PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



MARK SCHEME

TOPIC 1: KEY CONCEPTS IN CHEMISTRY: CALCULATIONS INVOLVING MASSES (PAPER 2)

SCORE	PERCENTAGE
/130	%

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Mark Scheme

Q1.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	neutralisation (1)	accept recognisable spelling	**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**D** acid + base → salt + water		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	17.12 – 7.02 (1) (=10.10/10.1) (g)	10.10/10.1 (g)	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	$\frac{17.12 - 7.02}{2}$ (1) (=5.05) (g dm^{-3})	5.05 (g dm^{-3}) allow error carried forward from bi	**(1)**

(**Q07 1SC0/1CF, June 2015**)

Q2.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	neutralisation (1)	accept recognisable spelling	**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	**D** acid + base → salt + water		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	17.12 – 7.02 (1) (=10.10/10.1) (g)	10.10/10.1 (g)	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	$\frac{17.12 - 7.02}{2}$ (1) (=5.05) (g dm^{-3})	5.05 (g dm^{-3}) allow error carried forward from bi	**(1)**

(**Q15 1SC0/2CF, June 2015**)

Q3.

Question number	Answer	Additional guidance	Mark
(i)	as the number of carbon atoms in the molecule increases, the boiling point increases (1)	accept reverse argument	**(1)**

Question number	Answer	Additional guidance	Mark
(ii)	relative formula mass = (3 X 12) + (8 X 1) (1) = 44	Award mark if correct answer given with no working	**(1)**

Question number	Answer	Additional guidance	Mark
(iii)	propane + oxygen → carbon dioxide + water LHS (1) RHS (1)	ignore air allow reactants on LHS and products on RHS in either order allow $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$ (2) incorrect balancing of correct species max 1 mark ignore state symbols even if incorrect allow = for →	**(2)**

Question number	Answer	Additional guidance	Mark
(iv)	An explanation that combines identification - understanding (1 mark) and reasoning/justification - understanding (1 mark): **EITHER** carbon monoxide/CO formed (1) toxic/poisonous/restricts the amount of oxygen carried (by the blood) (1) **OR** carbon/smoke/soot formed (1) damages lungs/chokes people/breathing difficulties /makes things dirty (1)	ignore carbon dioxide ignore dangerous/harmful allow the second mark if an incorrect gas is given *e.g.* methane allow second mark if 'gas' stated, but no name is given allow less energy released ignore dangerous/harmful allow blocks fuel jets allow less energy released	(2)

(**Q03b 1SC0/2CF/S2, SAM**)

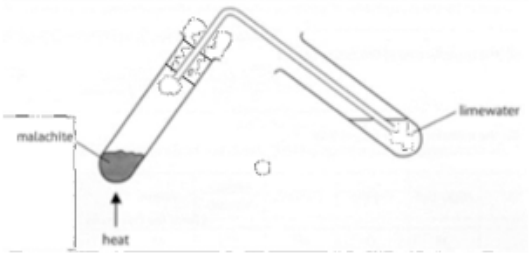
Q4.

Question number	Answer	Mark
(i)	ten (times) / 10 (x) / (x) 10	AO1 1 (1)

Question number	Answer	Additional guidance	Mark
(ii)	0.05 (g) OR 0.005 x factor from (i)	0.05 scores whether (i) correct or not. if answer **not** 0.05, only then apply ecf and no working is required e.g x2 AND 0.01 (1); x100 AND 0.5 (1)	AO3 1 (1)

(**QU02c 1SC0/1CH, June 2023**)

Q5.

Question number	Answer	Mark
(i)	**C**  **B** and **D** are not correct as the carbon dioxide would escape **A** is not correct as the bung would pop out and the carbon dioxide would escape	**(1)** **AO3.3**

Question number	Answer	Additional guidance	Mark
(ii)	calcium carbonate	allow $CaCO_3$	**(1)** **AO2.2**

Question number	Answer	Additional guidance	Mark
(iii)	formula mass of $Cu_2CO_3(OH)_2$: (63.5×2)+12+(16×3)+((16+1)x 2) = 221 (1) $\frac{22.1}{221}$ = 0.1 (1) 0.1 x 2 = 0.2 (1) 0.2 x 79.5 = 15.9 (1)	15.9 gains 4 marks with or without working allow ECF throughout alternative method: (63.5×2)+12+(16×3)+((16+1)x 2) = 221 (1) mole ratio 1 mole: 2 moles CuO (1) 221g malachite : 2 x 79.5 =159g CuO (1) 22.1 malachite : 159 x 22.1/221 = 15.9g (1) 31.8 (g) scores 3 7.95 (g) scores 3	**(4)** **AO2.1**

(**QU04a 1SC0/1CH, June 2025**)

Q6.

Question number	Answer	Additional guidance	Mark
(i)	copper oxide + carbon → copper + carbon dioxide	allow $2CuO + C \rightarrow 2Cu + CO_2$ (1) incorrectly balanced equation scores 0 allow = for → ignore heat	**(1) AO2-1**

Question number	Answer	Additional guidance	Mark
(ii)	reduction / redox	reject deoxidation	**(1) AO2-1**

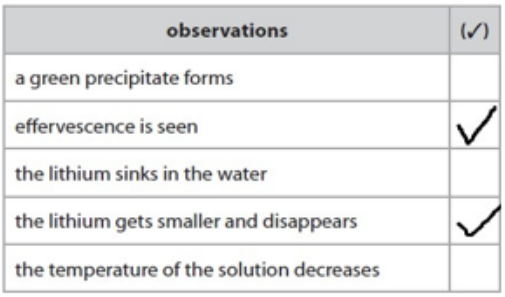
Question number	Answer	Additional guidance	Mark
(iii)	190.5 with or without working scores 2 mass = $\frac{238.5 \times 127.0}{159.0}$ = 190.5 (2)	allow ECF $\frac{159.0}{127.0}$ = 1.25196.... (1) [$\frac{238.5}{1.25196}$ = 190.5 (2)] $\frac{238.5}{159.0}$ = 1.5 (1) [x 127 = 190.5 (2)] $\frac{127.0}{159.0}$ = 0.79874.... (1) [x 238.5 = 190.5 (2)] if fractions are evaluated they must be correctly rounded to score, but can use ECF to score MP2 e.g 127/159 = 0.799 x 238.5 = 190.6 (2) 127/159 = 5 = 190.3 (1)	**(2) AO2-1**

Question number	Answer	Additional guidance	Mark
(iv)	so the copper oxide completely reacts / to get maximum yield (of copper)	allow so it completely reacts allow 'so all the {metal/ copper} is extracted' allow so that all of the oxygen is removed (from the copper) / so that copper oxide is fully reduced allow 'so the reaction is complete', ignore 'so there is enough carbon' reject so the carbon completely reacts	(1) AO3-2

(**QU04c 1SC0/1CF, June 2025**)

Q7.

Question number	Answer	Additional guidance	Mark
(i)	from green to {purple / blue}	reject colours in reverse order allow named shades e.g. light green, dark blue reject any other colours given	AO2 2 (1)

Question number	Answer	Additional guidance	Mark
(ii)	 	if 1-2 ticks: 1 mark per correct tick if 3 ticks: 1 mark only if **both** correct ticks included if 4-5 ticks: 0 marks	AO1 2 (2)

Question number	Answer	Mark
(iii)	**C** hydrogen is the only correct answer **A**, **B** and **D** are incorrect because hydrogen is formed when sodium reacts with water	**AO1 1 (1)**

Question number	Answer	Additional guidance	Mark
(iv)	a description to include: • loses **electron**(s) (1) • **{one / an}** (electron) (1)	reject shares electron(s) for MP1 and MP2 ignore mention of any bonding type allow {transfers / donates / gives away} electron(s)	**AO1 1 (2)**

Question number	Answer	Additional guidance	Mark
(v)	4.166666...**correctly rounded** with or without working scores 3 7 + 16 + 1 = 24 (1) $\frac{1}{24}$ (= 0.0416666666) (1) 0.0417 x 100 = 4.2 (1)	4.16 scores 3 marks with or without working 24 seen scores 1 allow ECF from Mr calculated by adding at least two Ar with working allow ECF to MP3 using $\frac{1}{Mr}$ x 100 or $\frac{2}{Mr}$ x 100 only	**AO2 1 (3)**

(**QU04b 1SC0/2CF, June 2025**)

Q8.

Question number	Answer	Mark
(i)	3 / three	(1) AO2 1

Question number	Answer	Additional guidance	Mark
(ii)	hydrogen	ignore H or H_2	(1) AO1 1

Question number	Answer	Mark
(iii)	**D** **X**, **Y** and **Z** is the only correct answer **A**, **B** and **C** are incorrect as every molecule is a hydrocarbon	(1) AO2 1

Question number	Answer	Mark
(iv)	**C** **X** and **Z** only is the only correct answer. **A**, **B** and **D** are incorrect as **Y** has 2 extra hydrogen atoms	(1) AO2 1

(**QU03a 1SC0/2CF, June 2024**)

Q9.

Question number	Answer	Additional guidance	Mark
(i)	a description including • add {ice/ cold water} <u>to beaker</u>(1)	allow add ice/cold water around tube A reject add condenser / cool delivery tube ignore cobalt chloride paper/ anhydrous copper	(2) AO3 3a
	• add limewater to <u>tube B</u> (1)	sulfate allow answer on diagram	

Question number	Answer		Mark
(ii)	• moles of carbon = $\frac{26.4}{4}$ = 0.6 (1) • moles of hydrogen = $\frac{(2 \times 5.4)}{4}$ = 0.6 (1) • ratio = 1 : 1 / empirical formula = CH / x = y (1) • **C_6H_6** (1)	allow moles of carbon dioxide = 0.6 moles of water/ hydrogen = 0.3 scores 0 for MP2 allow ECF for MP3 only depending on calculated moles 0.6: 0.3 (from MP2) = 2: 1 / C_2H / x = 2y scores MP1 and MP3 allow ratio of moles CO_2 : H_2O = 2:1 for MP3 no ECF for MP4 C_6H_6 or H_6C_6 is a stand alone mark for **MP4 only** the other 3 marks must be shown to be scored	(4) AO2 1

(**QU04b 1SC0/2CH, June 2024**)

Q10.

	Answer	Acceptable answers	Mark
(a)	A description including excess magnesium oxide (1) filter (to remove excess solid / magnesium oxide) (1)		**(2)**
(b)	$MgCO_3 + H_2SO_4 \rightarrow MgSO_4 + H_2O + CO_2$ (2) left hand side (1) right hand side (1)	max 1 if incorrect balancing	**(2)**
(c)	A calculation involving mass of solid = 258.515 – 258.450 (1) (= 0.065 g) concentration = $0.065 \times {}^{1000}/_{500}$ (1) (= 0.130 (g dm^{-3}))	allow TE from mass of solid for second mark	**(2)**

		Indicative Content	

QWC	***(d)**	A description including some of the following points • hardness caused by dissolved calcium and/or ions • boiling water • removes temporary hardness only / not perma hardness • ions removed • by formation of limescale / calcium carbonate • ion exchange resin • run tap water through resin • calcium and / or magnesium ions are exchang ions • which do not cause hardness allow full credit for use of other correct methods such washing soda

Level	**0**	No rewardable content
1	**1 - 2**	• a limited description e.g. temporary hardness by boiling water / permanent hardness (& temporary hardness) by ion exchange • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	**3 - 4**	• a simple description e.g. use of ion exchange and boiling water removes ions causing hardness • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	**5 - 6**	• a simple description and explanation e.g. boiling water removes only temporary hardness, ion exchange resin removes both types of hardness, by removing calcium and/or magnesium ions from hard water • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

(**Q32 1SC0/1CF, June 2013**)

Q11.

	Answer	**Acceptable answers**	**Mark**
(a)	A description including excess magnesium oxide (1) filter (to remove excess solid / magnesium oxide) (1)		**(2)**

(b)	$MgCO_3 + H_2SO_4 \rightarrow MgSO_4 + H_2O + CO_2$ (2) left hand side (1) right hand side (1)	max 1 if incorrect balancing	**(2)**
(c)	A calculation involving mass of solid = 258.515 – 258.450 (1) (= 0.065 g) concentration = $0.065 \times {}^{1000}/_{500}$ (1) (= 0.130 (g dm^{-3}))	allow TE from mass of solid for second mark	**(2)**

		Indicative Content	
QWC	***(d)**	A description including some of the following points • hardness caused by dissolved calcium and/or ions • boiling water • removes temporary hardness only / not perma hardness • ions removed • by formation of limescale / calcium carbonate • ion exchange resin • run tap water through resin • calcium and / or magnesium ions are exchang ions • which do not cause hardness allow full credit for use of other correct methods such washing soda	
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. temporary hardness by boiling water / permanent hardness (& temporary hardness) by ion exchange • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. use of ion exchange and boiling water removes ions causing hardness • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a simple description and explanation e.g. boiling water removes only temporary hardness, ion exchange resin removes both types of hardness, by removing calcium and/or magnesium ions from hard water • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(**Q40 1SC0/2CF, June 2013**)

Q12.

	Answer	Acceptable answers	Mark
(a)	C smaller than the mass of a proton		**(1)**
(b)	An description linking • 8 protons (1) • (and) {17-8/9} neutrons (1)	 ignore references to electrons in shells / charges on particles if electrons in nucleus max 1 protons and neutrons with incorrect numbers (1)	**(2)**
(c)	Explanation linking • (both have) same number (of electrons) in outer shell(1) • 6 (electrons in outer shell) (consequent on first point) (1)	correct electronic configurations or diagrams alone max 1 'they both have 6 in the outer shell' scores both marks allow 'both need 2 (more) (electrons) to fill outer shell' for both marks	**(2)**
(d)	A description to include • 2.8 (in 1^{st} and 2^{nd} shell)(1) • 5 (in outer shell)(1)	suitable diagram in place of 2.8(1).5(1) electrons in {shells / orbits / rings}(1)	**(2)**
(e)(i)	A description to include • electron(s) shared (1) • {**pair(s) of / two**} (electrons) (1)	can be shown in a diagram of a covalent bond any mention of ions scores zero	**(2)**
(e)(ii)	P_2O_5	Reject P2O5 / P^2O^5	**(1)**

(**Q46 1SC0/1CH, June 2013**)

Q13.

	Answer	Acceptable answers	Mark
(a)	C smaller than the mass of a proton		**(1)**
(b)	An description linking • 8 protons (1) • (and) {17-8/9} neutrons (1)	 ignore references to electrons in shells / charges on particles if electrons in nucleus max 1 protons and neutrons with incorrect numbers	**(2)**

		(1)	
(c)	Explanation linking • (both have) same number (of electrons) in outer shell(1) • 6 (electrons in outer shell) (consequent on first point) (1)	correct electronic configurations or diagrams alone max 1 'they both have 6 in the outer shell' scores both marks allow 'both need 2 (more) (electrons) to fill outer shell' for both marks	**(2)**
(d)	A description to include • 2.8 (in 1st and 2nd shell)(1) • 5 (in outer shell)(1)	suitable diagram in place of 2.8(1).5(1) electrons in {shells / orbits / rings}(1)	**(2)**
(e)(i)	A description to include • electron(s) shared (1) • {**pair(s) of / two**} (electrons) (1)	can be shown in a diagram of a covalent bond any mention of ions scores zero	**(2)**
(e)(ii)	P_2O_5	Reject P2O5 / P^2O^5	**(1)**

(**Q43 1SC0/2CH, June 2013**)

Q14.

Question Number	Answer	Additional guidance	Mark
(i)	number of moles = 0.1 /24 = 0.0042 or 4.2 x 10^{-3} (1)	ignore answer left as fraction 1/240 rounding must be correct: reject 0.00416 (no dot) allow 0.00416̇ (with dot above the 6) allow 0.004	**(1)** AO 2 1

Question Number	Answer	Additional guidance	Mark
(ii)	the equation shows two HCl reacting with one Mg	allow ratio is 2:1 allow 1 mol HCl reacts with 0.5 mol of Mg allow 0.5 mol HCl reacts with 0.25 mol Mg	**(1)** AO 2 1

(**Q21 1SC0/2CH, June 2018**)

Q15.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	A description including carbon (1) atom(s) (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	covalent Ignore giant molecular		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	fractional distillation (2)	distillation fractionation	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)	**A** 0.25		**(1)**

Question Number		Indicative Content	Mark
QWC	*** (d)**	A description/explanation including some of the following points content could be shown in diagram(s) **practical procedure** • ignite magnesium /put magnesium in (Bunsen) flame • use of tongs/crucible / tube or gas jar of {oxygen/air} • lift lid (to let air in)- if crucible used • magnesium burns/oxidises/exothermic reaction • (bright) white {flame/light} • white powder/ash/solid formed **bonding** • magnesium atoms have 2 electrons in the outer shell • magnesium atoms {lose/transfer} electrons • form Mg^{2+}/ions with positive charge • oxygen atoms have 6 electrons in the outer shell • oxygen atoms gain electrons • forms O^{2-}/ions with negative charge • {8 electrons in /full/complete} outer shell • two electrons transferred/gained/lost • ions with opposite charges attract each other/ Mg^{2+} attracts O^{2-} ions	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. magnesium burns / magnesium atoms lose electrons • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. magnesium burns with a white flame / magnesium forms positive ions and oxygen forms negative ions • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description including the experiment and bonding e.g. magnesium burns with a white flame, magnesium atoms give their 2 outer electrons to oxygen atoms • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for Question = 12 marks)

(**Q05 1SC0/1CF, June 2014**)

Q16.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	A description including carbon (1) atom(s) (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	covalent Ignore giant molecular		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	fractional distillation (2)	distillation fractionation	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)	**A** 0.25		**(1)**

Question Number		Indicative Content	Mark
QWC	*** (d)**	A description/explanation including some of the following points content could be shown in diagram(s) **practical procedure** • ignite magnesium /put magnesium in (Bunsen) flame • use of tongs/crucible / tube or gas jar of {oxygen/air} • lift lid (to let air in)- if crucible used • magnesium burns/oxidises/exothermic reaction • (bright) white {flame/light} • white powder/ash/solid formed **bonding** • magnesium atoms have 2 electrons in the outer shell • magnesium atoms {lose/transfer} electrons • form Mg^{2+}/ions with positive charge • oxygen atoms have 6 electrons in the outer shell • oxygen atoms gain electrons • forms O^{2-}/ions with negative charge • {8 electrons in /full/complete} outer shell • two electrons transferred/gained/lost • ions with opposite charges attract each other/ Mg^{2+} attracts O^{2-} ions	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. magnesium burns / magnesium atoms lose electrons • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. magnesium burns with a white flame / magnesium forms positive ions and oxygen forms negative ions • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description including the experiment and bonding e.g. magnesium burns with a white flame, magnesium atoms give their 2 outer electrons to oxygen atoms • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for Question = 12 marks)

(**Q05 1SC0/2CF, June 2014**)

Q17.

Question Number	Answer	Additional guidance	Mark
(i)	calcium + oxygen → calcium oxide LHS (1) RHS (1)	ignore air allow reactants on LHS in either order allow $2Ca + O_2 \rightarrow 2CaO$ (2) incorrect balancing of correct species max 1 mark ignore state symbols allow = for →	**(2)**

Question number	Answer	Additional guidance	Mark
(ii)	Ca : O 1.05/40 : 0.42/16 (1) 0.026 : 0.026 1 : 1 (1) empirical formula CaO (1)	allow ecf formula alone scores max 1 mark	(3)

(**Q04e 1SC0/2CF/S2, SAM**)

Q18.

Question number	Answer	Additional guidance	Mark
	• divides mass by relative atomic mass (1) • calculates simplest ratio (1) • expresses ratio correctly as empirical formula (1)	Example of calculation Ca : Br $\frac{0.2}{40}$: $\frac{0.8}{80}$ 0.005 : 0.01 1 : 2 empirical formula $CaBr^2$ formula alone scores max	(3)

(**Q05g 1SC0/2CF, SAM 2016**)

Q19.

Question number	Answer	Additional guidance	Mark
	• divides mass by relative atomic mass (1) • calculates simplest ratio (1) • expresses ratio correctly as empirical formula (1)	Example of calculation Ca : Br $\frac{0.2}{40}$: $\frac{0.8}{80}$ 0.005 : 0.01 1 : 2 empirical formula $CaBr_2$ Formula alone scores max 1	(3)

(**Q02d 1SC0/2CH, SAM 2016**)

Q20.

Question number	Answer	Mark
	• divide mass by relative atomic mass: lead $\frac{0.207}{207} = 0.001$; oxygen $\frac{0.032}{16} = 0.002$ (1) • divide by the smaller: $\frac{0.001}{0.001} = 1$; $\frac{0.002}{0.001} = 2$ (1) empirical formula PbO_2 which is different to that of compound R (1)	**(3)**

(**Q04d 1SC0/1CF, SAM 2016**)

Q21.

Question number	Answer	Mark
	• 84 g sodium fluoride → 46 g of sodium (1) • so 168 g sodium fluoride → 92 g of sodium (1) **or** • 168 ÷ 42 = 4 (mol NaF) (1) • 4 × 23 = 92 (g) (1)	**(2)**

(**Q03d 1SC0/1CF, SAM 2016**)

Q22.

Question number	Answer	Additional guidance	Mark
(i)	3.21 with or without working scores 1 (17.83 – 14.62 =) **3.21**	answer must be evaluated reject -3.21 / 3.2 / 3	**(1)** **AO2-1**

Question number	Answer	Additional guidance	Mark
(ii)	A description including • (re)heat (the test tube for longer) (1) • to constant mass / until mass does not change/ until bubbles stop / until results do not change (1)	allow (repeat experiment but) heat for more than 5 minutes (1) allow repeat step 1 MP2 depends on MP1 allow 'until limewater no longer goes cloudy' For MP2 must give comment about mass/ gas/ results, so ignore vague statements such as 'to see if it changes'	(2) AO3-3b

(QU01d 1SC0/1CF, June 2025)

Q23.

Question number	Answer	Additional guidance	Mark
	mass = $50 \times \frac{40}{1000}$ (1) = 2 (g) (1)	Award full marks for correct numerical answer without working.	(2)

(Q06c 1SC0/1CH, SAM 2016)

Q24.

Question number	Answer	Additional guidance	Mark
	40 + 2 × (14 + 16 × 3) (1) = 164 (1)	Award full marks for correct numerical answer without working.	(2)

(Q04c 1SC0/1CF, SAM 2016)

Q25.

Question number	Answer	Additional guidance	Mark
	40 + 2 × (14 + 16 × 3) (1) = 164 (1)	Award full marks for correct numerical answer without working.	**(2)**

(**Q02b 1SC0/1CH, SAM 2016**)

Q26.

Question number	Answer	Additional guidance	Mark
	$\frac{132.905}{6.02 \times 10^{23}}$ (1) = 2.208×10^{-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**

(**QU03c 1SC0/2CH, June 2025**)

Q27.

Question number	Answer	Additional guidance	Mark
	final answer of 114 (g dm^{-3}) with or without working (3) OR $\frac{28.4}{250}$ (1) (= 0.1136) 0.1136 x 1000 (1) (= 113.6) = 114 (g dm^{-3}) (1)	allow ECF throughout $\frac{250}{1000}$ (dm^3) (1) (= 0.250 (dm^3)) $\frac{28.4}{0.250}$ (1) (= 113.6) OR $\frac{1000}{250}$ (1) = 4 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)

(**Q05b 1SC0/1CF, Nov 2020**)

Q28.

Question Number	Answer	Mark
	• 0.4 dm^3 (1) • 100/0.4 (1) • = 250 (g dm^{-3}) (1) OR • 400 cm^3 contain 100 g 1 cm^3 contains $\frac{100}{400}$ g (1) • 1 dm^3 contains $\frac{100 \times 1000}{400}$ g (1) • = 250 (g dm^{-3}) (1)	(3)

(**Q05c 1SC0/1CF, SAM**)

Q29.

Question number	Answer	Additional guidance	Mark
	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**

(**Q05a 1SC0/2CF, Nov 2021**)

Q30.

Question number	Answer	Additional guidance	Mark
	final answer of 114 (g dm^{-3}) with or without working (3) OR $\frac{28.4}{250}$ (1) (= 0.1136) 0.1136 x 1000 (1) (= 113.6) = 114 (g dm^{-3}) (1)	allow ECF throughout $\frac{250}{1000}$ (dm^3) (1) (= 0.250 (dm^3)) $\frac{28.4}{0.250}$ (1) (= 113.6) OR $\frac{1000}{250}$ (1) = 4 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)**

(**Q01b 1SC0/1CH, Nov 2020**)

Q31.

Question number	Answer	Additional guidance	Mark
	12.56 with or without working scores 2 $\frac{3.14}{250}$ (1) (= 0.01256) 0.01256 x 1000 (1) (= 12.56) OR $\frac{250}{1000}$ (1) (= 0.250) $\frac{3.14}{0.250}$ (1) (= 12.56)	0.01256 / 0.0126 / 0.013 scores 1 ECF for MP2 final answer of: 12.6 scores 2 13 **with working** scores 2 200.96 scores 1 0.0796 scores 1 2.0096×10^{-4} scores 1 2.0096×10^{-7} scores 0	**(2)** **AO2-1**

(**Q04a 1SC0/1CF, June 2022**)

Q32.

Question number	Answer	Additional guidance	Mark
	26.08 with or without working scores 2 marks $\frac{6.52}{250}$ = 0.02608 / 0.026 / 0.0261 (1) [MP1] MP1 x 1000 = 26.08 /26(.0) / 26.1 (1)	allow ecf on all methods ignore 0.03 OR $\frac{1000}{250}$ = 4 (1) 4 x 6.52 = 26.08 (1) OR $\frac{250}{1000}$ = 0.25 (1) $\frac{6.52}{0.25}$ = 26.08 (1)	**(2)** **AO 2-1**

(**Q04a 1SC0/1CF, June 2024**)

Q33.

Question number	Answer	Additional guidance	Mark
	95 with or without working scores 3 volume of solution = $\frac{250}{1000}$ = 0.25 (1) concentration = $\frac{23.8}{0.25}$ (1) = 95 (to 2 sig figs) (1) OR concentration = $\frac{23.8}{250}$ (1) = 0.0952 x 1000 = 95.2 (1) = 95 (to 2 sig figs) (1)	95.2 with or without working scores 2 0.095 with or without working scores 2 allow ecf for incorrect volume conversion allow correct rounding to 2 sig fig of a calculation using **all** the data in the question (23.8 **and** 250) 95.2 to any power of 10 scores 1 e.g 0.00952 / 95200 95 to any power of 10 score 2 e.g 0.95 / 9.5	**(3)** **AO2-1**

(**QU04d 1SC0/1CF, June 2025**)

Q34.

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

(**Q03b 1SC0/2CF, Nov 2021**)

Q35.

Question Number	Answer	Additional guidance	Mark
	MP1 for dividing by atomic mass **A** : **G** $\frac{3.5}{7}$: $\frac{4.0}{16}$ (1) **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, $\frac{7}{3.5}$: $\frac{16}{4.0}$ (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)**

(**Q05d 1SC0/1CF, June 2019**)

Q36.

Question number	Answer	Additional guidance	Mark
	MP1 for dividing by atomic mass **A : G** $\frac{3.5}{7} : \frac{4.0}{16}$ (1) **MP2 for deriving ratio from MP1** 0.5 : 0.25 OR 2 : 1 (1) **MP3 for ratio in MP2 to formula** empirical formula $\mathbf{A_2G}$ (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, $\frac{7}{3.5} : \frac{16}{4.0}$ (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)**

(**Q01d 1SC0/1CH, June 2019**)

Q37.

Question number	Answer	Additional guidance	Mark
	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)**

(**Q04c 1SC0/1CF, June 2023**)

Q38.

Question number	Answer	Additional guidance	Mark
	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)	**AO2 1 (3)**

(**QU06c 1SC0/2CF, June 2025**)

Q39.

Question number	Answer	Additional guidance	Mark
	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**

(**QU02c 1SC0/2CH, June 2025**)

Q40.

Question number	Answer	Additional guidance	Mark
	fractions $\frac{1.35}{27}$ and $\frac{12.00}{80}$ (1) **ratios derived from two fractions into simplest whole number ratio** (0.05 0.15) 1 3 (1) **whole number ratio to formula** $AlBr_3$ (1)	answer with no working scores 0 MP2 depends fractions being shown to give ratio allow ECF for MP2 and MP3 inverted fractions correctly followed through to Al_3Br scores 2 allow Al_1Br_3 allow errors in case or using superscript e.g. $albr^3$	**(3)** **AO2-1**

(**Q03b 1SC0/1CF, June 2022**)