Past-paper walk-through

Giant covalent structures ▪ 2.6

eXercise

Questions in this set

- 0620/21 N25 Q4 ▪ 1 mark
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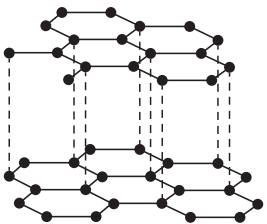
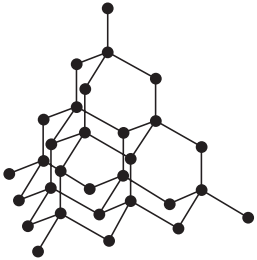
Question 4

0620/21 N25 ▪ Q4 ▪ 1 mark

4 Substances with giant covalent structures can be used as lubricants and as cutting tools for hard materials.

The diagrams show how the atoms are arranged in two giant covalent substances, P and Q.





key

—— strong covalent bond

- - - - weak attraction

Question 4

P Q

Which statement is correct?

A Only P is used as a cutting tool and only Q is used as a lubricant.

B Only P is used as a lubricant and only Q is used as a cutting tool.

C P and Q are both used as cutting tools.

D P and Q are both used as lubricants.

Solution 4

Answer: **B**

Why

- Both are giant covalent, so both have very high melting points.
- A layered structure with weak forces *between* layers lets them slide – that is the lubricant.
- A rigid three-dimensional network of strong bonds in every direction is the cutting tool.

Question 8

0620/22 N25 ▪ Q8 ▪ 1 mark

8 Graphite and diamond are both forms of the element carbon.

Which row shows the number of other carbon atoms that each carbon atom is covalently bonded to in graphite and in diamond?

	graphite	diamond
A	3	3
B	3	4
C	4	3
D	4	4

Solution 8

Answer: **B**

Why

- In graphite each carbon is bonded to three others, forming flat hexagonal layers.
- In diamond each carbon is bonded to four others, forming a rigid tetrahedral network.
- Graphite's fourth outer electron is delocalised, which is why only graphite conducts.

Question 8

0620/23 N25 ▪ Q8 ▪ 1 mark

8 Rescuers are drilling through fallen rock in order to rescue some people trapped in a cave. The drill needs lubricating from time to time.

Four statements are made about the materials used for the drill tip and the lubricant to explain the reasons for their use.

1 Diamond is used for the drill tip as it does **not** conduct electricity.

2 Diamond is used for the drill tip as it is very hard.

3 Graphite is used as the lubricant as it conducts electricity.

4 Graphite is used as the lubricant as it is soft and slippery.

Which statements are correct?

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

Solution 8

Answer: **D**

Why

- Diamond and graphite are both giant covalent forms of carbon, so both have very high melting points.
- Diamond's rigid three-dimensional network makes it extremely hard – right for the drill tip.
- Graphite's layers slide over one another, which is what makes it a lubricant.

Question 7

0620/21 J25 ▪ Q7 ▪ 1 mark

7 Which statement about silicon(IV) oxide is correct?

A It contains silicon ions and oxide ions arranged in a giant lattice.

B It is used in electrical circuits because it can conduct electricity.

C Its bonds each contain one shared pair of electrons.

D Its atoms are arranged in the same way as the atoms in graphite.

Solution 7

Answer: **C**

Why

- Silicon(IV) oxide is giant *covalent*, so it contains no ions at all.
- Every bond in it is a single covalent bond, that is one shared pair of electrons.
- It has no free electrons, so it cannot conduct electricity.

Question 6

0620/22 J25 ▪ Q6 ▪ 1 mark

6 Which statement about silicon(IV) oxide, SiO_2, is correct?

A It conducts electricity because it contains delocalised electrons.

B It has a giant covalent structure with each silicon atom bonded to four oxygen atoms.

C It is a simple covalent molecule.

D Its structure is similar to that of graphite.

Solution 6

Answer: **B**

Why

- Silicon(IV) oxide is a giant covalent lattice.
- Each silicon is bonded to four oxygens, and each oxygen to two silicons.
- It has no delocalised electrons and no ions, so it does not conduct.