Chapter 5.10-5.16 Study Guide

# Important Ideas

* Living organisms follow two laws when acquiring and using energy. (Chapter modules 5.10-5.12)
* Enzymes accelerate chemical reactions in living organisms. (Chapter 5 modules 5.13-5.16; also see Module 3.16 p.51)

Learning Objectives

Upon successful completion of **Modules 5.9-5.16** you will be able to

1. Define the term “energy” and describe its importance to living organisms.
2. Compare and contrast potential energy and kinetic energy, and provide or recognize examples of them.
3. The most common forms of energy associated with living organisms are chemical energy, light energy, motion, and thermal energy (heat). Relate each of these to either potential or kinetic energy and state with this energy if ordered (high quality) or disordered (low quality).
4. State the first law of thermodynamics (conservation of energy), relate its importance to living organisms, and provide or recognize examples of it.
5. State the second law of thermodynamics, relate its importance to living organisms and to the concept of entropy, and provide or recognize examples of it.
6. Compare and contrast endergonic, exergonic, anabolic\* and catabolic\* reactions, and provide or recognize examples of them.
7. Interpret or draw and label graphs representing endergonic and exergonic reactions. Include activation energy, energy of reactants and products, and overall energy changes during the reaction.
8. Describe the role of ATP in metabolism and relate it to the original energy source of the cell (chemical energy or light energy).
9. Compare and contrast ATP and ADP in the following ways: structure, relative energy levels, endergonic and exergonic reactions, high-energy bonds. Describe the ATP/ADP cycle and cellular uses of energy released.
10. Describe and interpret the role of ATP in energy coupling (coupled reactions). Recognize or provide examples of energy coupling.
11. Characterize enzymes with respect to their biochemical composition, role in the cell, and mechanism(s) of action.
12. Define and interrelate the following terms: catalyst, substrate, reactant, product, active site, activation energy, induced fit, cofactor, coenzyme, competitive inhibitor, noncompetitive inhibitor, and feedback inhibition.
13. Describe, recognize, and draw graphs illustrating how temperature, pH, enzyme concentration and substrate concentration affect enzyme activity.

\* These terms are NOT defined in the textbook but will be discussed in lecture.