

Definitions and Concepts for WJEC (Wales) Chemistry GCSE

Topic 2.1 - Bonding, Structure and Properties

Definitions in **bold** are for higher tier only

Definitions have been taken, or modified from the [WJEC \(Wales\) Specification for GCSE Chemistry. 3410. Version 2 March 2019](#)

Bulk properties: The properties such as strength, melting point, conductivity, flexibility and hardness which are related to the different types of bonds the compound contains, the bond strengths in relation to intermolecular forces and the ways in which the bonds are arranged. The atoms themselves do not have these properties.

Conductor: A material that contains charged particles which are free to move to carry electrical or thermal energy. Metals are good conductors due to the delocalised electrons.

Covalent bond: A shared pair of electrons between two non-metals.

Diamond: A giant covalent structure which is made up of carbon atoms each of which form four covalent bonds with four other carbon atoms. The structure makes diamond very hard, making it suitable for use as drill bits.

Electrostatic forces: The strong forces of attraction between oppositely charged ions.

Fullerenes: Molecules of carbon atoms with hollow shapes. The structures are based on hexagonal rings of carbon atoms but they may also contain rings with five or seven carbon atoms. Examples include graphene and C_{60} .

Giant covalent structure: A molecular structure containing many atoms covalently bonded together. The strong covalent bonds mean that giant covalent structures have high melting points.

Graphene: A single layer of graphite with properties that make it useful in electronics and composites.

Graphite: A giant covalent structure which is made up of carbon atoms each of which form three covalent bonds with three other carbon atoms. These atoms form layers of hexagonal rings which have no covalent bonds between them. There is one delocalised electron per carbon atom which is free to move to carry charge.

This work by [PMT Education](#) is licensed under [CC BY-NC-ND 4.0](#)



Ion: An atom or molecule with an electric charge due to the loss or gain of electrons. A positive ion is formed when an atom loses electrons, and a negative ion is formed when an atom gains electrons.

Ionic bond: The bond formed between the oppositely charged ions when a metal atom loses electron(s) to form a positively charged ion and a non-metal gains these electron(s) to form a negatively charged ion.

Ionic compound: Chemical compound formed of oppositely charged ions, held together by strong electrostatic forces.

Lattice: A repeating regular arrangement of atoms/ions/molecules. This arrangement occurs in crystal structures.

Malleable: Capable of being deformed and moulded into various shapes. Metals are malleable since the uniform layers of atoms can slide over each other.

Metallic bond: The bonds present in metals between the positive metal ions and negatively charged delocalised electrons.

Nanoparticles: Particles with diameters between 1 nm to 100 nm in size. Nanoparticles can exhibit properties different to those for the same material in bulk.

Simple molecules: Molecules containing a fixed number of atoms covalently bonded together. Simple molecules have low boiling points since they have weak intermolecular forces which are easy to overcome.

Smart materials: Materials which respond to certain external stimuli such as temperature and moisture. Examples include thermochromic pigments (change colour depending on the temperature), polymer gels and shape memory alloys.

