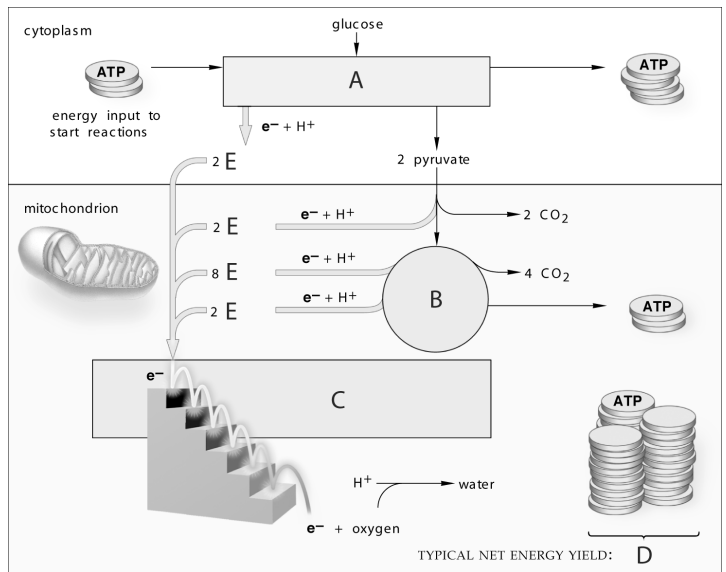


ACTIVE LEARNING WORKSHEET

Topic: Cellular Respiration

- With reference to the schema shown here:
 - All of the lines labeled "E" represent
 - The glycolysis reactions are represented by the letter ____.
 - Electron transfer phosphorylation is represented by the letter ____.
 - The net ATP yield (at letter "D") from the metabolism of one glucose molecule is ____.



- Unlike mitochondria, chloroplasts do not have a transporter that allows them to export ATP to the cytosol. How, then, does the rest of the cell get the ATP it needs to survive?
- The citric acid cycle generates NADH and FADH₂, which are then used in the process of oxidative phosphorylation to make ATP. The citric acid cycle (which does not use oxygen) and oxidative phosphorylation are separate processes, as they are, but the citric acid cycle stops almost immediately when O₂ is removed. How would you explain this?

- (i) Match each equation in column A with the corresponding standard redox potential in column B.

Column A

- $\text{H}_2\text{O} \leftrightarrow \frac{1}{2}\text{O}_2 + 2\text{H}^+ + 2\text{e}^-$
- reduced ubiquinone \leftrightarrow oxidized ubiquinone + $2\text{H}^+ + 2\text{e}^-$
- $\text{NADH} \leftrightarrow \text{NAD}^+ + \text{H}^+ + 2\text{e}^-$
- reduced cytochrome c \leftrightarrow oxidized cytochrome c + e^-

Column B

- +30 mV
- +820 mV
- +230 mV
- 320 mV

- How do these standard redox potentials support our understanding of the stepwise electron transfers that occur in the electron-transport chain?
 - Why would it not be advantageous for living systems to evolve a mechanism for the direct transfer of electrons from NADH to O₂?
- In eukaryotes how will the ATP yield per mole of glucose oxidation be affected if the mitochondrial membrane is made permeable to NADH? Explain.
 - In the absence of oxygen, some cells convert pyruvate to some fermentation product even when it does not result in any additional ATP production. Why is this so?
 - True or false: "Other than its role in feeding the pathways for oxidation of glucose in the mitochondria, which yield several-fold more ATP, glycolysis is not really important for human cells."
 - Use the five processes listed below as answers to the five questions that follow:

A. glycolysis	B. aerobic respiration	C. anaerobic electron transport
D. alcohol fermentation	E. lactate fermentation	

 - This process yields two molecules of ATP and the final product ethanol.
 - This process yields a final product called lactate.
 - This process yields the most energy.
 - This process involves electron transfer phosphorylation.
 - This process precedes the Krebs cycle.