

## 12. BIOCHEMISTRY: ENERGY AND METABOLISM

### CHAPTER 12

- 1. **Exergonic reactions** – proceed with a net release of free energy and are spontaneous
- 2. **Endergonic reactions** – do not take place spontaneously; free energy must be re-supplied and the reaction is non-spontaneous

FREE ENERGY, ENTHALPY	ENTROPY, ENTHALPY
Exergonic	Exergonic
Endergonic	Exergonic/endergonic
Exergonic	Endergonic
Order of release	Order of order

- 3. **Kinetic energy** – energy in processes that is motion, ex: falling particle, an electron
- 4. **Potential energy** – energy stored in the body or system due to its position or a state that is awaiting a trigger to be put into motion
- 5. **Chemical energy** – potential of a chemical substance to undergo a transformation through a chemical reaction (forming chemical bonds)
- 6. **The direction of thermodynamics**
  - o Thermodynamics is a branch of physics
  - o Thermodynamics is a branch of chemistry
- 7. **The second law of thermodynamics**
  - o Spontaneous change that increases overall entropy increases the entropy, or disorder, of the system
- 8. **Entropy of life**
  - o Cells absorb low-entropy food and use it to produce heat
- 9. **Free energy provides energy that is used for synthesizing cell's energy needs**
  - o Catabolism – release
  - o Anabolism – input
- 10. **Enthalpy is matter**
  - o A characteristic measure for substances, or at least the measure change (change in matter) is "enthalpic change"
- 11. **Properties of enzymes**
  - o Specificity: specific – each enzyme is substrate specific
  - o Reversible – can reverse the reaction
- 12. **Factors affecting enzymes**
  - o enzyme concentration – positive correlation
  - o substrate concentration – positive correlation
  - o temperature – increase followed optimum (1) decrease follow optimum (2)
  - o pH – positive slope, velocity changes
  - o pH – positive slope, pH changes
  - o activation
  - o inhibition
- 13. **Enzymes are – they do things (FUNCTIONAL)**
- 14. **Enzymes are – are proteins, sugar molecules, lipid components or polypeptides or nucleic acid molecules**