

Atomic number or proton number is the total number of protons in the nucleus of an atom.

Mass Number or nucleon number is the total number of protons and neutrons in the nucleus of an atom.

Isotopes are atoms with the same number of protons but different numbers of neutrons.

The **relative isotopic mass** is the mass of one isotope of an element compared to 1/12 the mass of the ^{12}C isotope.

The **relative atomic mass** is the average mass of one atom compared to 1/12 the mass of the ^{12}C isotope.

First Ionisation Energy is the energy required to remove one mole of electrons from 1 mole of gaseous atoms to produce 1 mole of gaseous unipositive ions.

First Electron Affinity is the energy liberated when one electron is added to each atom in 1 mole of gaseous atoms to form 1 mole of gaseous ions with a uninegative charge.

Electronegativity is the power of an atom to attract bonding electrons.

Oxidation is loss of electrons. Remember OIL RIG

Reduction is gain of electrons.

Oxidising agent is a substance which removes electrons from another substance and itself is reduced.

Reducing agent is a substance which gives electrons to another substance and itself is oxidised.

Disproportionation is simultaneous oxidation and reduction of one species in a chemical reaction.

Metallic bond is the electrostatic attractions between the positive ions and a 'sea' of delocalised valence electrons surrounding the positive ions.

Ionic bond is the attraction between the oppositely charged ions formed by transfer of one or more electrons from one atom to another.

Covalent bond is the attraction of the nuclei for the shared pair of electrons between two atoms.

Sigma bond is the covalent bond formed by 'head on' overlap of atomic orbitals.

Pi Bond is the covalent bond formed by sideways overlap of atomic orbitals.

Valence Shell Electron Pair Repulsion (VSEPR) Theory states that the shape of a molecule is determined by the repulsion between the electron pairs in the valence shell. According to the VSEPR, the electron pairs will arrange themselves so as to be as far apart as possible.

Polarising power is the ability of a positive ion to attract electrons away from a negative ion.

Dipole-Dipole Forces are intermolecular attractions between molecules which are permanently polarised.

Hydrogen Bond is the electrostatic attraction between a hydrogen atom which is bonded to a very electronegative atom and an electronegative atom of a neighbouring molecule.

Van Der Waals Forces are intermolecular forces of attraction which arise from temporary dipoles in molecules.

Standard Enthalpy Of Formation is the enthalpy change when 1 mole of the substances is formed from its elements at their natural states at 298K and 1 atm pressure.

Standard Enthalpy Of Combustion is the enthalpy change when 1 mole of an element or compound is completely burned in oxygen at 298K and 1 atm pressure.

Standard Enthalpy Of Neutralisation is the enthalpy change when 1 mole of water is formed from the reaction between an acid and a base at 298K and 1 atm pressure.

Hess's Law states that the total energy change resulting from a chemical reaction is dependant only on the initial and final states of the reactants and is independent of the reaction route.

Bond energy is the energy required to break 1 mole of bonds from gaseous molecules into gaseous atoms.

Activation energy is the minimum energy required by colliding particles to start off a reaction.

A **catalyst** is a substance which changes the rate of a chemical reaction without itself undergoing any chemical change at the end of the reaction.

Homogenous catalyst is a catalyst in which the physical state is in the same phase as the reactants.

Heterogenous catalyst is a catalyst in which the physical state is in the different phase as the reactants.

Increase the concentration of reactants will increase the rate since there will be more molecules per unit volume resulting in an increase in the collision frequency between the reactants. This leads to higher number of effective collisions.

Increase in the temperature will increase the rate since at higher temperature the particles gain more kinetic energy resulting an increase in collision frequency at higher temperature. In addition, more molecules have kinetic energy greater than or equal to the activation energy. Consequently, the number of effective collisions increases.

A catalyst operates by providing an alternative route of lower activation energy for the reaction.

Geometric isomers are compounds with different spatial arrangement due to the restriction in the rotation about the double bond in an alkene. In geometric isomers, two different groups at each end of the double bond can either be on the same side (cis) or on opposite sides (trans)

Optical isomers are mirror images that have the same geometric and structural formula, but cannot be superimposed onto one another.

Cracking is a process to break long alkane into a shorter alkane and an alkene. Hydrogen may also be produced.

Thermal cracking requires temperature between 400°C to 900°C and high pressure whereas catalytic cracking requires a zeolite catalyst and a temperature of about 450°C. The purpose of cracking is to form extra gasoline and to produce alkenes with higher commercial value

Homolytic fission is the breaking a covalent bond in which one electron goes to each atom to form free radicals.

Heterolytic fission is the breaking a covalent bond in which one atom takes both electrons forming negative and positive ions.

A *free radical* is a highly reactive atom or molecule with an unpaired electron.

An *electrophile* is an electron-deficient species that can form a new covalent bond by accepting an electron pair provided by the carbon compound. Example : positive ion such as hydrogen ion or nitronium ion and a polar molecule with a δ^+ charge

A *nucleophile* is an electron-rich species with a lone pair of electrons that can form a new covalent bond by donating a pair of electrons to the electron deficient carbon atom. Example : negative ions with at least a lone pair.