

National 5 Unit 1 - Chemical Changes and Structure – KU statements**Rates of reaction**

Certain factors can affect the rate of a chemical reaction:

- Temperature (the higher the temperature the faster the reaction)
- Concentration (the higher the concentration the faster the reaction)
- Particle size (the smaller the particle size, the faster the reaction)
- Use of catalyst

Atomic structure and bonding related to properties of materials

Isotopes are atoms with the same atomic number but different mass number

The relative atomic mass of an element is an average mass of all the isotopes present taking into account their relative proportions

The Noble Gases are un-reactive because they have a stable electron arrangement

Atoms can achieve a filled-up outer shell of electrons by losing, gaining or sharing outer shell electrons

Atoms sharing outer shell electrons form covalent bonds

The atoms in a covalent bond are held together by the attraction of each positive nucleus for the shared pair of electrons

Covalent molecules have shapes such as:

- *Linear – CO₂*
- *Bent – H₂O*
- *Pyramidal – NH₃*
- *Tetrahedral – CH₄*

The diatomic elements are:

- *Hydrogen*
- *Nitrogen*
- *Oxygen*
- *The halogens*

Discrete covalent molecules have low melting and boiling points due to weak forces of attraction between the molecules

Covalent network molecules have very high melting points because many strong covalent bonds must be broken before they can melt

Metal atoms form ions losing electrons

Non-metal atoms form ions losing electrons

Ionic bonds are the electrostatic forces of attraction between oppositely charged ions

An ionic lattice is a 3-dimensional structure composed of oppositely charged ions

The melting and boiling points of ionic compounds are high as strong ionic bonds must be broken when ionic compounds melt/boil

When an ionic compound dissolves in water the ionic lattice breaks

Ionic compounds conduct electricity when molten or in solution because the ions are free to move

Formulae and reaction quantities

The gram formula mass of a substance is the mass of a quantity called a mole

That the units of concentration are mol l⁻¹

Acids and bases

Water dissociates into equal numbers of hydrogen and hydroxide ions

pH is a measure of the hydrogen ion concentration

In a neutral solution there are an equal number of hydrogen and hydroxide ions

A solution is acidic if it contains a higher concentration of H^+ ions compared to OH^- ions

A solution is alkaline if it contains a higher concentration of OH^- ions compared to H^+ ions

Diluting an acid decreases its H^+ ion concentration and increases its pH

Diluting an alkali decreases its OH^- ion concentration and decreases its pH

Soluble metal oxides give an alkaline pH when dissolved in water

Non-metal oxides give an acidic pH when dissolved in water