AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.2.2.3

Properties of ionic compounds

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**1**
Available paper years	**2024–2024**

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.

5.2.2.3 Properties of ionic compounds

Answer 01 · Mark scheme June 2024 | 8464/C/1H | Original Q3

Question 3

Question	Answers	Mark	AO / Spec. Ref.
03	**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.	4–6	AO1 5.2.1.1 5.2.1.2 5.2.1.3 5.2.1.4 5.2.2.3 5.2.2.4
	Level 1: Relevant features are identified and differences noted.	1–3	
	No relevant content	0	
	Indicative content: Similarities • both have strong bonds • particles have full outer shells Differences • sodium chloride is a compound • sodium chloride is made from two elements • oxygen is an element • sodium chloride is a giant structure of ions • oxygen is a small molecule • sodium chloride has ionic bonds • sodium chloride consists of oppositely charged ions • electrons are transferred from sodium atoms to chlorine atoms • oxygen is covalent • oxygen (molecules) are made up of oxygen atoms • joined by double covalent bond • electrons are shared between oxygen atoms • with weak forces between oxygen molecules For **Level 2**, there must be a comparison of either the structure **or** bonding of both sodium chloride **and** oxygen, and a description of magnitude.		

Total Question 3	**6**

5.2.2.3 Properties of ionic compounds

Answer 01 · Examiner comments

June 2024 | 8464/C/1H | Original Q3

Question 3 (standard demand)

03 This was an 'extended response' style of question. Such questions are marked holistically. There are overall generic descriptions for the two levels of response at the top of the mark scheme, giving a hierarchy of response. Within each level there are 3 marks.

Students were asked to compare the structure and bonding of sodium chloride and oxygen; diagrams which represent the structures were given. The indicative content was not an exhaustive list and examiners used professional judgement with other content.

At Level 1, students needed to identify some relevant features of each substance and note some differences. To enter Level 2 students needed to clearly show the way(s) in which the structure and bonding of the two substances are similar/different and note the magnitude of the similarity/difference. Examples of magnitude include strong (bond), weak (forces), giant (structure of ions), small (molecule) and two or one (elements). To access Level 2 a minimum of four comments on the relevant features were required, at least one of which must include a comparison, and a reference to magnitude had to have been made. To gain 5 or 6 marks there needed to be a minimum of two comparative statements, a reference to magnitude and statement(s) referring to the structures.

Students often gave sufficient relevant features; many included properties, which was ignored. Those responses that did not access Level 2 usually did not include *both* a comparison *and* reference to magnitude. There were, however, some excellent and concise 6-mark descriptions that included a minimum of two comparisons, one of which included the structures and magnitudes of both substances.

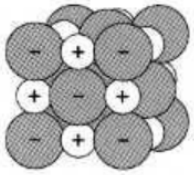
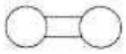
© 2024 AQA and its licensors. All rights reserved.

5.2.2.3 Properties of ionic compounds

Answer 01 · Examiner comments June 2024 | 8464/C/1H | Original Q3

0 8 **Table 8** shows diagrams which represent the structures of two substances.

Table 8

Substance	Structure
Sodium chloride NaCl metal + non	
Oxygen O_2 non	

Compare the structure and bonding of sodium chloride and oxygen.

[6 marks]

Sodium chloride is ionic bonding which is between a metal and a non metal. They use electrostatic forces to transfer electrons. They create giant structures and have a high melting point. ①
Oxygen is a non metal which is used for covalent bonding as it's for two non metals. They have strong covalent bonds but have weak intermolecular forces. They can conduct electricity. ① They can also conduct electricity but only when molten

This response (from a Foundation tier paper) includes references to magnitude (*weak* intermolecular forces and *strong* bonds) and sufficient indicative content to access Level 2 (bullet points 4, 10, 11, 15). However, there is no comparison (simply a list of statements referring to sodium chloride and then a list for oxygen), so the response does not meet the Level 2 descriptor. They have identified a number of relevant features, so the response was awarded 3 marks, top of Level 1.

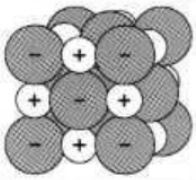
© 2024 AQA and its licensors. All rights reserved.

5.2.2.3 Properties of ionic compounds

Answer 01 · Examiner comments June 2024 | 8464/C/1H | Original Q3

0 8 **Table 8** shows diagrams which represent the structures of two substances.

Table 8

Substance	Structure
Sodium chloride NaCl	
Oxygen O_2	

Compare the structure and bonding of sodium chloride and oxygen.

[6 marks]

Oxygen is an element and Sodium Chloride is a compound which is arranged in a lattice structure with positive and negative [redacted] ions. Oxygen has Sodium Chloride has ionic bonds.

This response (from a Foundation tier paper) is set out as a comparison with sufficient indicative content to access Level 2 (bullet points 5, 3, 9 and 8) but there is no reference to magnitude (strong/weak, giant/small or one/two element(s)). Therefore, similarly to the previous example, the response does not meet the Level 2 descriptor. It was awarded 3 marks.

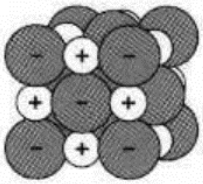
© 2024 AQA and its licensors. All rights reserved.

5.2.2.3 Properties of ionic compounds

Answer 01 · Examiner comments June 2024 | 8464/C/1H | Original Q3

0 3 **Table 2** shows diagrams which represent the structures of two substances.

Table 2

Substance	Structure	
Sodium chloride NaCl		Ionic
Oxygen O_2		covalent

Compare the structure and bonding of sodium chloride and oxygen.

[6 marks]

In NaCl, ionic bonding occurs. Sodium will transfer its outer electron to chlorine to form a positive ion and when chlorine receives this transfered electron, it will form a 1^- ion. Due to the ions being oppositely charged, strong electrostatic forces holds them together. In O_2 however, covalent bonding occurs as it is non metal and O_2 will form a double covalent bond as it shares 2 electrons from their outer shell with each other in order to get a full outer shell and maine it stable.

This response (from a Higher tier paper) is set out as a comparison (use of 'however' on line 8) with sufficient indicative content to access Level 2 (bullet points 8, 9, 10, 11, 13 and 14). Bullet points 1 and 2 are mentioned for oxygen but not sodium chloride. In addition to the comparison a reference to magnitude (*strong* electrostatic forces) is included so 4 marks are awarded. Statement(s) referring to the *structure* of sodium chloride and/or oxygen were required for 5+ marks.

© 2024 AQA and its licensors. All rights reserved.