

Cambridge IGCSE Chemistry

Topic 3: atoms, elements and compounds

Ions and ionic bonds

Notes



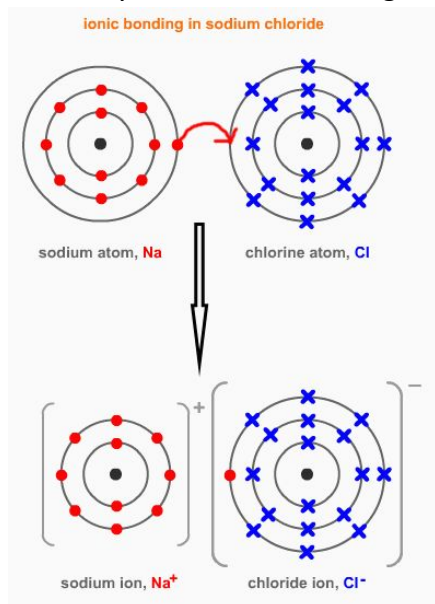


Describe the formation of ions by electron loss or gain

- an ion is an atom or group of atoms with a positive or negative charge
- ions are formed by an atom losing or gaining electrons (which have a -1 charge)
- if an atom gains electrons, it becomes a negative ion
- if an atom loses electrons, it becomes a positive ion
 - o Cation = positive ion (+ -> ca+ion)
 - o Anion = negative ion (Negative -> aNion)

Describe the formation of ionic bonds between elements from Groups I and VII

- an ionic bond is formed when an electron is transferred from one atom to another
- when ionic bonds are formed between group 1 and 7:
 - o group 1 atom loses one electron and forms a +1 ion
 - o group 7 atom gains the electron the group 1 atom lost and becomes a -1 ion
- Electron transfer during the formation of an ionic compound can be represented by a dot and cross diagram (see eg for NaCl below):





(Extended only) Describe the formation of ionic bonds between metallic and non-metallic elements

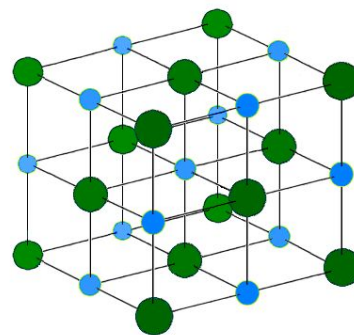
- Metal + Non-metal: electrons in the outer shell of the metal atom are transferred
 - Metal atoms lose electrons to become positively charged ions
 - Non-metal atoms gain electrons to become negatively charged ions

(Extended only) Describe the lattice structure of ionic compounds as a regular arrangement of alternative positive and negative ions

- Held together by strong electrostatic forces of attraction between oppositely charged ions, which are regularly arranged
- The forces act in all directions in the lattice, and this is called ionic bonding.

An example is sodium chloride (salt):

Na⁺ (small blue particles) and Cl⁻ (larger green ones)



- Strong electrostatic forces of attraction between alternating positive and negative ions
- Requires a lot of energy to overcome these forces of attraction

