

Definitions and Concepts for CAIE Chemistry IGCSE

Topic 3 - Atoms, Elements and Compounds

Definitions in **bold** are for extended supplement only

Definitions have been taken, or modified from the [CAIE Specification for GCSE Chemistry, 0971, Version 1 September 2020](#)

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.

Atom: The smallest part of an element that can exist. All substances are made up of atoms. Atoms contain a positively charged nucleus surrounded by negatively charged electrons. The nuclear radius is much smaller than the atomic radius and most of the mass is in the nucleus.

Atomic nucleus: Positively charged object composed of protons and neutrons at the centre of every atom with one or more electrons orbiting it.

Compound: A substance made up of two or more types of atoms chemically combined together.

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. This structure makes diamond very hard so it is used in cutting tools.

Electron: Negatively charged subatomic particle which orbit the nucleus at various energy levels. Very small relative mass (negligible).

Electron shell: Different energy levels in atoms, occupied by electrons.

Element: A substance made up of only one type of atom.

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.

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

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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 ions, held together by strong electrostatic forces.

Isotopes: Atoms of the same element which have the same proton number but a different nucleon number. **They will display the same chemical properties as they have the same electron configuration.** Isotopes can be radioactive or non-radioactive.

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

Macromolecules (giant covalent structure): A molecular structure containing many atoms covalently bonded together. The strong covalent bonds mean that macromolecules have high melting points.

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 bonding: Positive metal ions are held in a sea of delocalised electrons.

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

Neutron: Neutral subatomic particle present in the nucleus of the atom. Relative mass of 1.

Noble gases: The elements in Group 0 of the periodic table. They have a stable full outer shell of electrons which makes them very unreactive.

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

Nucleon number (mass number): The total number of protons and neutrons in the nucleus.

Proton: Positively charged subatomic particle present in the nucleus of the atom. Relative mass of 1.

Proton number (atomic number): The number of protons in the nucleus.

