

Cellular Respiration: Harvesting Chemical Energy Review Questions

1. Provide reasoning for describing cellular respiration as an exergonic process.
2. If the following redox reaction occurred, which compound would be oxidized and which would be reduced? $C_4H_6O_5 + NAD^+ \rightarrow C_4H_4O_5 + NADH + H^+$
3. Describe cellular respiration as a redox reaction.
4. Describe the purpose of the citric acid cycle.
5. Identify the processes in your cells that produce the carbon dioxide you exhale.
6. After the citric acid cycle, most of the energy originally in fuel molecules is contained in NADH. Identify the process that will release that energy in a slow, controlled fashion.
7. Identify the immediate source of the energy used by ATP synthase to drive the endergonic production of ATP from ADP + Pi.
8. Imagine that the fourth electron carrier in the ETC were nonfunctional. Predict the effect on the rate of ATP production.
9. Explain the effect of a lack of oxygen on the ETC and ATP production.
10. A researcher develops a method of artificially keeping the pH of the intermembrane space low. After treating some mitochondria with his method, he places the mitochondria in a completely anaerobic environment. Predict whether the mitochondria will produce ATP. Justify your prediction.
11. Describe the evidence that suggests glycolysis evolved very early in the history of life.
12. Consider the chemical structure of carbohydrates and lipids. Explain why lipids contain more energy per gram than carbohydrates.
13. Describe how yeast cells are able to use glucose as a source of energy even in the absence of oxygen.
14. a) Describe how the rate of cellular respiration is regulated.
b) Predict what will happen in a muscle cell that has exhausted its supply of oxygen and ATP.