

## 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 but free energy from the surroundings and/or another reaction

FREE ENERGY, ENTHALPY	ENTROPY, ENTHALPY
Exergonic	Exergonic
Endergonic	Endergonic/Exergonic
Exergonic	Endergonic
Order of Release	Order of Order

- 3. **Kinetic energy** – energy in processes that is motion, ex. ball's passing an obstacle
- 4. **Potential energy** – energy stored in the body or system due to its position or a state that is reacting, ex. spring in its position
- 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 Thermodynamic equilibrium and disequilibrium
  - o Energy cannot be created or destroyed
- 7. **The second law of thermodynamics**
  - o Spontaneous change that increases overall entropy because the entropy is disorder of the system
- 8. **Entropy of life**
  - o Substrate molecules and non-thermodynamic
- 9. **Free energy provides energy (also used for stabilizing cell's energy levels)**
  - o Condensation – release
  - o Hydrolysis – input
- 10. **Enthalpy of water**
  - o A structure of water for cohesion, ex. to bond the water change (hydrogen bonds) to "hydrogen bond"
- 11. **Properties of water**
  - o Specific heat – will increase in solution specific
  - o Density – non-compressible water
- 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 – low pH slope (1) optimum (2) (3)**
- 14. **Coenzymes** – non-protein, organic molecules, bind temporarily or permanently to enzyme and assist