

# 4. States of matter

## 4.2 Bonding and structure

### Paper 1

#### Question Paper

**1** In the structure of solid  $\text{SiO}_2$

each silicon atom is bonded to x oxygen atoms  
 each oxygen atom is bonded to y silicon atoms  
 each bond is a z type bond.

What is the correct combination of x, y and z in these statements?

	x	y	z
<b>A</b>	2	1	covalent
<b>B</b>	2	1	ionic
<b>C</b>	4	2	covalent
<b>D</b>	4	2	ionic

**2** The table shows properties of four solids held together by different types of bonding.

Which row correctly describes the properties of a solid with a giant covalent structure?

	melting point	solubility in polar solvents
<b>A</b>	high	insoluble
<b>B</b>	high	soluble
<b>C</b>	low	insoluble
<b>D</b>	low	soluble

**3** Sodium chloride, water and air represent three states of matter – solid, liquid and gas.

Which row is correct?

	sodium chloride	water	air
<b>A</b>	particles held in rigid structure	can easily be compressed	can easily be compressed
<b>B</b>	particles stationary	particles move	cannot easily be compressed
<b>C</b>	particles stationary	particles stationary	particles move
<b>D</b>	resistant to change of shape	cannot easily be compressed	can easily be compressed

4 In which carbon allotrope are all electrons localised?

- A buckminsterfullerene
- B diamond
- C graphite
- D graphene

5 The table shows some properties of four substances.

Which substance could be potassium iodide?

	melting point of solid / °C	electrical conductivity when molten
<b>A</b>	-66	poor
<b>B</b>	-39	good
<b>C</b>	680	good
<b>D</b>	1600	poor

6 Which pair of substances are both simple molecular?

- A C<sub>60</sub> and graphene
- B C<sub>60</sub> and iodine
- C graphene and graphite
- D graphite and iodine

7 Which row describes the structure and bonding of SiO<sub>2</sub> and SiCl<sub>4</sub>?

	SiO <sub>2</sub>		SiCl <sub>4</sub>	
	bonding	structure	bonding	structure
<b>A</b>	covalent	giant	covalent	giant
<b>B</b>	covalent	giant	covalent	simple
<b>C</b>	ionic	giant	covalent	giant
<b>D</b>	ionic	giant	covalent	simple

**8** Which solid contains more than one type of bonding?

- A** iodine
- B** silicon dioxide
- C** sodium chloride
- D** zinc

**9** Materials can be classified by their chemical structures. Four common types of structure are metallic, ionic, simple molecular and giant molecular.

Some physical properties of four substances are shown in the table.

Which substance has a simple molecular structure?

	melting point /°C	effect of adding water	electrical conductivity
<b>A</b>	64	reacts	good when solid
<b>B</b>	113	insoluble	always poor
<b>C</b>	767	soluble	good when solid
<b>D</b>	1600	insoluble	always poor