Ionic compound

An ionic compound is any compound that only contain ionic bond.

The ionic Lattice structure:

- An ionic compound is a giant structure of ions.
- The ions have a regular, repeating arrangement called an ionic lattice.
- The lattice is formed because the ions attract each other and form a regular pattern with oppositely charged ions next to each other.
- **Representing models for ionic compounds**

Different types of model are used to represent giant ionic structures.

- **Two-dimensional space-filling model:**

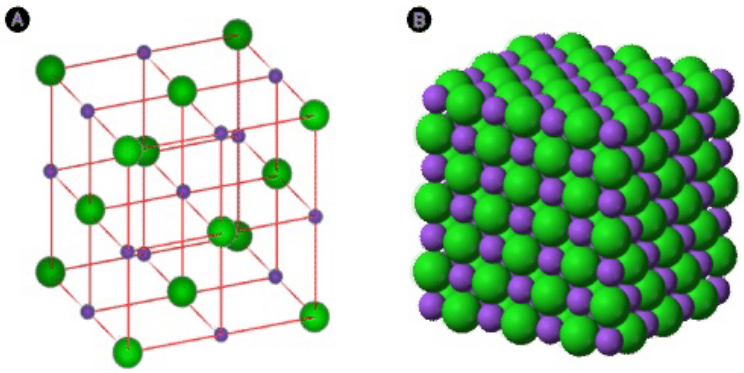
a) Advantages : it clearly shows the arrangement of ions in one layer

b) Disadvantage:but it does not show how the next layer of ions is arranged as shown in diagram B

- **Three-dimensional ball and stick model:**

a) Advantage: it shows the arrangement of ions in a larger section of the crystal,

b) Disadvantage: using sticks for bonds is misleading because the forces of attraction between ions actually act in all directions as shown as in diagram part A.



Properties of ionic compound:

1. Physical properties of ionic compounds

Due to the presence of the strong force of attraction between the positive and negative ions, ionic compounds are solids and are hard to break. They generally break into pieces when pressure is applied, hence they are considered brittle.

2. Melting and boiling points of ionic compounds

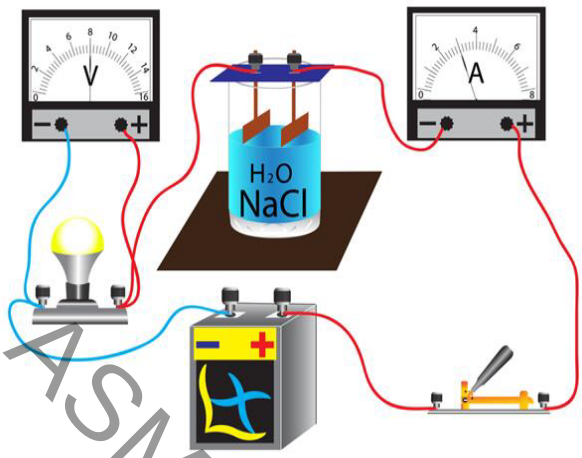
Due to the presence of electrostatic forces of attraction between ions, a large amount of energy is required to break the ionic bonds between the atoms. Thus, ionic compounds have high melting and boiling points.

3. The solubility of ionic compounds

Ionic compounds are generally soluble in polar solvents such as water whereas solubility tends to decrease in non-polar solvents such as petrol, gasoline, etc.

4. Conduction of Electricity

Ionic compounds are solid crystals, and so their **ions** are **tightly** bound together. As a result, the ions **cannot move** freely, and they **do not conduct electricity** in a solid-state. However, in a molten state, their **aqueous** solutions **conduct** electricity.



5. **Density, hardness and brittleness:**

Ionic compounds include a **high density**, and they are pretty **hard** because of the strong **electrostatic force** between the ions. But, they are highly brittle.




Look at the charges to find the formula of an ionic compound

- If it is a cross and dot diagram, count up how many atoms there are of each element
- if you are given 3D diagram of the ionic lattice, use it to work out what ions are there in ionic compound
- Then we have to balance the charges of the ion so the overall charges on compound is zero
- **Examples**:

a) In Potassium oxide compound potassium and oxide ions are present. Potassium is from Group 1 so it has +1 charge where as oxygen is in group 6 so it gain 2 electrons and form -2 ion

b) A potassium ion only has +1 charge so you will need to balance -2 charge of an oxide ion so the Empirical formula is K2O (balance charges must be zero)