

# Knowledge



1. Positive
2. Bond between positive metal ions and negative non-metal ions
3. High MP/BP, conducts electricity when molten or in solution, crystalline
4. A shared pair of electrons

5.

	<b>Melting &amp; boiling points</b>	<b>Conduction of electricity?</b>
<b>Simple covalent</b>	very low	No
<b>Giant covalent</b>	Extremely high	No, except graphite

6. In diamond, 4    In graphite, 3

7. Non-metals

8. Different structural form of the same element

9. An alloy is a mixture of metals

10. Metallic bonding – attraction between positive metal ions and the sea of delocalised electrons

# Application

1. Magnesium loses 2 electrons to become  $\text{Mg}^{2+}$ . Oxygen gains 2 to become a  $\text{O}^{2-}$  oxide ion. The two ions are then attracted to each other to form the compound.
2.  $\text{MgO}$  has a high melting point because the ionic bonds are very strong and there are lots of them in the giant ionic lattice, so it takes a lot of energy to overcome them all.
3.  $\text{CO}_2$  is a gas at room temperature because it exists as molecules and the intermolecular forces are weak, so do not take much energy to overcome.

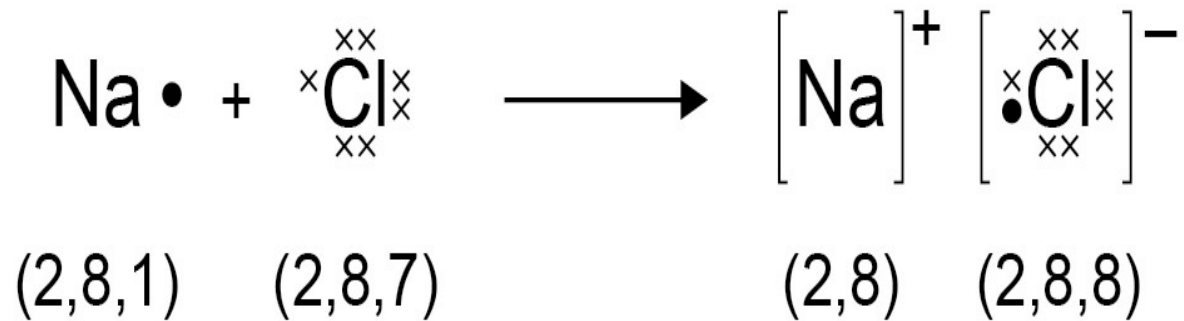
4. Graphite can be used in electrical circuits because it has free electrons that can move through the graphite.

5. Metals have high melting points because of the giant lattice of strong forces of attraction between the ions and the sea of electrons – it takes a lot of energy to overcome all of the strong bonds. They conduct electricity because of the delocalised electrons – they are able to move through the metal

6a) The pure metal contains atoms that are all the same size and they are ordered in neat rows. The alloy contains a mixture of atoms of different sizes and the rows are disrupted.

6b) Alloys are stronger because the rows cannot move over each other the same way pure metals can, because of the disrupted layers.

7.



8. Diamond can be used in drill bits because of its giant covalent structure. All the carbon atoms are bonded to 4 others in a giant lattice, which makes diamond extremely hard. This makes it ideal for use in drill bits.

9. Graphite can be used as a lubricant because of its layered structure. The layers of graphite can move over each other, because of the weak forces of attraction between the layers, which makes it very slippery. It also has a very high melting point because of the giant lattice of strong covalent bonds, which take a lot of energy to overcome, so this means it won't melt in the high heat of the engine.