

12. BIOCHEMISTRY: ENERGY AND METABOLISM

CHAPTER 12

- 12.1 **Exergonic reactions** – proceeds with a net release of free energy and is spontaneous
- 12.2 **Endergonic reactions** – it requires standard free energy from its surroundings and is non-spontaneous

FREE ENERGY, ENTHALPY	ENTROPY, ENTHALPY
Exergonic	Exergonic
Exothermic	Exothermic/Endothermic
Exergonic	Exergonic
Order of Release	Order of Order

- 12.3 **Kinetic energy** – energy in processes that is motion, ex: falling particle, an electron
- 12.4 **Potential energy** – energy stored in the body or system due to its position or a state that is awaiting a trigger to do work
- 12.5 **Chemical energy** – potential of a chemical substance to undergo a transformation through a chemical reaction (forming chemical bonds)
- 12.6 **The direction of thermodynamics**
 - 12.6.1 Energy can be conserved and transformed
 - 12.6.2 Energy cannot be created or destroyed
- 12.7 **The second law of thermodynamics**
 - 12.7.1 Spontaneous change that increases overall energy increases the entropy, or disorder, of the system
- 12.8 **Entropy of a cell**
 - 12.8.1 Substrate molecules and ions decrease/lose
- 12.9 **Free energy provides energy (also used for stabilizing cell's energy levels)**
 - 12.9.1 ΔG – Gibbs free energy
 - 12.9.2 ΔH – Enthalpy
- 12.10 **Enthalpy of reaction**
 - 12.10.1 A structure of reaction for substances, as it leads to increase change (change in system) or "enthalpy change"
- 12.11 **Properties of reactions**
 - 12.11.1 Reaction kinetics – rate increase to achieve specific
 - 12.11.2 Kinetics – rate increase to reaction
- 12.12 **Factors affecting reactions**
 - 12.12.1 Energy concentration – positive contribution
 - 12.12.2 Volume concentration – positive contribution
 - 12.12.3 Temperature – increase forward reaction if decrease volume system if
 - 12.12.4 Volume – positive change, volume change
 - 12.12.5 pH – positive change, pH change
 - 12.12.6 Enthalpy
 - 12.12.7 Entropy
- 12.13 **Enthalpy of formation** – heat of change (enthalpy change)
- 12.14 **Enthalpy of reaction** – net positive, negative molecules, total temperature or potential to increase one molecule