

Definitions and Concepts for OCR (B) Chemistry GCSE

Topic 4 - Material Choices

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

Definitions marked by '' are for separate sciences only*

Definitions have been taken, or modified from the [OCR \(B\) Specification for GCSE Chemistry, J258, Version 3.2 April 2020](#)

***Addition polymerisation:** The reaction in which many small molecule monomers bond together to form a long chain polymer.

***Alloys:** A metal compound made by combining two or more metals together. This process is carried out to give the material greater strength or resistance to corrosion.

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.

Clay ceramics: Ceramics made from firing moulded wet clay in a furnace until it hardens. Used for pottery and bricks.

Composites: Generally made up of two materials - a matrix/binder material which surrounds the reinforcement material. They have a very broad range of uses as the combination of several materials gives the composite a range of properties.

***Condensation polymerisation:** Reactions in which monomers join together and lose small molecules, such as water. These reactions involve monomers with two functional groups.

***Corrosion:** The destruction of materials by chemical reactions with substances in the environment. For example, iron will rust when in the presence of oxygen and water.

Diamond: A giant covalent structure which is made up of carbon atoms each of which form four covalent bonds with four other carbon atoms.

***DNA:** Encodes genetic instructions for the development and functioning of living organisms and viruses. Most DNA molecules are two polymer chains, made from four different nucleotides, in the form of a double helix.

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Fullerenes: Molecules made up of carbon atoms in 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.

Glass: A type of ceramic. Glass has a high melting point which allows the ceramic to be moulded when hot. Soda-lime glass and borosilicate glass are both types of glass ceramics.

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. The 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.

Life-cycle assessment: The analysis of the impact a product has on the environment. It considers the raw materials, manufacturing, packaging, transportation, product use and disposal.

***Monomer:** Small short chain molecules which can join together to form a long chain polymer.

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.

Nanotechnology: The use and control of structures which are 1-100 nm in size.

***Nucleotides:** The monomers which make up DNA.

Oxidation: A reaction involving the gain of oxygen. **Oxidation is the loss of electrons.**

***Polyamide:** A category of polymers which contain the amide functional group in their main chain. Formed by a condensation reaction, usually between a diamine and a dicarboxylic acid.

***Polyester:** A category of polymers which contain the ester functional group in their main chain. Formed by a condensation reaction, usually between a diol and a dicarboxylic acid.

Polymer: Large long-chain molecule made up of lots of small monomers joined together by covalent bonds.

Proteins: Polymers made up of amino acid molecules.



Reduction: A reaction involving the loss of oxygen. **Reduction is the gain of electrons.**

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

***Sacrificial protection:** The protection of iron or steel against corrosion by using a more reactive metal. Zinc is often used as a sacrificial metal. Sacrificial protection creates a physical barrier to oxygen and water, preventing corrosion of the metal.

