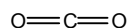


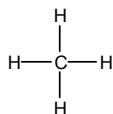


# THE TRUTH ABOUT STRUCTURE & BONDING

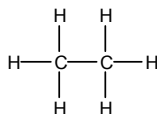
## 1) Simple molecular structures



molecule of carbon dioxide,  
 $\text{CO}_2$



molecule of methane,  
 $\text{CH}_4$



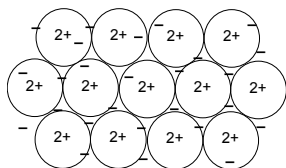
molecule of ethane,  
 $\text{C}_2\text{H}_6$

- T F 1 Methane is a gas at room temperature because the bonds between the atoms are weak.
- T F 2 Ethane has a higher boiling point than methane because there are more bonds to break.
- T F 3 Carbon dioxide has a higher boiling point than methane because its atoms are held together by double bonds rather than single bonds.

## 2) Giant covalent structures

- T F 4 Diamond has a high melting point because the atoms are all joined by covalent bonds in a lattice.
- T F 5 Diamond has a high melting point because there are strong covalent bonds between its molecules.

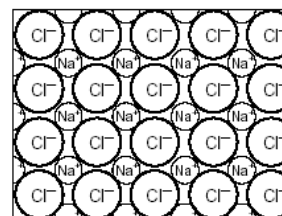
## 3) Metallic structures



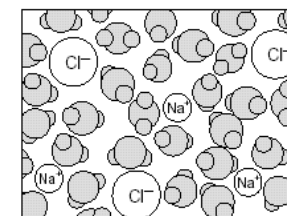
copper metal (Cu)

- T F 6 The metal is held together by the attraction between the copper ions.
- T F 7 Copper has a high melting point because there are strong forces of attraction between the copper ions and the free moving outer shell electrons.
- T F 8 The metal conducts electricity because the copper electrons are free to move.
- T F 9 Copper has a high melting point because there are lots of strong covalent bonds to break.
- T F 10 Copper can be bent because the layers of copper ions can slide relative to each other.

## 4) Ionic structures



Sodium chloride as a solid,  $\text{NaCl(s)}$



Sodium chloride dissolved in water,  $\text{NaCl(aq)}$

As a solid:

- T F 11 Each molecule of sodium chloride contains one sodium ion and one chloride ion.
- T F 12 Each sodium ion is attracted to one chloride ion.
- T F 13 The ions exist in pairs containing one sodium ion and one chloride ion.
- T F 14 Each sodium ion is bonded ionically to one chloride ion, and then to others by attractive forces.
- T F 15 There is a bond between the ions in each molecule, but no bonds between molecules.
- T F 16 There are no molecules shown in the diagram.
- T F 17 An ionic bond is when one atom donates an electron to another atom.
- T F 18 A sodium ion can only form one ionic bond because it only has one electron in its outer shell.
- T F 19 The sodium ions and chloride ions are not joined to each other, but are attracted to each other by electrostatic attraction.
- T F 20 Each sodium ion is attracted to all the chloride ions surrounding it.

As a solution:

- T F 21 The ions are separated.
- T F 22 The sodium chloride molecules break apart when they dissolve.
- T F 23 The sodium and chloride ions move around in  $\text{Na}^+ \text{Cl}^-$  pairs.
- T F 24 The solution conducts electricity because electrons can pass through the solution.