

AQA GCSE Chemistry

Topic 2: Chemical bonds and types of bonding

Notes

(Content in bold is for Higher Tier Only)

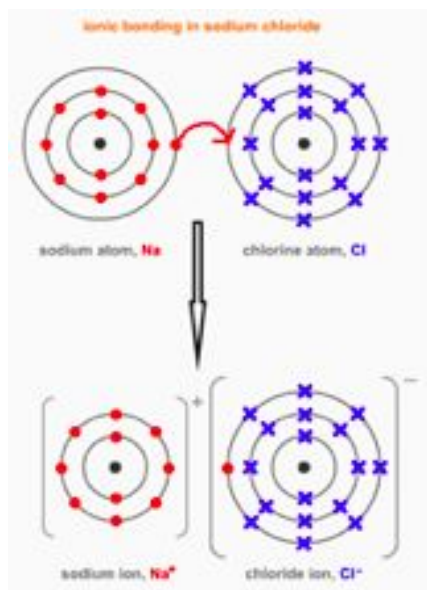


Chemical bonds

- **Compounds** - substances in which 2 or more elements are chemically combined.
- There are 3 types of strong chemical bonds: ionic, covalent and metallic.
- **Ionic**
 - Particles are oppositely charged ions
 - Occurs in compounds formed from metals combined with non-metals
- **Covalent**
 - Particles are atoms which share pairs of electrons
 - Occurs in most non-metallic elements and in compounds of non-metals
- **Metallic**
 - Particles are atoms which share delocalised electrons
 - Occurs in metallic elements and alloys

Ionic bonding

- 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
 - An ion is an atom that has lost or gained electron(s).
- Ions produced by metals in Groups 1 and 2 and by non-metals in Groups 6 and 7 gains full outer shell of electrons. So they have the same electronic structure as a noble gas (Group 0 element).
- Electron transfer during the formation of an ionic compound can be represented by a dot and cross diagram (see eg for NaCl below)

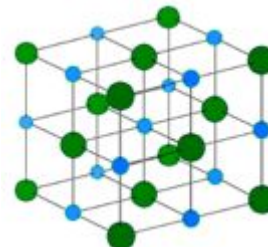


http://www.yenka.com/activities/Properties_of_Ionic_Materials_-_Activity/?decorator=yenkaactivityprintable



Ionic compounds

- A giant structure of ions.
- Held together by strong electrostatic forces of attraction between oppositely charged ions
- Since the structure is in 3D, the forces act in every direction.



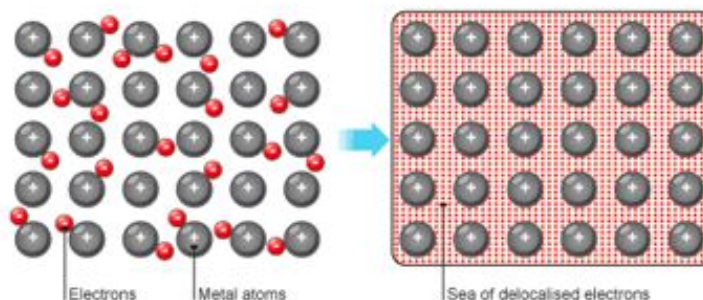
An example is sodium chloride (salt):
 Na^+ (small blue particles) and Cl^- (larger green ones)

Covalent bonding

- Covalent bonding is when atoms share one or more pairs of electrons..
- Small molecules, such as: HCl , H_2 , O_2 , Cl_2 , NH_3 , CH_4 have strong covalent bonds within their molecules.
- Polymers are large covalently bonded molecules.
- Giant covalent structures (macromolecules) consist of many atoms covalently bonded in a lattice structure. For example: diamond, silicon dioxide.
- Diagrams to show these substances could be dot and cross, shown as repeat units for polymers using a single line to represent a single bond, ball and stick and two- and three-dimensional diagrams.

Metallic bonding

- The bonding in a metal consists of positive ions (atoms that have lost electron(s)) and delocalised electrons arranged in a regular pattern.
- The delocalised electron system consists of the electrons 'lost' from the atoms to form positive ions.
- Delocalised electrons are free to move through the structure.
- The delocalised electrons are shared through the structure so metallic bonds are strong.



http://www.bbc.co.uk/schools/gcsebitesize/science/add_gateway_pre_2011/periodictable/metalsrev2.shtm

