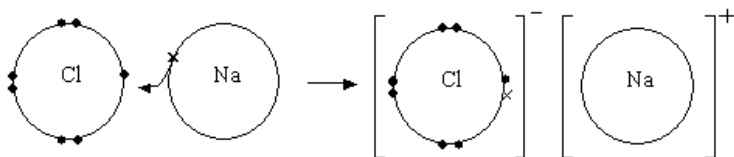


C3 – Chemical Bonding

Ionic bonding

An **ion** is an **atom** or group of atoms with a positive or negative **charge**. Ions form when atoms lose or gain **electrons** to obtain a full outer shell:

- **metal** atoms lose electrons to form positively charged ions
- **non-metal** atoms gain electrons to form negatively charged ions

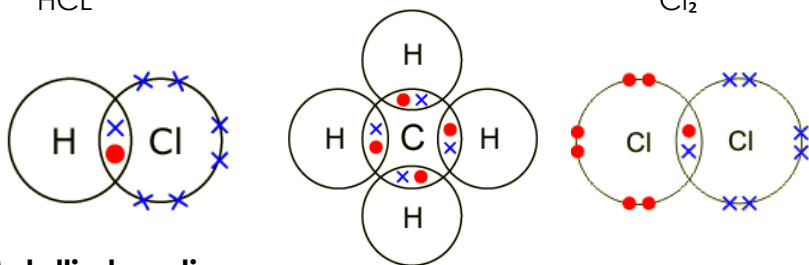


Covalent bonding

A **covalent bond** is formed when two **atoms share** a pair of **electrons**. Covalent bonding occurs in most **non-metal elements**, and in **compounds** formed between non-metals.

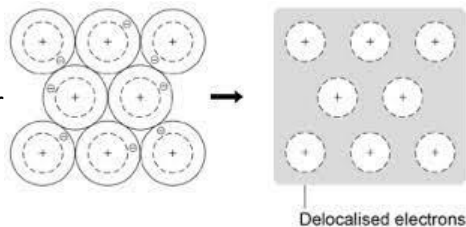
Hydrochloric acid
HCL

Chlorine
Cl₂



Metallic bonding

Metals **lose electrons** to form **positive ions**. Positive metal ions are closely packed together and arranged in regular layers. The positive ions are surrounded by a sea of **delocalised electrons**.

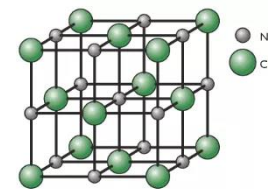


C3 - Structure and Properties

The three states of matter are **solid, liquid, and gases**.

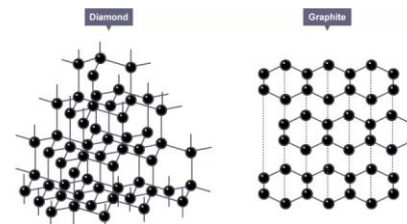
In **melting** and **boiling**, energy is transferred from the surroundings to the substance. In **freezing** and **condensing**, energy is transferred from the substance to the surroundings.

Ionic compounds are held together in a **giant ionic lattice** by strong electrostatic attractions between oppositely charged ions. They have **high melting points**. Molten or dissolved ionic compounds can conduct electricity as the ions can move. Ionic solids do not conduct electricity as the ions cannot move.



Simple molecules have low melting and boiling points – there are **weak intermolecular forces** between molecules.

Macromolecules have high melting and boiling points – the giant structure is held together by **many strong covalent bonds**. Diamond is very **hard**, but graphite is very **soft** as the **layers** of carbon atoms can slide over each other. Graphite **conducts electricity** as it contains **delocalised electrons**.

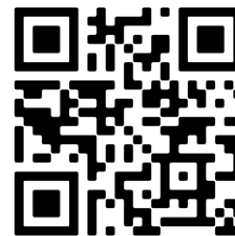


Metals are **malleable** as the layers of ions can slide. Metals are very good thermal and electrical conductors as **delocalised electrons** can flow through the structure. An **alloy** is a mixture of a metal with another element to give improved properties.

Vocabulary:

Word	Meaning
solid	Particles are held close together in a regular pattern. Particles cannot move but will vibrate.
liquid	Particles are held close together but are randomly arranged. Particles can move past each other.
gas	Particles are far apart and randomly arranged. There are no forces of attraction between the particles, which move fast in all directions.
ionic bond	The electrostatic force of attraction between positively and negatively charged ions. Ionic bonds form between a metal and a non-metal.
ion	A charged particle produced by the loss or gain of electrons.
covalent bond	The bond between two atoms that share one or more pairs of electrons. Covalent bonds form between non-metals only.
dot and cross diagram	A drawing to show only the arrangement of the outer shell of electrons of the atoms or ions of a substance.
metallic bond	The electrostatic force of attraction between positive metal ions and delocalised electrons. Metallic bonds form between metals only.
giant ionic lattice	A huge 3-dimensional network of oppositely charged ions.
simple molecule	A non-metal element or compound held together by covalent bonds. There are a fixed number of bonds in a simple molecule. Some examples of simple molecules are water, carbon dioxide, methane and oxygen.
intermolecular force	The attraction between the molecules in a covalently bonded substance. These forces are weak and it takes little energy to overcome them.
macromolecule	A huge 3-dimensional network of non-metal atoms held together by covalent bonds.
alloy	A mixture of two or more elements, at least one of which is a metal.

Videos



Quizzes

