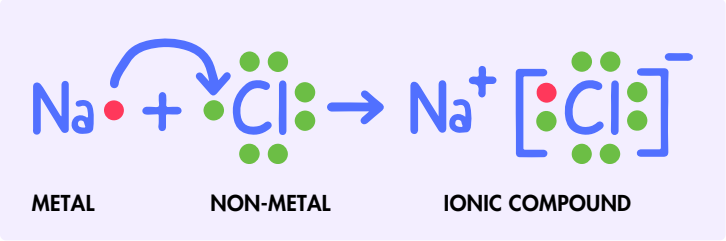
Ionic Bonding

How does an ionic bond form?

- An **ionic bond** forms due to the **strong electrostatic attraction** between positive and negative ions.
- Positive ions (**cations**) are formed when an atom loses one or more electrons.
  - *Metal atoms usually lose electrons and form positive ions.*
- Negative ions (**anions**) are formed when an atom gains one or more electrons.
  - *Non-metal atoms usually gain electrons and form negative ions.*
- An ionic bond typically forms between a **metal** and a **non-metal**.

- The electrons in the outer shell of the metal atoms are **transferred** to the non-metal atoms.
- The metal and non-metal atoms usually end up with outer electron shells that are complete/full.

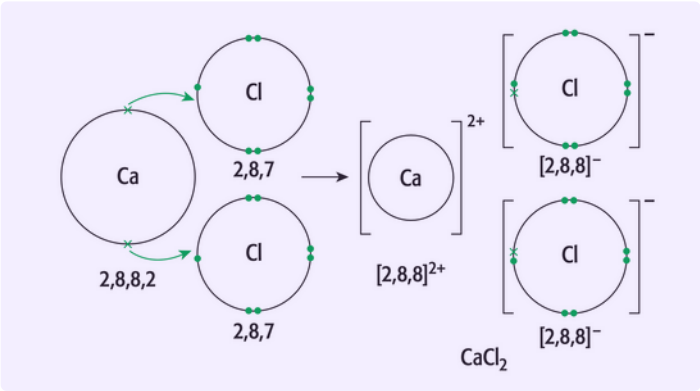


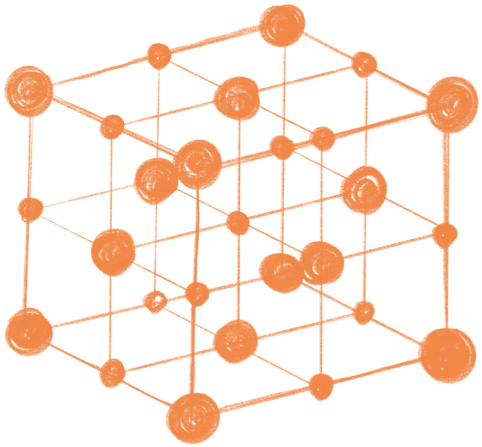
Dot-and-Cross Diagrams

A dot-and-cross diagram shows:

- the outer electron shells only
- that the charge of the ion is spread evenly, by using square bracket
- the charge on each ion, written at the top right-hand corner of the square brackets.

Example: Calcium Chloride





Properties of Ionic Compounds

- The ions are arranged in a very strong and giant **crystal lattice pattern**.
- They are hard and brittle and have high melting and boiling points.
- They do not conduct electricity as solids, but do when molten or dissolved in water.
- They are often soluble in water and insoluble in nonpolar solvents.