

5. Chemical Energetics

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Keywords	Definition
Absolute Zero	The lowest possible temperature, when all particles have no kinetic energy.
Average Bond Enthalpies	The average energy needed to break one mole of bonds in molecules, taking all possibilities into account.
Bond Enthalpy	The energy needed to break one mole of bonds in gaseous molecules under standard conditions
Closed System	A chemical reaction where only energy can be exchanged with the surroundings, not matter.
Endothermic	When heat is added to the system from the surroundings, the enthalpy of the system increases and the temperature of the surroundings decrease.
Energy	The measure of an object's ability to do work.
Energy Cycle	A method of calculating enthalpy change indirectly, using Hess's Law.
Enthalpy	The measure of the amount of heat energy contained in a substance. It is stored in chemical bonds and intermolecular forces.
Exothermic	When heat is released from the system to the surroundings, the enthalpy of the system decreases and the temperature of the surroundings increase.
Free Radical	A highly reactive atom or molecule with an unpaired electron.
Heat Capacity	The heat needed to increase the temperature of an object by 1 Kelvin
Hess's Law	States that the enthalpy change for any chemical reaction is independent of the route, provided the starting and ending conditions and the reactants and products remain the same.
Kelvin Scale	A temperature scale where the temperature is directly proportional to the average kinetic energy of the particles.
Open System	A chemical reaction where both energy and matter can be exchanged with the surroundings.
Standard Conditions	298 K (25°C), 1.00×10^5 Pa, all solutions 1.00 mol dm^{-3} , all substances in their standard states.
Standard Enthalpy Change of Combustion	The enthalpy change for the complete combustion of one mole of a substance in its standard state in excess oxygen under standard conditions.
Standard Enthalpy Change of Formation	The enthalpy change that occurs when one mole of the substance is formed from its elements in their standard states under standard conditions.
Standard Enthalpy Changes	The enthalpy change that occurs when a reaction happens at standard conditions (1) a pressure of 100kPa (2) a concentration of 1 mol dm^{-3} for all solutions (3) all substances in their standard states.
Steady State	A system showing no overall change in concentration.
Surroundings	The rest of the Universe that is not involved in a reaction.
System	The area of interest in a reaction.
Work	The act of moving an object against its opposing force.

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Keywords	Definition
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Absolute Entropy	The entropy change of a substance taken from absolute zero to a given temperature.
Born-Haber Cycle	A cycle of enthalpy change of process that leads to the formation of a solid ionic compound from the elemental atoms in their standard states.
Enthalpy Change of Atomization	The enthalpy change that occurs when one mole of gaseous atoms is formed from the element in its standard form.
Entropy	The distribution of available energy between particles. The more disordered a system, the higher the entropy.
First Electron Affinity	The enthalpy change when one mole of gaseous electrons is added to one mole of gaseous atoms.
First Ionization Energy	The minimum energy required to remove one mole of electrons from one mole of gaseous atoms.
Gibbs Free Energy	A measure of energy available to do work instead of leaving a system as heat. This value must be negative for a reaction to be spontaneous.
Lattice Enthalpy	The enthalpy change that occurs when one mole of a solid ionic compound is separated into gaseous ions under standard conditions.
Spontaneous Changes	A reaction that occurs without the need for any added energy.