



THE TRUTH ABOUT STRUCTURE & BONDING 2

In each question give the letter of the correct answer, and the number for the correct explanation of that answer.

1) Potassium fluoride, KF, exists as a molecule.

- A True
B False

- 1 The potassium atom shares a pair of electrons with the fluorine atom to form a simple molecule.
2 After donating its outer electron to the fluorine atom, the potassium ion forms a molecule with the fluoride ion.
3 Potassium fluoride exists as a lattice consisting of potassium and fluoride ions.
4 Potassium fluoride exists as a lattice of covalently bonded potassium and fluorine atoms.

2) Water (H₂O) and hydrogen sulphide (H₂S) have similar chemical formulae and structures. At room temperature, water is a liquid and hydrogen sulphide is a gas. The difference in state is due to:

- C forces between molecules
D forces within molecules

- 5 The difference in the forces attracting water molecules and those attracting hydrogen sulphide molecules is due to the different strength of the O-H and S-H covalent bonds.
6 The covalent bonds in hydrogen sulphide molecules are easily broken whereas those in water molecules are not.
7 The hydrogen sulphide molecules are closer to each other, leading to greater attraction between molecules.
8 The forces between water molecules are stronger than those between hydrogen sulphide molecules.

3) Silicon carbide has a high melting point and a high boiling point. This information suggests that the bonds in silicon carbide are:

- E Weak
F Strong

- 9 Silicon carbide is a simple molecular solid.
10 Silicon carbide has a giant molecular structure, composed of covalently bonded molecules.
11 Silicon carbide has a giant covalent structure, composed of covalently bonded atoms.
12 A large amount of energy is needed to break the intermolecular forces in silicon carbide.

4) Element C (electron arrangement: 2.8.8.2) and element E (electron arrangement 2.7) react to form an ionic compound CE₂:

- G True
H False

- 13 An atom of C will share one pair of electrons with each atom of E to form a covalent molecule, CE₂.
14 A giant molecular structure consists of covalently bonded atoms of C and E.
15 Atoms of C will each lose two electrons and twice as many atoms of E will each gain one electron to form an ionic compound CE₂.
16 An atom of C will lose one electron to an atom of E to form an ionic compound CE.

5) Sulphur atoms form rings consisting of eight atoms (S₈) covalently bonded together. From this, it can be concluded that sulphur's structure is:

- I Simple molecular
J Giant molecular

- 17 Simple molecular substances consist only of small molecules made up of two to four atoms.
18 Simple molecular compounds consist of molecules with weak forces between the molecules.
19 Giant molecular substances contain molecules which are covalently bonded together.
20 When the atoms of a molecule are covalently bonded, they will form a giant molecular structure.

6) a) What do each of the following formulas tell you about the structure and bonding in that substance.

- i) CH₄ ii) Mg iii) SiO₂ iv) CaBr₂ v) Ar

b) What is the difference between a substance with a giant covalent structure and a simple covalent structure