
Level 3	5–6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Interpretation and evaluation of the information, demonstrating throughout the skills of synthesising relevant understanding. (AO3)

Total for Question 5 = 13 marks

Question number	Answer	Additional guidance	Mark
6(a)	**gas** syringe	allow upturned burette over water	**(1)** **AO1-2**

Question number	Answer	Mark
6(b)	**B** 106 is the only correct answer **A**, **C** and **D** are incorrect because 2 x 53 = 106	**(1)** **AO3-2**

Question number	Answer	Additional guidance	Mark
6(c)	an explanation linking • the solution forms ions (1) • (so) (ions) can move (1)	mention of covalent = 0 score 0 if answer suggests non-conductor reject delocalised electrons (because) (solutions containing ions) **conduct** electricity (1) mp2 depends on mp1	**(2)** **AO1-1**

Question number	Answer	Mark
6(d)(i)	bromine	**(1)** **AO2-2**

Question number	Answer	Additional guidance	Mark
6(d)(ii)	Cl_2 + 2 KBr → 2 KCl + Br_2 (3) reactant formulae: Cl_2 + KBr → (1) product formulae: → KCl + Br_2 (1) balancing correct formulae (1)	allow correct balanced ionic equation (3) allow ClK ignore correct charges on KCl & KBr ignore state symbols even if incorrect	**(3)** **AO2-1**

Question number	Answer	Additional guidance	Mark
6(e)	-467 kJ mol^{-1} with or without working scores 4 • bonds broken = (4 x 299) + 495 = 1691 (1) • bonds made = (4 x 464) + (2 x 151) = 2158 (1) • energy change = 1691 – 2158 (1) • = -467 kJ mol^{-1} (1)	-467 without correct unit scores 3, +467 without correct unit scores 2 allow ecf throughout ignore sign / unit ignore sign / unit allow answers without positive sign where appropriate ecf, answer including sign and unit needed if no sign, assume it is positive	**(4)** **AO2-1**

Total for Question 6 = 12 marks

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