

An Introduction to Metabolism Review

Chapter 8

1. Draw a diagram to illustrate the term metabolic pathway.
2. Distinguish between catabolic and anabolic reactions.
3. Use the second law of thermodynamics to explain the diffusion of a molecule across a membrane.
4. Cells and organisms are highly ordered which makes them appear to violate the second law of thermodynamics. Explain how, in reality, they do not.
5. Cellular respiration uses glucose and releases carbon dioxide. Glucose has more free energy than carbon dioxide. Use this information to predict whether cellular respiration is spontaneous or not. Justify your prediction. Explain why cellular respiration is exergonic and describe what happens to the energy released from glucose.
6. The waste product of cellular respiration, CO_2 , must be eliminated from an organism. Use the concept of metabolic disequilibrium to explain why this is important.
7. Explain how the hydrolysis of ATP is used to couple exergonic reactions to endergonic reactions in order to do work in cells.
8. Draw a graph to show the change in free energy during a reaction not catalyzed by an enzyme and the same reaction catalyzed by an enzyme. Use the graph to describe how an enzyme speeds up the reaction.
9. Describe the basis of enzyme specificity.
10. Malonate is an inhibitor of succinate dehydrogenase. Describe how you would determine if malonate is a competitive or noncompetitive inhibitor.
11. Explain why the rate of an enzyme-catalyzed reaction does not increase indefinitely with increasing substrate concentration.
12. Draw a graph showing the effect of both temperature and pH on enzyme activity. Explain
13. Describe the difference between competitive and noncompetitive inhibition.
14. Describe how feedback inhibition can regulate a metabolic pathway.