

An Introduction to Metabolism

Chapter 8

1. Distinguish between catabolic and anabolic reactions.
2. Use the second law of thermodynamics to explain the diffusion of a molecule across a membrane.
3. Cells and organisms are highly ordered which suggests they seem to violate the second law of thermodynamics. Explain how, in reality, they don't.
4. Cellular respiration uses glucose and oxygen, which have high levels of free energy, and releases carbon dioxide and water, which have low levels of free energy. Is cellular respiration spontaneous or not? Is it exergonic or endergonic? What happens to the energy released from glucose?
5. Why do cells try to avoid metabolic equilibrium?
6. How is ATP used to couple exergonic reactions to endergonic reactions in order to do work in cells?
7. How does the hydrolysis of ATP perform work?
8. Draw a graph which shows both the change in free energy as a non-catalyzed reaction proceeds as well as that for an enzyme-catalyzed reaction.
9. At first, the rate of an enzyme-catalyzed reaction increases with increasing substrate concentration but, eventually, the reaction rate no longer increases. Explain.
10. Why do enzymes act only on specific substrates?
11. Briefly explain the effect of both temperature and pH on enzyme activity.
12. What is the difference between competitive and noncompetitive inhibition?
13. Describe how feedback inhibition can regulate a metabolic pathway.