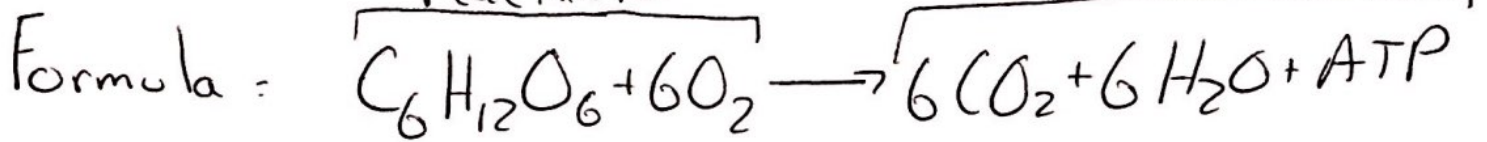


Cellular Respiration



3 Step Process

1 Glycolysis

2 Krebs's Cycle or "Citric Acid Cycle"

3 Electron Transport Chain

Step 1: Glycolysis

- happens in cytoplasm outside the mitochondria

- does not need oxygen = anaerobic

- $C_6H_{12}O_6$ broken down: 2 pyruvates \rightarrow

$$\begin{array}{c} O^- \\ | \\ C=O \\ | \\ C=O \\ | \\ CH_3 \end{array}$$

2 ATP

2 NADH

(used to transfer electrons later)

Step 2: Krebs Cycle or Citric Acid Cycle

- happens in mitochondria

- requires oxygen = aerobic

- O_2 is fixed to pyruvates

- makes CO_2 6 more NADH 2 FADH₂

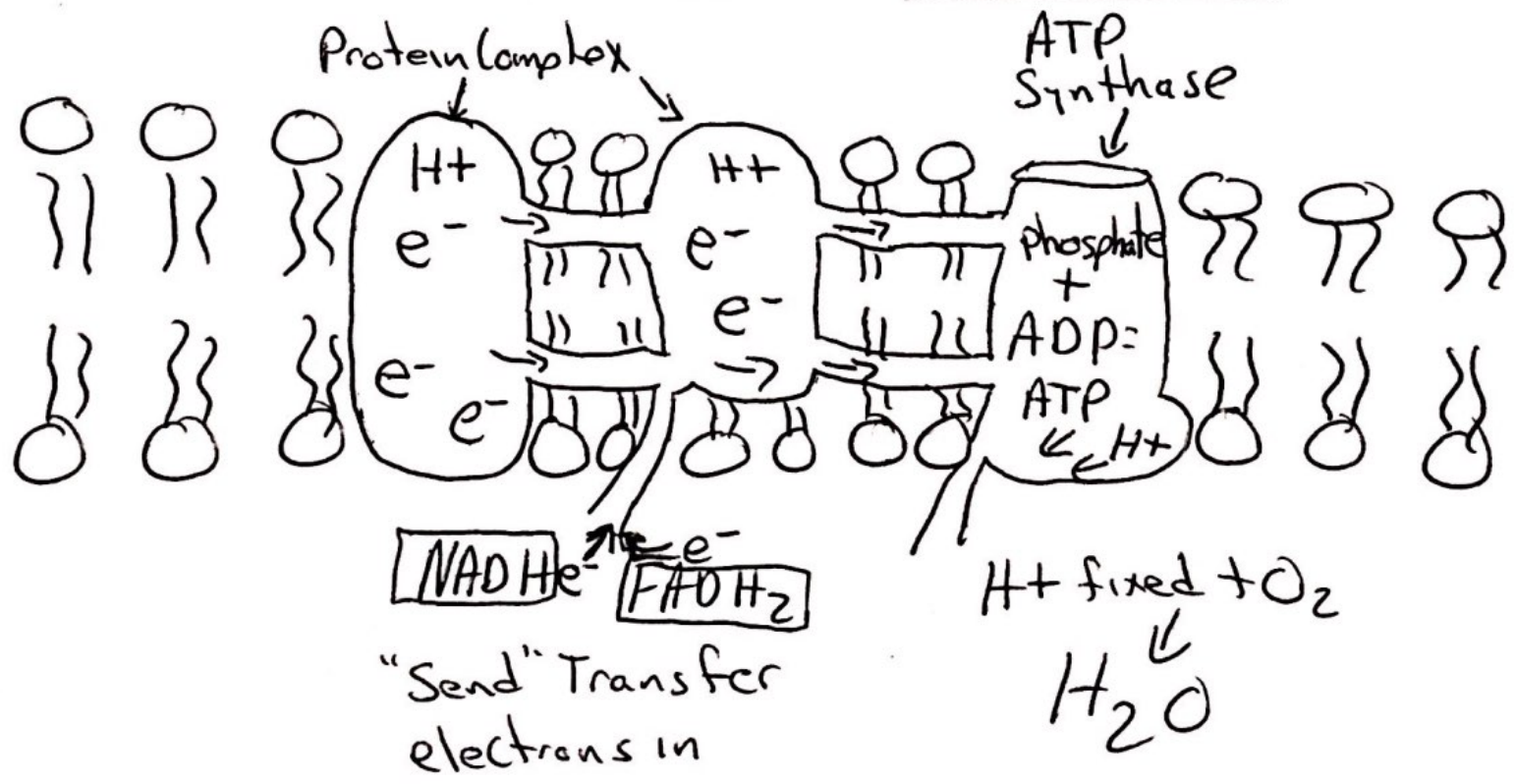
2 more ATP

(transfer electrons) (Also transfer electrons)

Step 3 : Electron Transport Chain

- happens in membrane of the mitochondria
- Oxygen needed = aerobic
- electrons from NADH and FADH₂ are transferred through special proteins in the membrane
- Protons (H⁺) move across membrane toward ATP Synthase - special enzyme in the membrane
- In ATP Synthase - a phosphate is added to ADP forming ATP
- Oxygen combines with H⁺ to make H₂O
- makes a total of 32-38 ATP

Mitochondria Membrane



Fermentation

Why do fermentation? No or low oxygen
No mitochondria

Two Types of fermentation

1. Lactic Acid
2. Alcoholic

1. Lactic Acid

- glycolysis $\left\{ \begin{array}{l} \text{sugar converted to pyruvates} \\ \text{NADH created} \end{array} \right.$
- H removed from NADH leaving NAD⁺
- H is fixed onto pyruvate forming Lactate (Lactic Acid)
- ATP created
- NAD⁺ is recycled

2. Alcoholic

- glycolysis $\left\{ \begin{array}{l} \text{sugar converted to pyruvates} \\ \text{NADH is created} \end{array} \right.$
- H is removed from NADH leaving NAD⁺
- H fixed to pyruvate forming ethyl alcohol
- ATP formed CO₂ released
- NAD⁺ is recycled

Lactic Acid

You perform this when you are doing extreme exercises "feel the burn" lactic acid

Alcoholic

Used in wine making yeast convert sugar to alcohol