

Giant Covalent Carbon

GCSE Chemistry · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Explain why diamond is very hard and has a very high melting point. (3 marks)

Step 1 · Structure

Giant covalent structure: each carbon atom forms 4 strong covalent bonds.

Step 2 · Many bonds

There are a huge number of strong bonds throughout the structure.

Step 3 · Energy

A great deal of energy is needed to break them, so it is hard with a very high melting point.

Answer: Each C has 4 strong covalent bonds in a giant lattice

Check: Say bonds are broken (not 'intermolecular forces') for giant covalent substances.

2. Now try one with the steps

Explain why graphite conducts electricity. (2 marks)

Step 1 · Bonding

Step 2 · Conduction

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Name two substances with giant covalent structures. [2]

2. State the number of covalent bonds formed by each carbon atom in diamond. [1]

3. State the number of covalent bonds formed by each carbon atom in graphite. [1]

4. Explain why diamond does not conduct electricity. [1]

5. Explain why graphite conducts electricity. [2]
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6. Explain why graphite is used in pencils. [2]
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7. Describe the structure of graphene. [1]
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8. Calculate the relative formula mass of buckminsterfullerene, C_{60} . (C = 12) [1]
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9. Calculate the relative formula mass of silicon dioxide, SiO_2 . (Si = 28, O = 16) [1]
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10. Describe the structure of buckminsterfullerene. [2]
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11. Explain why silicon dioxide has a very high melting point. [2]
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12. Explain why buckminsterfullerene has a much lower melting point than diamond. [2]
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13. A nanotube has a diameter of 2 nm and a length of 0.5 mm. Calculate its length-to-diameter ratio. [2]
(1 nm = 1×10^{-9} m, 1 mm = 1×10^{-3} m)
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14. Give two properties of graphene that make it useful in electronics and composites. [2]
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4. Before you hand it in

"Graphite melts easily because the layers slide."

Layers slide because of weak forces between them; melting needs strong covalent bonds within the layers to break.

"Diamond has strong intermolecular forces."

Diamond is a giant covalent structure: melting breaks covalent bonds.

"Graphite conducts because of free ions."

Graphite conducts because of delocalised electrons.