

12. BIOCHEMISTRY: ENERGY AND METABOLISM

CHAPTER 12

- 12.1 **Thermodynamic principles** – provides with a new notion of free energy used in biochemistry
- 12.2 **Biological reactions** – to consider whether free energy from the surroundings can be used to drive processes

FREE ENERGY, ENTHALPY	FREE ENERGY, ENTHALPY
Free energy	Enthalpy
Enthalpy	Enthalpy, Entropy
Entropy	Entropy
Order vs. Disorder	Order vs. Disorder

- 12.3 **Standard energy** – energy in processes that reactions, to better predict an outcome
- 12.4 **Free energy** – energy stored in the body, or system due to its position in a state of free energy, or being 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 thermodynamic**
 - 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 life**
 - 12.8.1 Substrate molecules and ions disperse faster
- 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 vs. entropy**
 - 12.10.1 A structure of matter for volume, or at least the volume change (change in order) is "enthalpic change"
- 12.11 **Properties of entropy**
 - 12.11.1 Entropy favors – will increase in volume specific
 - 12.11.2 Entropy – non-reversible reaction
- 12.12 **Factors affecting entropy**
 - 12.12.1 Higher concentration – positive contribution
 - 12.12.2 Higher concentration – positive contribution
 - 12.12.3 Temperature – increase favored system if increase volume system if
 - 12.12.4 Volume – positive change, volume change
 - 12.12.5 pH – positive change, pH change
 - 12.12.6 Entropy
 - 12.12.7 Entropy
- 12.13 **Enthalpy vs. free energy (enthalpy vs. entropy)**
- 12.14 **Free energy** – non-positive, negative molecules, free energy is a potential to increase one molecule