

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, or better put, an electron's
- 12.4 **Potential energy** – energy stored in the body or system due to its position or a state that is reacting (e.g. spring in its position)
- 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 entropy increases the entropy, or disorder, of the system
- 12.8 **Entropy of life**
 - 12.8.1 Cells absorb molecules and use them to grow/live
- 12.9 **Free energy provides energy (also used for stabilizing cell's energy levels)**
 - 12.9.1 Enthalpy – volume
 - 12.9.2 Entropy – order
- 12.10 **Enthalpy of reaction**
 - 12.10.1 A structure of reaction for substances, as it leads to increase change (change in order) or "enthalpic change"
- 12.11 **Properties of reactions**
 - 12.11.1 Reaction kinetics – rate increase in substance specific
 - 12.11.2 Kinetics – non-reversible reactions
- 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 Volume
 - 12.12.7 Volume
- 12.13 **Enthalpy of reaction** – heat of change (enthalpic change)
- 12.14 **Entropy** – non-particle, system molecules, total temperature or potential to increase over time