

# Cellular Respiration + Photosynthesis

• Cellular Respiration - Opposite of photosynthesis, Humans go through this process.

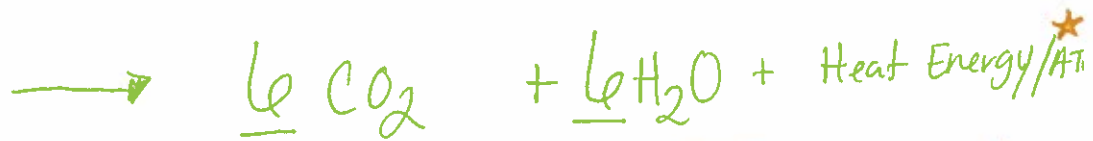
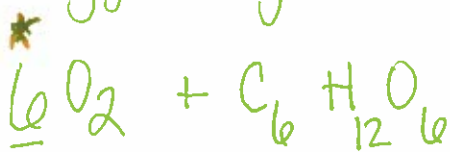
• Occurs in 3 stages: Glycolysis, Citric Acid Cycle, Electron transport chain.

★ Equation for Cellular Respiration ★:

Reactants: what you Need → Products: (what you make)

Oxygen + glucose

→ Carbon dioxide + Water + Heat Energy



Reactants  
what you need

Products  
What you make w/ the reactants

Glycolysis - It's Anaerobic (No oxygen is needed)

• Occurs in the cytoplasm of cell.  
• Glucose is broken down into pyruvic Acid. Ex: Sprinting, Heavy lifting, Jumping.

• Produces 2 ATP

• If oxygen continues to not be present/or too low, Lactic Acid Fermentation will occur.

• Lactic Acid Fermentation - Makes muscles tired, and Heavy.

• Results in 2 ATP molecules.

Citric Acid Cycle: It's Aerobic (Oxygen is Needed/Present) AKA: Krebs Cycle

• Occurs in the mitochondria (combining oxygen + glucose to make ATP) ★

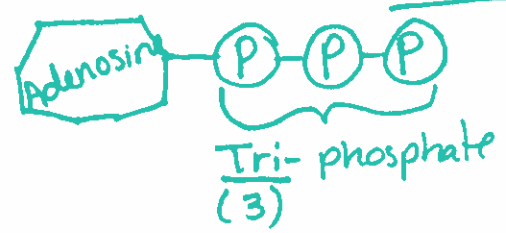
• 2 ATP + 2 CO<sub>2</sub> are produced.

• This process is step 1 of 2.

Electron Transport Chain (ETC) - It's Aerobic, electrons are passed between proteins. • Produces the most ATP - 32 ATP's. (A lot of energy)

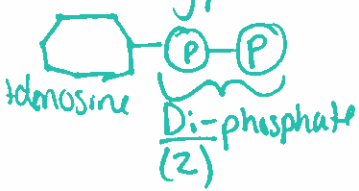
Ex: Jogging, biking, walking

• ATP - Quick USABLE source of energy. (Adenosine tri-phosphate)



• Represents a full battery Similar to: After eating (Recharged body)  
 • Energy is stored between the 2nd + 3rd phosphate

• ADP - Used up Energy, <sup>Between the 2nd + 3rd</sup> phosphate bond is broken, and loses its energy. Like having a low battery

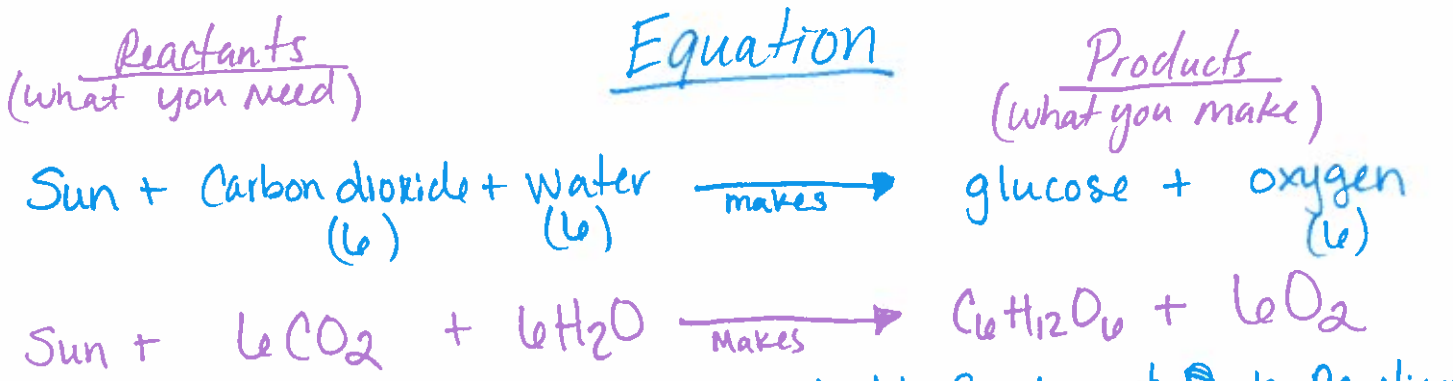


← 3rd phosphate is missing, now energy is gone. Similar to body after an extracurricular activity: feeling tired and need food.

\* Photosynthesis \*

- The process of using light energy to make sugar (glucose)
- Autotrophs (AKA Producers) - Ex: Plants, Algae, + Bacteria
  - All organisms that make their own energy (Self-feeding)
  - Auto = Self, Troph = eating \*opposite of cellular respiration!

Photosynthesis - Converts energy from the sun (light energy) into chemical energy in the form of carbohydrates (glucose).



Photosynthesis - Occurs in 2 stages: Light Reaction & Dark Reaction

- 1) Light Reaction / Light dependant (Requires light)
  - Hydrolysis occurs - Water (H<sub>2</sub>O) broken down to oxygen (O<sub>2</sub>)
  - Occurs in Thylakoids
- 2) Dark Reaction / Light independant Reaction / Calvin Cycle: (Doesn't require light)
  - Takes place in the Stroma, CO<sub>2</sub> (Carbon dioxide) broken apart into glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>)

2 Main Parts of Chloroplast

1) Thylakoids: Look like green pancakes  
 • Light Reaction and Hydrolysis occurs here (Thylakoids)

2) Stroma: Space around the Thylakoids.  
 • Dark reaction occurs CO<sub>2</sub> turns into C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>