

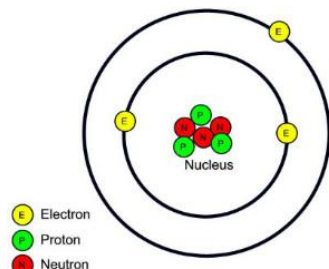
8C2 Knowledge Organiser – Structure & Bonding

Key words

Term	Definition
Atom	Smallest part of an atom that can exist
Proton	Subatomic particle with a charge of +1
Neutron	Subatomic particle with a charge of 0
Electron	Subatomic particle with a charge of -1
Nucleus	Centre of an atom with protons and neutrons
Electron Shell	Where electrons are found. Maximum of 2 in the first shell, 8 in the second and 8 in the third
Ions	Electrically charged atom, formed when an atom loses or gains an electron
Covalent bond	A bond between atoms formed when atoms share electrons to achieve a full outer shell
Ionic bond	Forms between two atoms when an electron is transferred from one atom to the other, forming a positive-negative ion pair.
Metallic bond	Bonding in metal elements of a giant structure of metal ions and their delocalised electrons moving between them.
Delocalised electron	Electrons that are not associated with a particular atom.

Atomic structure

An atom is made up of three particles: protons, neutrons and electrons. Protons and neutrons are found together in the nucleus, whereas electrons are found orbiting the nucleus in electron shells. The first shell can hold up to 2 atoms, the second shell can hold up to 8 electrons, and the third shell can hold up to 8 electrons.



Subatomic particle	Charge
Proton	+1
Neutron	0
Electron	-1

Properties of metals

Malleable: to be hammered into shape without breaking

Electrical conductor: allow an electrical current to be transferred through

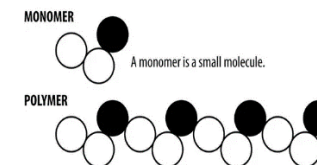
Thermal conductor: allows heat energy to be transferred through

Lustrous: Shiny

Ductile: drawn into a wire

Polymers

Structure of Monomers and Polymers



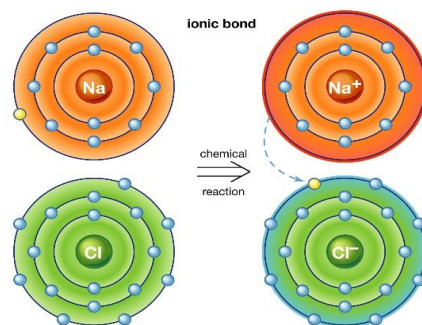
A polymer is a large molecule made up of smaller repeating chains called monomers.

Ionic bonding

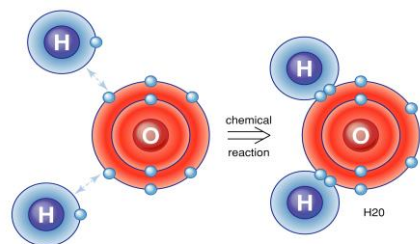
An electron is lost from an atom so it has a full outer shell. It is now a positive ion.

The electron joins another atom so that it too has a full outer shell. It is now a negative ion.

The positive and negative ion attract in an ionic bond.

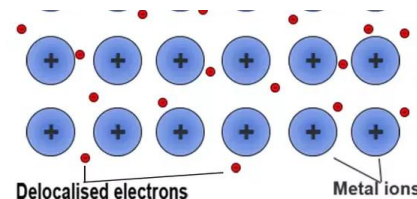


Covalent bonding



Two or more atoms share pairs of electrons to achieve a full outer shell.

Metallic bonding



The metal atoms lose an electron, forming a positive metal ion. The delocalised electron stays in the structure and attracts to the ion – this is a metallic bond.

Properties of ionic compounds

Ionic compounds have high melting and boiling points as lots of heat energy is needed to overcome the bonds. They can conduct electricity if dissolved or melted as the charged ions are free to flow.

Properties of simple covalent molecules

These are made up of just a few atoms joined by covalent bonds. They have low melting and boiling points as the intermolecular force are easier to overcome. They don't conduct electricity.

Properties of giant covalent structures

They have very high melting and boiling points as lots of energy is needed to overcome the bonds. Most cannot conduct electricity as they have no charged particles that can move. Some, such as Graphite, can.

Allotropes

Different form of the same element. Diamond and graphite are both just made of carbon – they are carbon allotropes.

Diamond: every atom is joined to another by four strong covalent bond.

Graphite: every atom bonded into a layer with three strong covalent bonds. Leaves them with a delocalised electron.