

## 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 in a field (including a 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 low-entropy food and use it to produce heat
- 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 depends on activation energy
  - 12.11.2 Kinetics – rate measurement reaction
- 12.12 **Factors affecting reactions**
  - 12.12.1 Enzyme concentration – positive correlation
  - 12.12.2 Substrate concentration – positive correlation
  - 12.12.3 Temperature – increase followed optimum (1) decrease follow optimum (2)
  - 12.12.4 pH – positive slope, velocity changes
  - 12.12.5 pH – positive slope, pH changes
  - 12.12.6 activation
  - 12.12.7 inhibition
- 12.13 **Enzymes** – low activation energy (LOWERS ACTIVITY)
- 12.14 **Coenzymes** – non-protein, organic molecules, bind temporarily or permanently to enzyme and assist