2.4 Ionic Bonding and Properties of Ionic Compounds: 10-minute Pack

EDEXCEL 4CH1 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A solid ionic sample does not complete a circuit in a conductivity test. State what this observation shows about its electrical conductivity in the solid state.

(Total for Question 1 is 1 mark)

2 A compound contains sodium ions, Na^{+}, and sulfide ions, S^{2-}. Deduce its formula.

(Total for Question 2 is 1 mark)

3 A conductivity probe gives no reading in a solid ionic crystal and a reading after the crystal is dissolved in water. Explain the difference using the movement of ions.

(Total for Question 3 is 2 marks)

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4 Draw a dot-and-cross diagram showing the electron transfer between magnesium and oxygen to form magnesium oxide, including the final ions and their charges.

(Total for Question 4 is 3 marks)

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5 Explain why ionic solids are brittle: describe what happens at the atomic level in a giant ionic lattice when a shear force is applied.

(Total for Question 5 is 3 marks)

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Mark scheme · 2.4 Ionic Bonding and Properties of Ionic Compounds: 10-minute Pack

Question 1

the solid does not conduct electricity **B1**

Answer: The solid does not conduct electricity.

Question 2

formula Na_2S **B1**

Answer: Na_2S

Question 3

ions are fixed in position in the solid **B1**

ions can move in solution and carry charge **B1**

Answer: Ions are fixed in the solid, but move in solution and carry electrical charge.

Question 4

shows Mg losing two electrons and O gaining two electrons (electron transfer arrows or equivalent) **B1**

shows Mg^{2+} ion and O^{2-} ion with square brackets and correct charges **B1**

shows outer shells of ions complete (no extra unpaired electrons shown) **B1**

Answer: Diagram showing Mg -> Mg^{2+} (loses 2 e-) and O -> O^{2-} (gains 2 e-), ions in brackets with charges.

Question 5

states that layers of ions shift when a force is applied **B1**

states that like-charged ions can be brought next to each other by the shift **B1**

states that strong repulsion between like charges causes the crystal to cleave or shatter **B1**

Answer: A shear shifts layers of ions so that like-charged ions are adjacent; strong repulsion between these like charges breaks the lattice, causing brittle fracture.

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