Definitions and Concepts for CAIE Chemistry IGCSE

Topic 2 - Atoms, Elements and Compounds

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

Definitions have been taken, or modified from the CAIE Cambridge IGCSE Chemistry 0620 syllabus for 2023, 2024 and 2025.

Anion: A negatively charged ion, formed when a nonmetal atom has gained an electron

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.

Atomic number (proton number): the number of protons in the nucleus of an atom.

Cation: A positively charged ion, formed when a metal atom has lost an electron.

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

Covalent bond: A strong bond formed when a pair of electrons is shared between two (nonmetal) atoms. The sharing of electrons results in the atoms achieving full outer shells of electrons (the same as the electronic configuration of a noble gas)

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.

Ductile: **Can be bent or hammered into other shapes due to its pliability and flexibility. Metals are ductile since the uniform layers of atoms can slide over each other.**

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.

Ionic bond: a strong electrostatic attraction between oppositely charged ions

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

Isotopes: Different atoms of the same element that have the same number of protons but different numbers of neutrons, so same atomic number but different mass number. **They will display the same chemical properties as they have the same number of electrons and the same electron configuration.**

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.**

Mass number (nucleon number): the total number of protons and neutrons in the nucleus of an atom

Metallic bonding: the electrostatic attraction between the positive ions in a giant metallic lattice and 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.

Mixture: A substance made up of two or more elements or compounds, but are not chemically bonded together

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 of an atom.

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 of an atom