



# GCSE REVISION 6

## Formulae, equations, particles, structure & bonding

**1** Write the formula of the following ionic compounds.

- a) sodium sulfate       $\text{Na}_2\text{SO}_4$       c) ammonium bromide       $\text{NH}_4\text{Br}$   
b) iron(III) oxide       $\text{Fe}_2\text{O}_3$       d) aluminium nitrate       $\text{Al}(\text{NO}_3)_3$

**2** Write balanced equations for the following equations.

- a)  $\text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O}$        $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$   
b) magnesium + nitric acid  $\rightarrow$  magnesium nitrate + hydrogen  
 $\text{Mg} + 2\text{HNO}_3 \rightarrow \text{Mg}(\text{NO}_3)_2 + \text{H}_2$

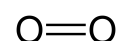
**3** Complete the following table about some atoms and ions. The first row has been done for you.

Particle	Atom or ion	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons	Electron structure
${}^{19}_9\text{F}^-$	ion	9	19	9	10	10	2,8
${}^{27}_{13}\text{Al}^{3+}$	ion	13	27	13	14	10	2,8
${}^{39}_{19}\text{K}$	atom	19	39	19	20	19	2,8,8,1
${}^{34}_{16}\text{S}^{2-}$	ion	16	34	16	18	18	2,8,8

**4** What is the structure type of each of the following substances. Tick the correct box.

name	aluminium oxide	potassium	sulfur dioxide	graphite	buckminsterfullerene	helium	calcium bromide	sucrose
formula	$\text{Al}_2\text{O}_3$	K	$\text{SO}_2$	C	$\text{C}_{60}$	He	$\text{CaBr}_2$	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$
giant covalent				✓				
ionic	✓						✓	
metallic		✓						
molecular			✓		✓			✓
monatomic						✓		

**5** Oxygen is a molecular substance containing  $\text{O}_2$  molecules. Explain why oxygen has a very low boiling point ( $-183^\circ\text{C}$ ).



**weak forces between molecules**

- 6** Diamond and graphite are both forms of carbon. They both have very high melting points but only graphite conducts electricity. Explain these properties by discussing the structure and bonding in each substance.

**both are giant covalent  
so high melting points as need to break covalent bonds  
graphite conducts as it has delocalised electrons that can move along layers to carry charge  
diamond has no delocalised electrons**

- 7** Carbon dioxide (CO<sub>2</sub>) and silicon dioxide (SiO<sub>2</sub>) are both oxides of Group 4 elements. Carbon dioxide has a very low boiling point (-78°C) while silicon dioxide has a very high melting point (1600°C). Explain this difference by discussing structure and bonding in each substance.

**CO<sub>2</sub> is molecular  
weak forces between molecules  
SiO<sub>2</sub> is giant covalent  
high melting point as need to break covalent bonds**

- 8** Aluminium metal is extracted from aluminium oxide by electrolysis. The aluminium oxide must be molten to conduct and melts at 2072°C. Explain, by discussing structure and bonding, why aluminium oxide must be molten to conduct and why it has a high melting point.

**must be molten to conduct so ions can move to carry charge through it  
high melting point as strong attraction between positive and negative ions**

Area	Strength	To develop	Area	Strength	To develop	Area	Strength	To develop
Done with care and thoroughness			Can find PNE numbers in atoms			Why giant covalent have high mpt		
Good SPG			Can find PNE numbers in ions			Why giant covalent conduct or not		
Write formulae			Identify structure type from formula			Why ionic have high mpt		
Write balanced equations			Why molecular substance has low mpt			Why ionic conduct or not		