

Year 9 C2 Elements, Compounds and Mixtures

C2.1 Purity and Separating Mixtures

Relative atomic mass, A_r , is the mean mass of an atom of an element compared to 1/12th of Carbon-12

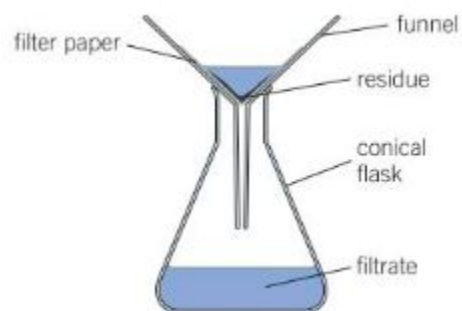
Relative formula mass, M_r , is the mean mass of a unit of substance compared to 1/12th of the mass of Carbon-12

Relative molecular mass, M_r , is the same as above but used for substances that exist as molecules.

Empirical formula, simplest whole number ratio of the atoms of each element in a compound.

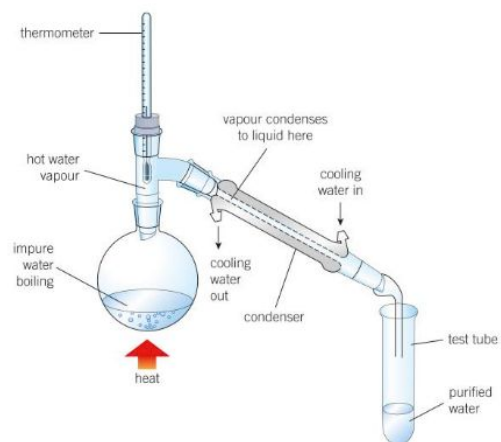
Filtration

- Separates a solid and a liquid
- **Insoluble** substance forms residue
- **Soluble** substance goes through filter paper as filtrate



Simple Distillation

- Separates a **solvent** from a **solution**
- Evaporation → cooling → condensing



Crystallisation

- Produces dry sample of soluble substance
- Solution is heated
- Solvent evaporates

Chromatography

- **Stationary phase**
- **Mobile phase**
- Substances distributed between phases

$$R_f = \frac{\text{distance travelled by substance}}{\text{distance travelled by solvent}}$$

Fractional Distillation

- Separates a liquid from a mixture of liquids
- Evaporation → cooling at different temperatures → condensing

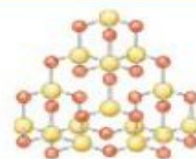
Pure substance: Contains one element or compound, Single sharp melting point

Impure Substances: Melts over a range of temperatures

C2.2 Bonding

Metals	Non-metals
Shiny Malleable Solid at room temperature (except mercury) Good conductors Form positive ions Metallic bonding	Dull Brittle Approx half are solid, half are gas (bromine is liquid) Insulators Form negative ions Covalent Bonding

Giant covalent structures



- strong
- high melting points and boiling points
- do not conduct electricity (except graphite)

Simple molecules



- weak
- low melting points and boiling points
- conduct electricity

Metals



- strong
- high melting points and boiling points
- conduct electricity when solid or liquid

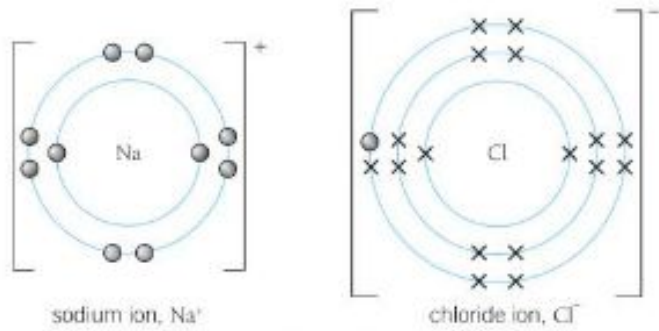
Ionic compounds



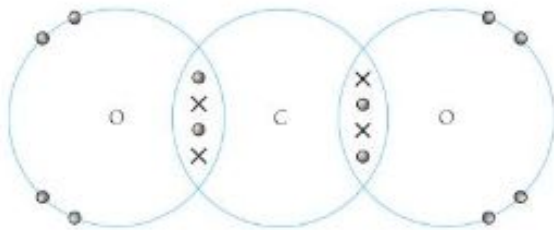
- strong
- high melting points and boiling points
- conduct electricity when molten or dissolved

C2.2 Bonding continued

Ionic bonding, an electrostatic force of attraction between oppositely charged ions of metals and non-metals.



Covalent bonding, a shared pair of electrons between non-metals.



The Periodic Table

1869

elements arranged in order of ↑
relative atomic mass

proton discovered

elements arranged in order of ↑
atomic number

- elements with similar properties grouped
- some pairs reversed

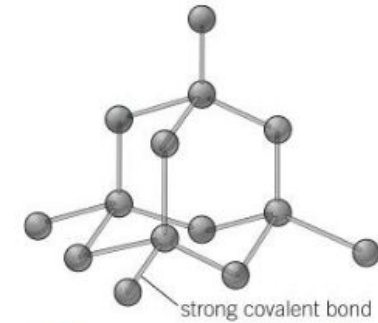
- periods (rows of elements)
- groups (columns of elements)

today

C2.3 Properties of Materials

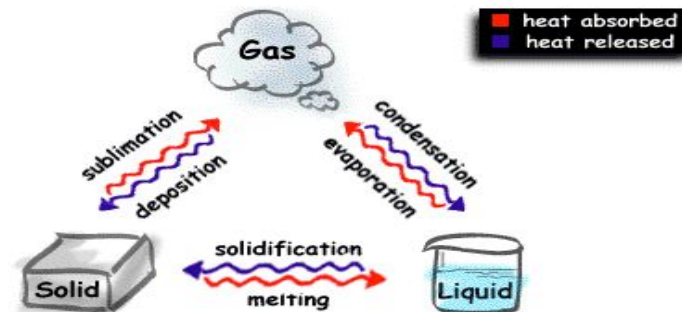
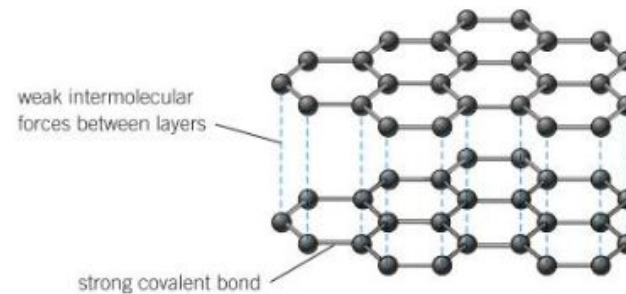
Diamond

4 covalent bonds per C atom
Giant covalent lattice
Hard
No delocalised electrons
Does not conduct electricity



Graphite

3 covalent bonds per C atom
Layered structure with weak forces between layers
Soft and slippery
Delocalised electrons
Good conductor of electricity



Changing State

