

Unit 6: Cellular Respiration - Krebs's Cycle/Electron Transport Notes

(This represents Phase III of the Cell Factory Project)



Respiration (aerobic)

- The process that involves oxygen and breaks down food molecules to release energy.
- Uses the _____ formed in _____ and captures much of the remaining energy from glucose in the form of _____ additional molecules of ATP.
- Takes place inside the _____.
 1. The first set of reactions, the _____, takes place in the area enclosed by the inner membrane.
 2. The second set of reactions, the _____, takes place within the inner membrane.

Krebs's Cycle

- Does not produce a final end product, but is a continuing series of reactions
- Because citric acid is the first compound formed in this series of reactions, the _____ is also known as the _____.

Steps of Krebs's Cycle

1. Pyruvic acid produced during glycolysis travels from the _____ to the _____.
2. Pyruvic acid is broken down into _____ and a 2-carbon compound called _____.
3. Acetic acid, bound to a carrier molecule called _____ (CoA) enters the Krebs's Cycle by reacting with a 4 carbon compound to produce _____, a 6-carbon compound
4. There are _____ reactions and _____ intermediates in the Krebs's Cycle
 - a. At two places in the cycle _____ is released
 - b. At four places in the cycle a pair of high-energy electrons are accepted by electron carriers, changing NAD^+ to NADH and FAD to FADH_2
 - c. At one place in the cycle a molecule of GDP is converted to GTP , the GTP is then combined with ADP to make ATP

Summary of the events of the Krebs's Cycle

- ___ carbon atoms _____ (from the breakdown of pyruvic acid)
- ___ carbon atoms _____ (in 2 molecules of carbon dioxide)
- ___ molecules of _____ converted to _____
- ___ molecule of _____ converted to _____
- ___ molecule of _____ converted to _____, which ultimately gets converted to _____

Electron Transport and ATP Formation

- ❖ An electron transport chain is a series of molecules along which electrons are transferred, releasing energy.

Steps of the Electron Transport Chain

1. Carrier molecules _____ and _____ bring electrons from the reactions of both _____ and the _____ to the electron transport chain located on the inner membranes of _____. At the top of the chain, the electrons have _____. As the electrons pass down the chain, the energy given off is captured in molecules of _____.

2. At the end of the chain is an _____ that combines _____ from the electron transport chain, _____ ions from the fluid inside the cell, and _____ to form _____.

3. As they accept electrons, some of the enzymes in the electron transport chain pump a _____ ion from the inside of the inner membrane to the outside.
 - a. Like in photosynthesis, the movement of hydrogen ions powers the formation of _____ (more H ions outside than inside, charge difference creates energy to make ATP).
 - b. On average, the movement of a pair of electrons down the electron transport chain produces enough energy to _____ molecules from _____.

Answer the following Questions:

1. List the products of the Krebs's Cycle. What happens to each of these products? Explain.

2. Why is this second part of respiration, specifically the electron transport chain, referred to as the “aerobic” phase of respiration?

3. How is electron transport and ATP formation in respiration similar to electron transport and ATP formation in photosynthesis? How are they different? Explain your reasoning.

4. How do the processes of photosynthesis, glycolysis, and Krebs’ cycle/electron transport chain relate to one another? Explain your reasoning. Be complete in your answer.

5. Complete the following:

| <u>Process</u> | <u>Location</u> | <u>Molecules In/Out</u> | <u>Net ATP</u> |
|----------------|-----------------|-------------------------|----------------|
|----------------|-----------------|-------------------------|----------------|

Photosynthesis

Glycolysis

Krebs’ Cycle

Electron Transport