

## Definitions and Concepts for AQA Chemistry GCSE

### Topic 2 - Bonding, Structure, and the Properties of Matter

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

*Definitions marked by '\*' are for separate sciences only*

*Definitions have been taken, or modified from the [AQA Specification for GCSE Chemistry, 8462, Version 1.1 04 October 2019](#).*

**\*Coarse particles:** Coarse particles ( $PM_{10}$ ) have diameters between  $1 \times 10^{-5}$  m and  $2.5 \times 10^{-6}$  m. They are often referred to as dust.

**Conductor:** A material which contains charged particles which are free to move to carry electrical or thermal energy.

**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.

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

**Empirical formula:** The smallest whole number ratio of atoms of each element in a compound.

**\*Fine particles:** Fine particles ( $PM_{2.5}$ ) have diameters between 100 and 2500 nm ( $1 \times 10^{-7}$  m and  $2.5 \times 10^{-6}$  m).

**Fullerenes:** Fullerenes are 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.

**Gas:** The state of matter where the particles have the most energy. The particles in a gas are relatively spread out and move randomly in all directions.

**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, forming layers of hexagonal rings which have no covalent bonds between the layers.

**Ion:** An atom or molecule with an electric charge due to the loss or gain of electrons.

**Ionic bond:** 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. An ionic bond is formed between the oppositely charged ions.

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

**Intermolecular forces:** The forces which exist between molecules. The strength of the intermolecular forces impact physical properties like boiling/melting point.

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

**Liquid:** The state of matter where the particles are arranged randomly and close together and are able to move past each other.

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

**Metals:** Elements that react to form positive ions. Found to the left and towards the bottom of the periodic table.

**Molecular formula:** The actual ratio of atoms of each element present in a compound.

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

**\*Nanoscience:** Nanoscience refers to structures that are 1–100 nm in size, of the order of a few hundred atoms.

**Non-metals:** Elements that react to form negative ions. Found towards the right and top of the periodic table.

**Particle theory:** The theory which models the three states of matter by representing the particles as small solid spheres. Particle theory can help to explain melting, boiling, freezing and condensing.

**Polymers:** Large long-chain molecules made up of lots of small monomers joined together by covalent bonds.



**Repeat unit:** The part of a polymer whose repetition would produce the complete polymer chain.

**Solid:** The state of matter where the particles hold a regular arrangement and have the least amount of energy.

**State symbols:** The symbols used in chemical equations to denote the states of the chemicals reacting: (s) - solid, (l) - liquid, (g) - gas, (aq) - aqueous solution.

