AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.2.1.1

Chemical bonds

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**2**
Available paper years	**2018–2025**

Using this booklet

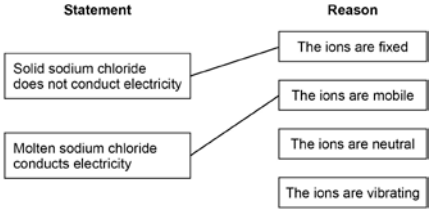
1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

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.

5.2.1.1 Chemical bonds

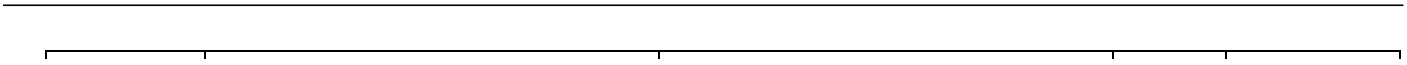
Answer 01 · Mark scheme June 2018 | 8464/C/1F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	ionic		1	AO1 5.2.1.3
01.2	a molecule		1	AO1 5.2.1.4
01.3	a fullerene		1	AO1 5.2.3.3
01.4	covalent		1	AO1 5.2.3.2
01.5	1		1	AO1 5.2.3.2
01.6	solid		1	AO1 5.2.2.8
01.7	electrons		1	AO1 5.2.2.8
01.8	dissolved		1	AO1 5.2.2.3
01.9		do **not** accept if more than 1 line from 1 box	1 1	AO1 5.2.2.3
Total			**10**	

5.2.1.1 Chemical bonds

Answer 01 · Mark scheme

June 2018 | 8464/C/1F | Original Q1



5.2.1.1 Chemical bonds

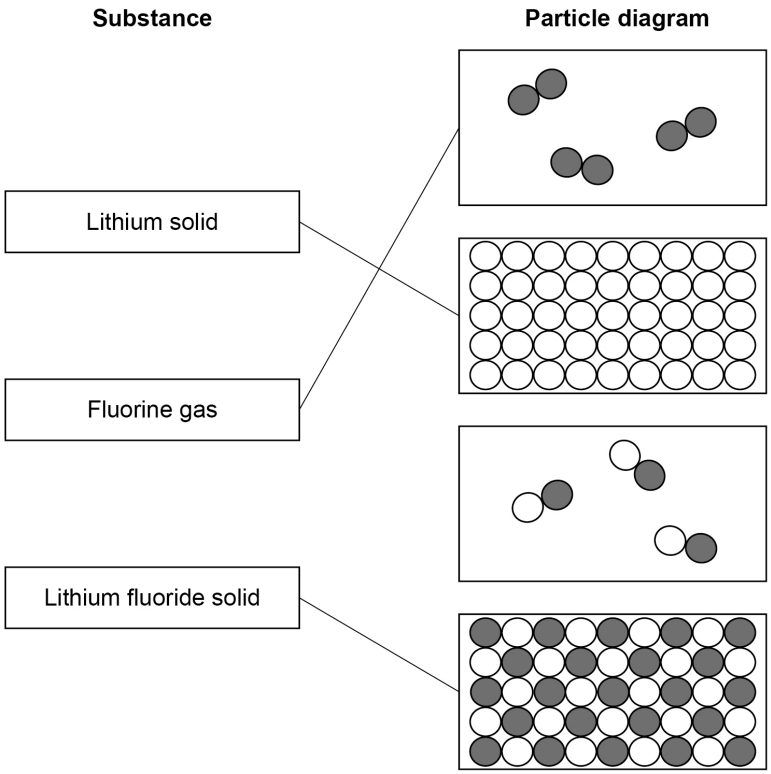
Answer 02 · Mark scheme

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

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**

5.2.1.1 Chemical bonds

Answer 01 · Examiner comments

June 2018 | 8464/C/1F | Original Q1

Question 1 (low demand)

01.1 47% of students correctly identified that the diagram for calcium oxide showed ionic bonding.

01.2 41% of students recognised that the bonding diagram for methane showed a molecule of methane.

01.3 The diagram of a fullerene was not recognised by 71% of students.

01.4 44% of students correctly identified, from the diagram, that the type of bond in graphite is covalent.

01.5 This question proved to be difficult because it required students to understand that in one covalent bond there is a shared pair of electrons, so one electron comes from each atom. 11% of students gave a correct answer.

01.6 This question was accessible to most students (76%) because the answer should have been obvious from the diagram that showed a solid between the electrodes.

01.7 66% of students knew that copper conducts electricity by the movement of delocalised electrons.

01.8 49% of students could use the labelled diagram to understand that the sodium chloride was dissolved to form the sodium chloride solution.

Answer 01 · Examiner comments

June 2018 | 8464/C/1F | Original Q1

01.9 19% of students knew that solid sodium chloride does not conduct electricity because the ions are fixed, whereas molten sodium chloride conducts electricity because the ions are mobile. Some students did not follow the instructions and drew more than one line from each statement box. 56% of students were awarded at least one mark.

Answer 02 · Examiner comments

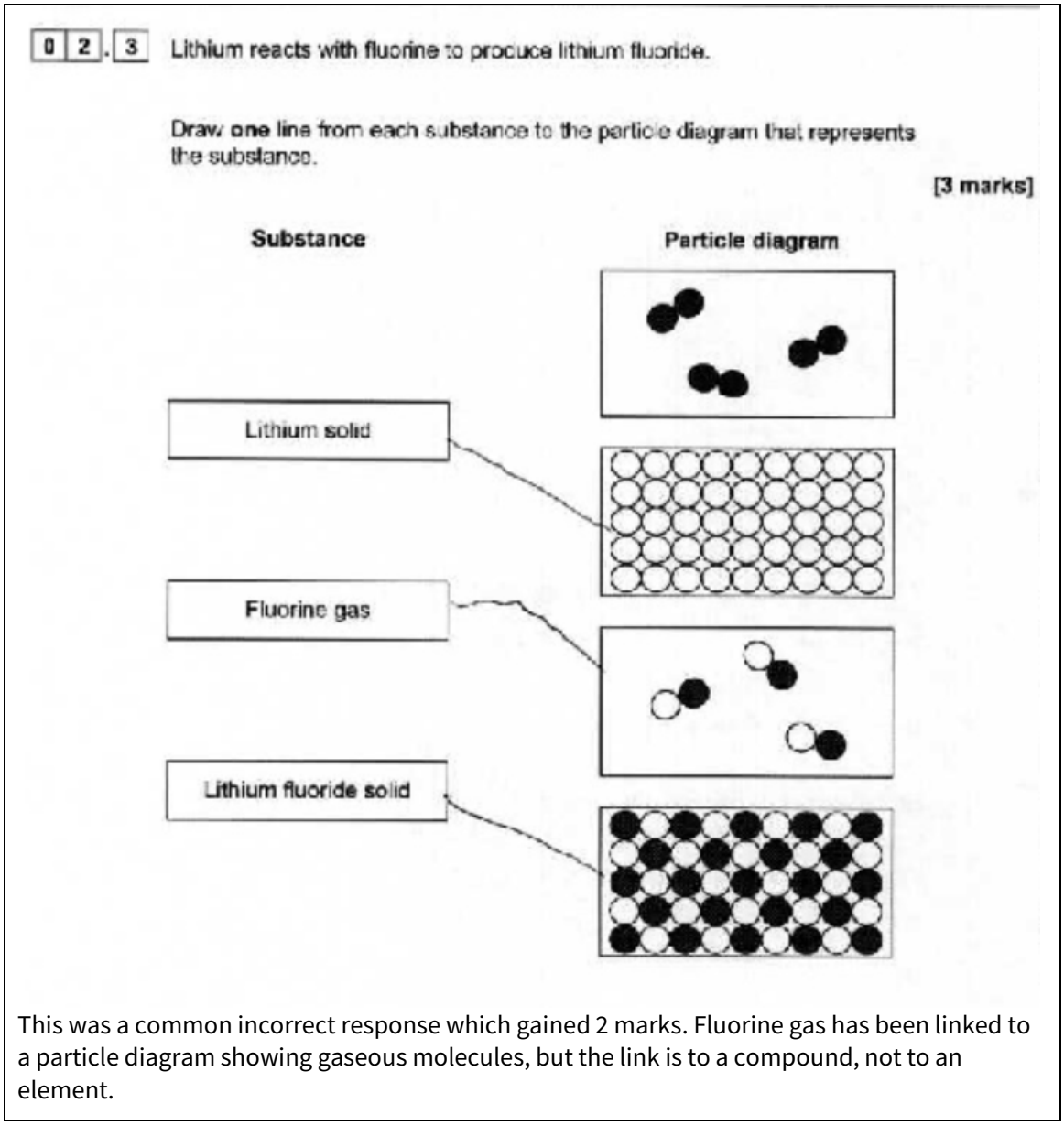
June 2025 | 8464/C/1F | Original Q2

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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5.2.1.1 Chemical bonds

Answer 02 · 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.