

The following information applies to all parts.

3. Cyanide is a chemical that affects the enzyme cytochrome c oxidase (CCO), a key enzyme in the mitochondrial electron transport chain. At high cyanide concentrations, CCO activity is much lower than when no cyanide is present. At low concentrations of cyanide, CCO activity is slightly higher than when no cyanide is present, as shown in Table 1.

Table 1. Effects of Cyanide on CCO Activity

No Cyanide	Low Cyanide	High Cyanide
Normal CCO activity	Slightly increases CCO activity	Greatly decreases CCO activity

Some strains of bacteria produce cyanide, which they then release into their environment. Other strains of bacteria do not produce cyanide. Researchers grew both types of bacteria in high-concentration nutrient medium and then isolated the medium from the bacteria. One-half of each medium sample was left at a high concentration, while the concentration of the other half was lowered.

To study the effects of cyanide on mammalian cells, researchers then added the four samples of media to the cells growing in culture dishes, as shown in Table 2. They measured ATP and lactic acid production by the mammalian cells in each of the four treatment groups.

Table 2. Experimental Design to Test Effects of Cyanide on Mammalian Cells

Mammalian Cell Treatment Group	Cyanide in Nutrient Medium?	Concentration of Medium
1	Yes	High
2	Yes	Low
3	No	High
4	No	Low

Part A

Describe the advantage to cells of producing ATP from one molecule of glucose by aerobic cellular respiration rather than by glycolysis alone.

Part B

Identify the two treatment groups that served as controls in the researchers' experiment.

Part C

Based on the information provided in both tables, **predict** the treatment group that is likely to have the highest ATP production of all four treatment groups.

Part D

The researchers claim that cells in which CCO activity is inhibited will show an increase in lactic acid production. **Support** the researchers' claim.