AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.1.2.5

Group 1

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**12**
Available paper years	**2018–2025**

Using this booklet

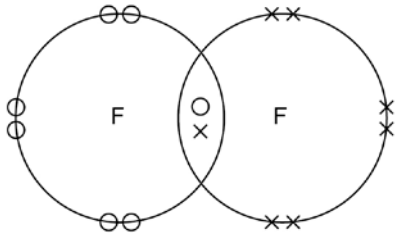
1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

5.1.2.5 Group 1

Answer 01 · Mark scheme June 2018 | 8464/C/1F | Original Q2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	group 7		1	AO1 5.1.2.6
02.2		one shared pair anywhere in overlap between two circles **or** on intersection 6 other electrons on each atom allow dots **or** crosses **or** mixture for all marks ignore any inner shell electrons	1 1	AO2 5.1.2.6 5.2.1.4
02.3	bromine potassium chloride	allow correct chemical formulae either order	1 1	AO2 5.1.1.1 5.1.2.6
02.4	displacement		1	AO1 5.1.2.6
02.5	(an) electron		1	AO2 5.1.2.6
02.6	smaller than		1	AO2 5.1.2.1 5.1.2.6

5.1.2.5 Group 1

02.7	(chlorine has) fewer levels / shells (of electrons)	mark independent of answer to question **02.6** allow converse for bromine allow (chlorine has) fewer electrons allow Cl has 3 levels / shells and Br has 4 levels / shells ignore atomic number **or** mass number **or** number of protons	1	AO2 5.1.2.1 5.1.2.6
02.8	3	allow multiples	1	AO2 5.1.1.1 5.1.2.6
02.9	there are weak forces between molecules which require little energy to overcome / break	do **not** accept weak bonds allow weak intermolecular forces for the first **2** marks allow does not need much energy to boil	1 1 1	AO1 5.1.2.6 5.2.2.4 AO1 5.1.2.6 5.2.2.4 AO2 5.1.2.6 5.2.2.4
Total			**13**	

5.1.2.5 Group 1

Answer 01 · Mark scheme June 2018 | 8464/C/1F | Original Q2

Answer 02 · Mark scheme June 2019 | 8464/C/1F | Original Q4

04.1	2 Na + Cl_2 → 2 NaCl	allow multiples	1	AO1 5.1.2.2
04.2	7.1 (g)		1	AO2 5.3.1.1
04.3	silver green yellow white	this order only allow yellow allow white	1 1 1 1	AO1 5.1.2.5
04.4	Na^+ Cl^-	if no other mark awarded allow **1** mark for +(1) charge for sodium ion and –(1) charge for chloride ion	1 1	AO1 5.2.1.2
04.5	an electron		1	AO2 5.1.2.5

5.1.2.5 Group 1

Answer 02 · Mark scheme

04.6	potassium (atom) is larger potassium (atom) has more energy levels (of electrons) **or** potassium (atom) has more shells (of electrons)	allow converse for sodium mark independently do **not** accept more outer shells	 1 1	AO2 5.1.2.1 & 5.1.2.5

Total			**11**

5.1.2.5 Group 1

Answer 02 · Mark scheme

June 2019 | 8464/C/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.

5.1.2.5 Group 1

Answer 03 · Mark scheme

04.1	$\frac{8}{10} \times 100$ **or** 0.8×100 = 80 (%)	 if no other mark awarded allow **1** mark for 20 (%)	1 1	AO2 5.1.2.3
04.2	any **two** from: • conducts electricity • conducts thermal energy • ductile • high melting point • malleable • shiny • strong	 allow conducts heat allow high boiling point allow can be bent / shaped allow dense allow sonorous ignore chemical properties	2	AO1 5.1.2.3
04.3	2 Na + Cl_2 → 2 NaCl	allow multiples	1	AO2 5.1.2.5 5.1.2.6 5.3.1.1
04.4	electrostatic attractions		1	AO3 5.2.1.3 5.2.2.3
04.5	(heat sodium chloride until) molten / liquid dissolve in water	 allow form aqueous solution allow add water	1 1	AO1 5.2.2.3
Total			**8**	

5.1.2.5 Group 1

Answer 03 · Mark scheme

November 2020 | 8464/C/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.

5.1.2.5 Group 1

Answer 04 · Mark scheme

November 2020 | 8464/C/1F | Original Q5

05.1	atomic weight		1	AO1 5.1.2.2
05.2	(because) properties were similar **or** (because) iodine has similar / same properties as bromine / chlorine / fluorine	allow symbols	1	AO3 5.1.2.2
05.3	solid		1	AO3 5.1.2.5 5.2.2.1
05.4	scale on the y-axis up to 180 bar for sodium at 98 (°C) bar for potassium at 63 (°C)	ignore scale beyond 180 allow a tolerance of ± half a small square allow a tolerance of ± half a small square	1 1 1	AO2 5.1.2.4 5.2.2.1
05.5	 lithium (atom) loses one electron chlorine (atom) gains one electron any **one** from: • ions are formed • lithium forms positive ion • chlorine forms negative ion • form a full outer shell(s) / level(s)	max **2** marks if reference to incorrect particle / bonding allow ionic bonding allow noble gas structure is formed	 1 1 1	 AO2 AO2 AO1 5.1.2.3 5.2.1.2

5.1.2.5 Group 1

05.6	any **two** from: • reactivity of elements increases going down the group • potassium has more shells • potassium can lose an (outer) electron more easily • potassium has an outer shell / electron further away from the nucleus • potassium has more shielding (of the outer shell / electron) • potassium has a weaker attraction between nucleus and outer shell / electron	allow energy levels for shells allow converse for lithium	2	AO1 AO2 5.1.2.3 5.1.2.5

Total			**11**

5.1.2.5 Group 1

Answer 04 · Mark scheme

November 2020 | 8464/C/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.

5.1.2.5 Group 1

Answer 05 · Mark scheme

November 2021 | 8464/C/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	alkali metals		1	AO1 5.1.2.5
04.2	98 (°C)	allow a value in the range 97–99 (°C)	1	AO2 5.1.2.5
04.3	$2\,Na + 2\,H_2O \rightarrow 2\,NaOH + H_2$	allow multiples	1	AO2 5.1.2.5 5.4.1.1
04.4	(M_r =) 23 + 16 + 1 = 40		1 1	AO2 5.1.2.5 5.3.1.2

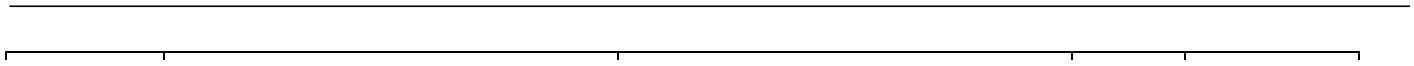
5.1.2.5 Group 1

Question	Answers	Mark	AO / Spec. Ref.
04.5	**Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.	3–4	AO1 AO2
	Level 1: Relevant features are identified and differences noted.	1–2	AO1
	No relevant content	0	
	Indicative Content: <u>Similarities – sodium and potassium both:</u> • float • move • bubble / effervesce / fizz • melt • form a ball • get smaller **or** disappear <u>Differences – potassium:</u> • moves faster • bubbles faster • reacts faster • disappears faster • catches fire • lilac flame		5.1.2.5
Total		**9**	

5.1.2.5 Group 1

Answer 05 · Mark scheme

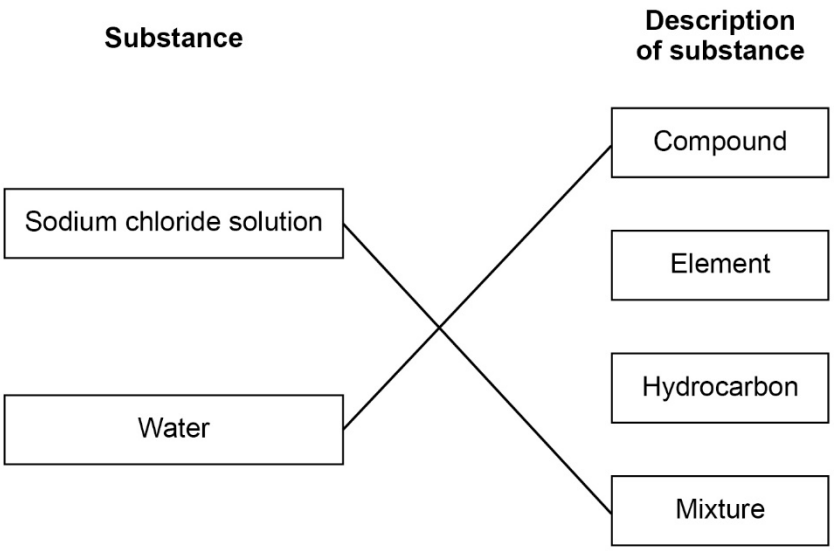
November 2021 | 8464/C/1F | Original Q4



5.1.2.5 Group 1

Answer 06 · Mark scheme

November 2021 | 8464/C/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	(the symbol) ⇌	allow description of reversible sign	1	AO1 5.6.2.1
01.2	white blue	must be in this order	1 1	AO1 5.6.2.2
01.3	to prevent reaction with water vapour (in the air)	allow to prevent reaction with moisture allow to keep water out	1	AO3 5.6.2.2
01.4	 do **not** accept more than one line from a box on the left		1 1	AO2 5.1.1.2
01.5	evaporation **or** crystallisation		1	AO1 RPA 13
01.6	(filtering) to remove solids (sterilising) to kill bacteria	 allow to kill microbes	1 1	AO1 5.10.1.2

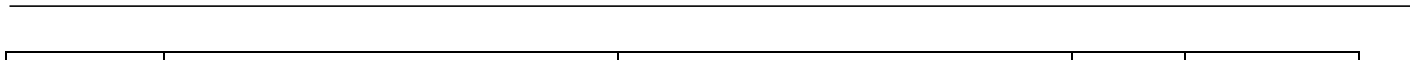
5.1.2.5 Group 1

01.7	ground water		1	AO1 5.10.1.3
01.8	screening and removal of grit		1	AO1 5.10.1.3
Total			**11**	

5.1.2.5 Group 1

Answer 06 · Mark scheme

November 2021 | 8464/C/2F | Original Q1



5.1.2.5 Group 1

Answer 07 · Mark scheme

June 2022 | 8464/C/1F | Original Q1

Question 1

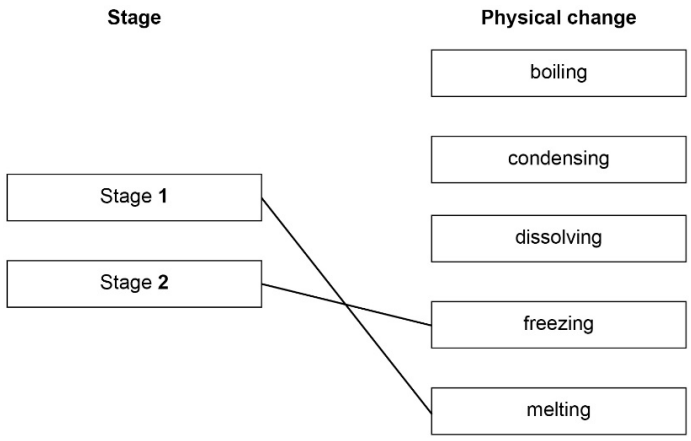
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	alkali metals		1	AO1 5.1.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	3 / three 4 / four	must be in this order	1 1	AO2 5.1.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	+1		1	AO2 5.1.1.4

5.1.2.5 Group 1

Answer 07 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	 do **not** accept more than one line from a box on the left		1 1	AO1 5.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	28 (°C)		1	AO2 5.1.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	bar plotted at 63 °C	allow a tolerance of ± ½ a small square	1	AO3 5.1.2.5

5.1.2.5 Group 1

Answer 07 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	(melting point) decreases as go down Group 1	allow converse in terms of increasing melting point ignore boiling points allow **1** mark for (melting point) decreases	2	AO1
	(and the) differences get smaller **or** initial drop is largest		1	AO3 5.1.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	liquid		1	AO3 5.1.2.5 5.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.9	loses an electron		1	AO1 5.1.1.7 5.1.2.1 5.1.2.5

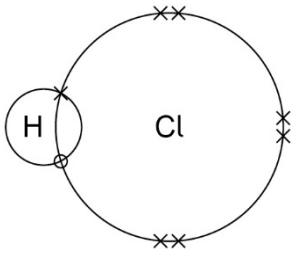
Total Question 1		13

5.1.2.5 Group 1

Answer 08 · Mark scheme

June 2022 | 8464/C/1F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	one shared pair in overlap	allow any combination of circles, dots, crosses or $e^{(-)}$	1	AO1 5.1.2.6 5.2.1.4
	6 non-bonding electrons in outer shell of chlorine	do **not** accept extra electron(s) on outer shell of hydrogen ignore any inner shell electrons	1	
		an answer of  scores **2** marks		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	sodium chloride	allow NaCl	1	AO2 5.4.2.2

5.1.2.5 Group 1

Answer 08 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	5.85 (g)		1	AO2 5.3.1.1 5.4.2.2 5.5.1.1 RPA10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	17.6 (°C)		1	AO2 5.4.2.2 5.5.1.1 RPA10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	exothermic (reaction)	allow neutralisation (reaction)	1	AO2 5.5.1.1 RPA10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	Na^+ OH^-		1 1	AO1 AO2 5.4.2.2 5.4.2.4 5.5.1.1

Total Question 2		**8**

5.1.2.5 Group 1

Answer 09 · Mark scheme

June 2022 | 8464/C/1F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	K_2SO_4		1	AO2 5.1.1.1 5.4.3.4 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	(volume of hydrogen) 30 (cm^3) **and** (volume of oxygen) 15 (cm^3)		1	AO2 5.4.3.4 RPA9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	(because) the ratio of volume of hydrogen : oxygen is 2 : 1 (and this is the) **same** as the ratio of hydrogen (atoms) : oxygen (atoms) in (formula of) H_2O **OR** (because) the ratio of volume of hydrogen : oxygen is **not** 2 : 1 (1) (and this is) **different** to the ratio of hydrogen (atoms) : oxygen (atoms) in (formula of) H_2O (1)	**must** relate to the volumes given in question **06.2**	1 1	AO3 5.4.3.4 RPA9

5.1.2.5 Group 1

Answer 09 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	9 ± 3 cm^3		1	AO2 5.3.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	(conversion) ($\frac{25}{1000}$ =) 0.025 (dm^3)		1	AO2 5.3.2.5 5.4.3.4
	(concentration =) $\frac{0.86}{0.025}$	allow correct use of incorrect / no conversion	1	
	= 34.4 (g per dm^3)	allow 34 (g per dm^3)	1	
	OR (conversion) $\frac{1000}{25}$ (1) = 40 (1) (40 × 0.86) = 34.4 (g per dm^3) (1)	allow correct use of incorrect / no conversion allow 34 (g per dm^3)		
	OR (concentration =) $\frac{0.86}{25}$ (1) = 0.0344 (1) (conversion) (0.0344 × 1000) = 34.4 (g per dm^3) (1)	allow 34 (g per dm^3)		

Total Question 6		**8**

5.1.2.5 Group 1

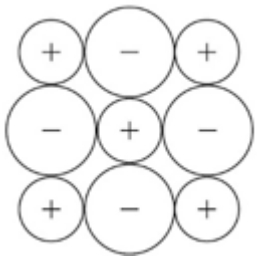
Answer 10 · Mark scheme

June 2023 | 8464/C/1F | Original Q3

Question 3

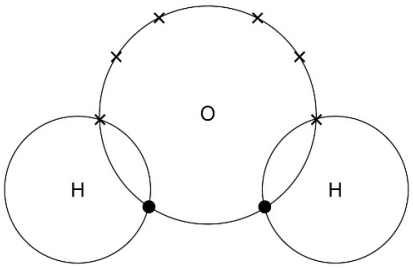
Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	noble gases		1	AO1 5.2.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	potassium (atoms) lose electrons		1	AO2
	chlorine (atoms) gain electrons		1	AO2
	reference to one electron		1	AO2
	any **one** from: • to form ions • to form full outer shell(s) • to form full energy level(s)	allow to form a noble gas structure	1	AO1 5.2.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3			1	AO2 5.2.1.3

5.1.2.5 Group 1

Answer 10 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	one shared pair in each overlap	allow any combination of circles, dots, crosses, $e^{(-)}$ for electrons	1	AO1 5.2.1.1 5.2.1.4
	four non-bonding electrons in outer shell of oxygen	do **not** accept extra electron(s) on outer shell of hydrogen ignore any inner shell electrons the diagram below scores 2 marks 	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	1 Si : 2 O	allow 6 Si : 12 O	1	AO3 5.2.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	weak intermolecular forces		1	AO1 5.2.2.5

5.1.2.5 Group 1

Answer 10 · Mark scheme

June 2023 | 8464/C/1F | Original Q3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7		ignore references to boiling point		AO3 5.2.2.4 5.2.2.5
	the melting point increases as the length of the polymer molecule increases	allow **1** mark for melting point increases	2	
	(then the) melting point levels off (as the polymer molecule length increases)	allow (then the) melting point becomes constant (as the polymer molecule length increases)	1	

Total Question 3	13

5.1.2.5 Group 1

Answer 11 · Mark scheme

June 2024 | 8464/C/1F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	alkali metals		1	AO1 5.1.2.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	0.2 nm		1	AO1 5.1.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	atomic number		1	AO1 5.1.1.5

Question	Answers	Mark	AO / Spec. Ref.
01.4	<table><tr><th>Name</th><th>Relative charge</th></tr><tr><td>Proton</td><td>**+(1)**</td></tr><tr><td>**Neutron**</td><td>0</td></tr><tr><td>Electron</td><td>-1</td></tr></table>	1 1	AO1 5.1.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	+1		1	AO2 5.1.1.7 5.1.2.3 5.2.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	63 (°C)	allow a value in the range 50–80 (°C)	1	AO3 5.1.2.5

5.1.2.5 Group 1

Answer 11 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	$A_r = \frac{(39 \times 93) + (41 \times 7)}{100}$		1	AO2 5.1.1.6

Total Question 1	8

5.1.2.5 Group 1

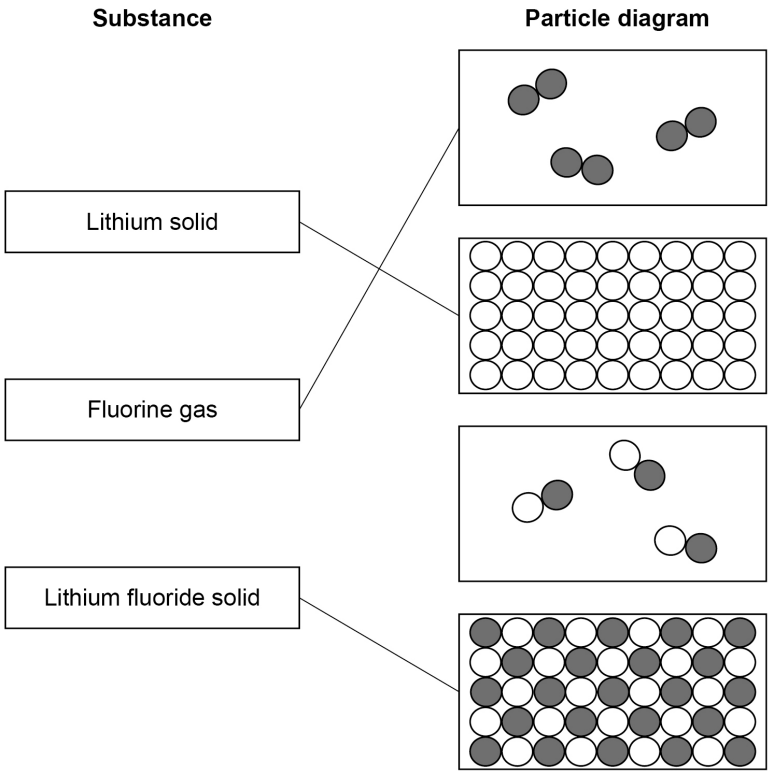
Answer 12 · Mark scheme

June 2025 | 8464/C/1F | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	Li		1	AO1 5.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	delocalised electrons from the outer shell		1	AO1 5.2.1.5

Question	Answers	Mark	AO / Spec. Ref.
02.3	 do **not** accept more than one line from a box on the left	1 1 1	AO3 5.1.1.1 5.2.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	**D**		1	AO3 5.2.2.3

5.1.2.5 Group 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	diamond		1	AO1 5.2.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	(relative formula mass =) 12 + (19 × 4) = 88		1 1	AO2 5.3.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	6	allow 3 pairs	1	AO2 5.2.1.1 5.2.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.8	nitride		1	AO2 5.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.9	neon has a stable arrangement of electrons		1	AO1 5.1.2.4

Total Question 2	**12**

5.1.2.5 Group 1

Answer 01 · Examiner comments — June 2018 | 8464/C/1F | Original Q2

Question 2 (low & standard demand)

02.4 47% of students knew that the type of reaction between chlorine and potassium bromide solution is called displacement.

02.5 73% of students knew that chlorine is more reactive than bromine because chlorine gains electrons more easily.

02.6 60% of students understood that a chlorine atom is smaller than a bromine atom.

Answer 05 · Examiner comments — November 2021 | 8464/C/1F | Original Q4

Question 4 (low and standard demand)

04.1 More than two thirds of students knew that the name of the Group 1 elements is the alkali metals.

04.2 More than two thirds of students were able to determine the melting point of sodium from the bar chart recognising the *y*-axis scale of 1 small square being equal to 4 °C.

04.3 Nearly two thirds of students were able to balance the chemical equation.

04.4 More than half of students successfully calculated the relative formula mass of sodium hydroxide.

04.5 This extended response question required students to compare the observations when sodium and potassium are reacted with water. Approximately half of students either recalled or used the figure to state that with sodium fizzing occurs. Other observations seen included sodium melting, forming a ball and moving. A comparison of the similarities and differences between these metals and also the magnitude of these was required to achieve level two.

Answer 06 · Examiner comments — November 2021 | 8464/C/2F | Original Q1

Question 1 (low and standard demand)

The reversible symbol was well known, but many students did not recognise that the starting point for the reaction was the anhydrous form of copper sulfate, so were unable to identify the colours of the salts. They did not appreciate the link between the reversible reaction and the storage of the anhydrous salt. Most students referred incorrectly to the toxicity of the salt.

The topic of water treatment was not well understood. Credit was given for the idea of filtering removing large insoluble solid material from the water and sterilising removing bacteria and pathogens, but not germs.

5.1.2.5 Group 1

Answer 07 · Examiner comments June 2022 | 8464/C/1F | Original Q1

Question 1 (Low demand)

01.1 Almost three-quarters of the students could correctly identify Group 1 metals as the alkali metals.

01.2 Just over 60% of students correctly deduced the number of electrons and the number of neutrons from the structure of a lithium atom.

01.3 The relative charge on a lithium atom was given by more than 55% of the students.

01.4 The physical changes occurring when a solid changes into a liquid and when the liquid changes back into a solid were known by 60% of the students.

01.5 More than 80% of the students were able to read the melting point of caesium from a bar chart.

01.6 More than 80% of the students were able to draw a bar at 63 °C for the melting point of potassium on a bar chart. The most common mistake was for students to misinterpret the scale on the graph. Others did not use a ruler so did not draw a straight horizontal line.

01.7 Almost half of the students gained two marks, for describing the trend as the melting point decreases going down Group 1. Many students recognised that the melting points decrease but had difficulty in articulating that this is as you go down or descend the group. Very few accessed the third marking point which was that the differences got smaller going down the group or that the initial drop was greatest.

01.8 Just under half of the students deduced that sodium is a liquid at 150 °C. Solid proved to be a popular distractor.

01.9 More than a third of students knew that potassium is more reactive than sodium because potassium more easily loses an electron.

Answer 08 · Examiner comments June 2022 | 8464/C/1F | Original Q2

Question 2 (Low demand)

02.1 More than a third of students correctly drew a dot and cross diagram for hydrogen chloride. The most commonly awarded mark was for the two shared electrons in the overlap between the atoms. Many failed to show that there are six unshared electrons.

02.2 Only 20% of students gained this mark for correctly identifying sodium chloride as one of the products of the reaction between hydrochloric acid and sodium hydroxide. The most common error was identifying the product as sodium chlorine. Some students also attempted to add other products to the equation.

02.3 Only 20% of students gained the mark for calculating the correct mass. Many students added the three masses together rather than recognising that in a reaction the mass of reactants equals the mass of products.

02.4 More than three-quarters of the students correctly read the temperature reading on the thermometer scale.

5.1.2.5 Group 1

Answer 08 · Examiner comments June 2022 | 8464/C/1F | Original Q2

02.5 Just under a quarter of students knew that when the temperature of a reaction increases an exothermic reaction is taking place. The most common error described the reaction as endothermic.

02.6 30% of students correctly identified that Na^+ and OH^- ions are present in sodium hydroxide.

Answer 09 · Examiner comments June 2022 | 8464/C/1F | Original Q6

Question 6 (Standard demand)

06.1 Students were given the formula of the potassium and sulfate ions and asked to deduce the formula of potassium sulfate. Just under 40% of students correctly determined the formula as K_2SO_4. The formula $K(SO_4)_2$ proved to be a good distractor.

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06.2 Just under 15% of students were able to correctly read the volumes of hydrogen and oxygen in the measuring cylinders. Most wrote the volumes of solution left in the measuring cylinder, rather than the gas, stating 20 cm^3 for hydrogen and 35 cm^3 for oxygen.

06.3 Students were given a hypothesis linking the ratio of the volumes of gases collected in an electrolysis experiment with the ratio of hydrogen to oxygen atoms in a water molecule. When students deduced that the volumes of hydrogen gas and oxygen gas collected were 30 cm^3 and 15 cm^3, they were able to simplify this ratio to 2:1 which they recognised as the ratio of hydrogen atoms to oxygen atoms in a water molecule and thus able to confirm the hypothesis. When the ratio of their volumes was not 2:1 many did not then go on to state that the hypothesis was incorrect.

06.4 Just over 30% of students identified that the measure of uncertainty in the 4 experiments was 9 ± 3 cm^3. The mean volume was 9 cm^3 and the range of reading was from 6 to 11 cm^3. The option of 9 ± 2 cm^3 proved a good distractor.

06.5 Just over 10% of students gained 2 of the 3 marks, usually following method 3 for dividing the mass of 0.86 g by the volume of 25 cm^3. Few students then went onto carry out the unit conversion of cm^3 into dm^3 which required multiplying their answer (in g/cm^3) by 1000.

5.1.2.5 Group 1

Answer 10 · Examiner comments

June 2023 | 8464/C/1F | Original Q3

Question 3 (low/standard demand)

03.1 More than half the students identified the noble gases as the group of elements that do not form ions.

03.2 This question was a good discriminator. Many gained the first three marks although MP4 was less common. Many incorrect terms such as ‘atoms sharing electrons to form ionic bonds’, ‘metal ions losing electrons’ and ‘non-metal ions gaining electrons’ were seen.

03.3 More than two thirds of students identified the structure that represents the arrangement of ions in solid potassium chloride. The first option was the best distractor.

03.4 More than a quarter of students correctly drew a dot and cross diagram for water. When only one mark was gained this was usually for the shared electrons in the overlap between oxygen and one of the hydrogen atoms. Some failed to show that there are four unshared electrons on the oxygen atom and others added more electrons into the circle around one or both of the hydrogen atoms.

03.5 More than three-quarters of students deduced the ratio of silicon atoms to oxygen atoms from the structure of silica.

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03.6 Only 20% of students knew that weak intermolecular forces hold polymer molecules together in a polymer. Covalent bonds and electrostatic attraction between ions were perhaps terms more familiar to the students and both proved more popular options than the correct answer.

03.7 Students found difficulty in recognising the link between the two variables from the *x*-axis and the *y*-axis. Many stated that as the melting point increases the length of the polymer molecule increases. Students should appreciate that the independent variable is on the *x*-axis and that as this is changed, the effect on the dependent variable (*y*-axis) can be observed ie as the length of the polymer molecule increases (independent, *x*-axis) then the melting point increases (dependent, *y*-axis).

5.1.2.5 Group 1

Answer 11 · Examiner comments

June 2024 | 8464/C/1F | Original Q1

Question 1 (low & standard demand)

01.1 Three-quarters of students could name Group 1 elements as the alkali metals. Halogens was the most common incorrect response.

01.2 Three-quarters of students could estimate the radius of a potassium atom as 0.2 nm. A fifth of students selected 0.2 mm.

01.3 The majority of students knew that the atomic number is the number of protons in an atom. Mass number was the most popular incorrect distractor.

01.4 Two-thirds of students gained both marks. Some students failed to indicate that protons are positively charged: + or +1 was needed for the answer. Phonetic spellings of neutron were credited.

0 1 . 4 **Table 1** shows the name and the relative charge of the particles in a potassium atom.

Table 1

Name of particle	Relative charge
Proton	1
Nefron	0
Electron	−1

Complete **Table 1**.

[2 marks]

This response demonstrates a common error in not giving the charge on the proton, but the spelling for neutron is acceptable phonetically so marking point 2 was awarded.

01.5 Students were given the electronic structure of a potassium atom (2,8,8,1) and a diagram showing that a potassium ion has a full outer shell (2,8,8). Nearly two-thirds of students were able to deduce that the ion is formed by losing an electron, which results in the formation of a +1 ion. A quarter of students thought that the ion had a –1 charge.

01.6 Most students were able to correctly predict the melting point of potassium from the trend shown in the bar graph.

01.7 Nearly two-thirds of students knew that relative atomic mass is calculated by multiplying the percentage abundance of each isotope by its mass number and averaging these values for all isotopes. A fifth of students selected the third option.

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5.1.2.5 Group 1

Answer 12 · Examiner comments

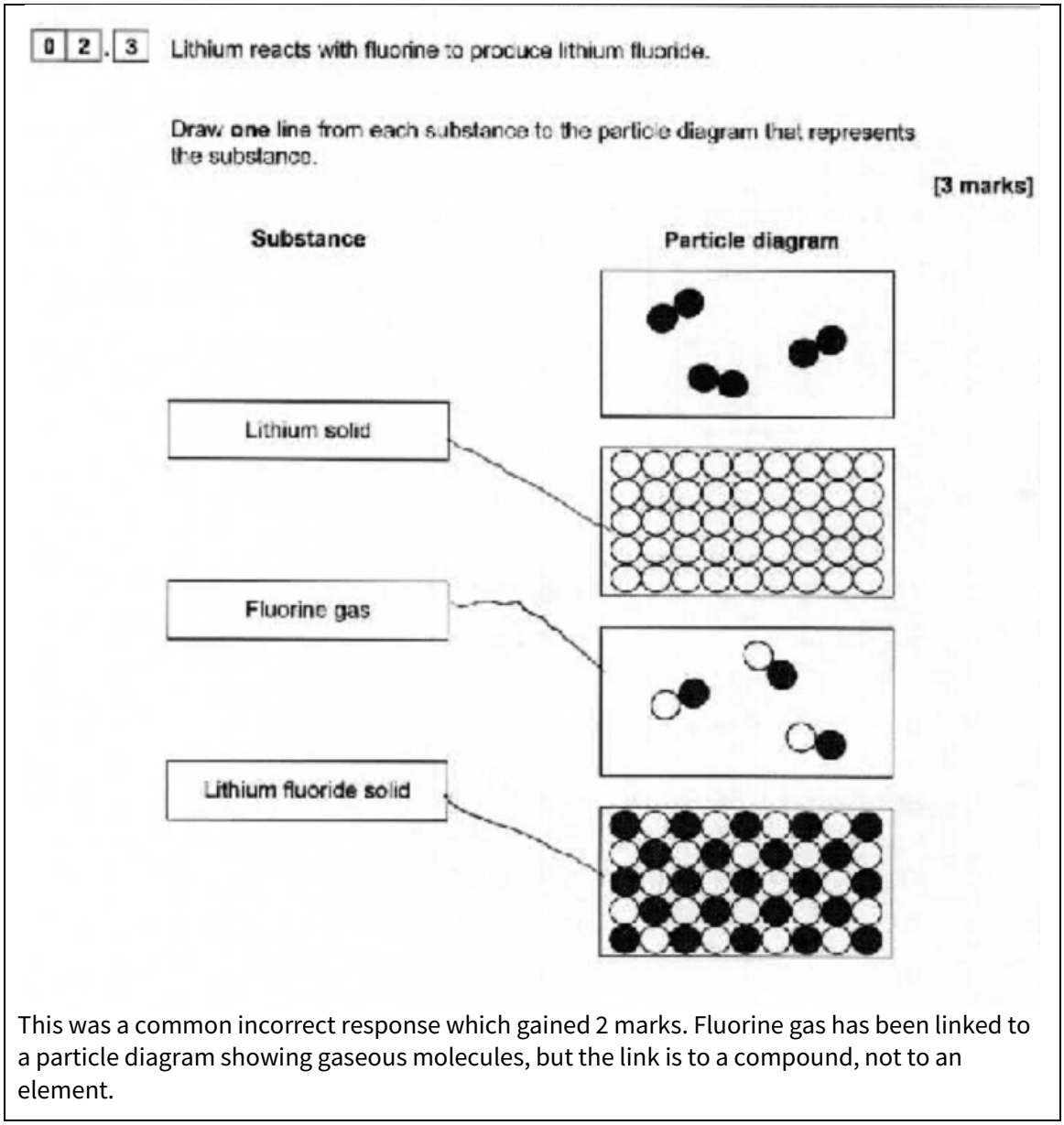
June 2025 | 8464/C/1F | Original Q2

Question 2 (Low demand)

02.1 Many students correctly wrote the chemical symbol of lithium with a capital L followed by a lower case i. When writing symbols lowercase letters must be discernibly smaller than capitals.

02.2 More than half of students knew that delocalised electrons from the outer shell are involved in metallic bonding. Fixed electrons in the outer shell was the most popular incorrect distractor.

02.3 Students should recognise particle diagrams for solid and gaseous states and for elements and compounds. Different colour circles are used to represent different atoms or ions so students should deduce that both the (diatomic) fluorine gaseous molecule and lithium solid particle diagram would only have one colour circle whereas the ionic compound lithium fluoride solid particle diagram would have two different colour circles. The majority of students correctly linked the substance to the particle diagram that represents the substance.



This was a common incorrect response which gained 2 marks. Fluorine gas has been linked to a particle diagram showing gaseous molecules, but the link is to a compound, not to an element.

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5.1.2.5 Group 1

Answer 12 · Examiner comments June 2025 | 8464/C/1F | Original Q2

02.4 Just over half the students were able to use the electrical conductivity of a substance when solid and liquid to identify the ionic compound lithium fluoride.

02.5 Just over half the students recognised the structure of diamond. Graphite was the most common incorrect response.

02.6 A third of students gained both marks for 88 with or without working. Some gained 1 mark for the correct mathematical expression or writing 12 + 76. Many students did not multiply the number of atoms by the relative atomic mass of the atom so gave either 31 or 288 by adding or multiplying the A_r values of carbon and fluorine or used the 4 (atoms of fluorine) as a power giving a M_r of several thousand.

02.7 Just over half the students identified that six shared electrons were shown in the overlap of energy levels in the diagram representing a molecule of nitrogen. Three pairs would have been an acceptable answer although 3 was a common incorrect answer.

02.8 Only 5% of students were able to select the word from the box to complete the name of the compound with the formula Li_3N. The most common answer was nitrogen. Credit was awarded if the student identified the correct answer in the box, provided this was not contradicted by what was written in the answer space.

02.9 Just under half of students knew that neon does not react with other elements because neon has a stable arrangement of electrons. The most popular incorrect distractor was neon is a non-metallic element.