1. The summary formula for cellular respiration is

C6H12O6 + 6 O2  6 CO2 + 6 H2O + Energy

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a. Where is each of the reactants used in the overall process? | | b. Where is each of the products produced in the overall process? | | |
| C6H12O6 + 6 O2  6 CO2 + 6 H2O + Energy | | | | |
|  |  |  |  |  |

2. In cellular respiration, the oxidation of glucose is carried out in a controlled series of reactions. At each step or reaction in the sequence, a small amount of the total energy is released. Some of this energy is lost as heat. The rest is converted to other forms that can be used by the cell to drive or fuel coupled endergonic reactions or to make ATP.

|  |  |  |
| --- | --- | --- |
| a. What is/are the overall function(s) of glycolysis? | b. What is/are the overall function(s) of the Krebs cycle? | c. What is/are the overall function(s) of oxidative phosphorylation? |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 3. Are the compounds listed here *used* or *produced* in: | Glycolysis? | The Krebs cycle? | Oxidative phosphorylation? |
| Glucose |  |  |  |
| O2 |  |  |  |
| CO2 |  |  |  |
| H2O |  |  |  |
| ATP |  |  |  |
| ADP + P i |  |  |  |
| NADH |  |  |  |
| NAD+ |  |  |  |

4. The cell’s supply of ADP, P i, and NAD+ is finite (limited). What happens to cellular respiration when all of the cell’s NAD+ has been converted to NADH?

5. If the Krebs cycle does not require oxygen, why does cellular respiration stop after glycolysis when no oxygen is present?

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6. Many organisms can withstand periods of oxygen debt (anaerobic conditions). Yeast undergoing oxygen debt converts pyruvic acid to ethanol and carbon dioxide. Animals undergoing oxygen debt convert pyruvic acid to lactic acid. Pyruvic acid is fairly nontoxic in even high concentrations. Both ethanol and lactic acid are toxic in even moderate concentrations. Explain why this conversion occurs in organisms.

7. a. Why can’t cells store large quantities of ATP?

b. Given that cells can’t store ATP for long periods of time, how do they store energy?