

Define electrochemical gradient. How is it different from a chemical gradient and where is it used in cellular respiration and photosynthesis?

Draw the structure of an ATP molecule using an “A” for adenine and an “R” for ribose.

Where is ATP synthesized in: (Hint: Ignore glycolysis since we haven't covered it yet. There may be more than 1 answer)
Plants?
Animals?
Prokaryotes?
What process is responsible for ATP synthesis in each case?

What is the purpose of ATP?

In the F1 domain of ATP synthase the _____ subunit is responsible for changing the conformation of the _____ and _____ subunits by rotating.

DNP was a commonly used weight loss pill. It was used as an uncoupler that allows protons to freely flow across a membrane, down the electrochemical gradient. Why did this drug help people lose weight? It was later found that this drug was linked to a number of deaths. Why?

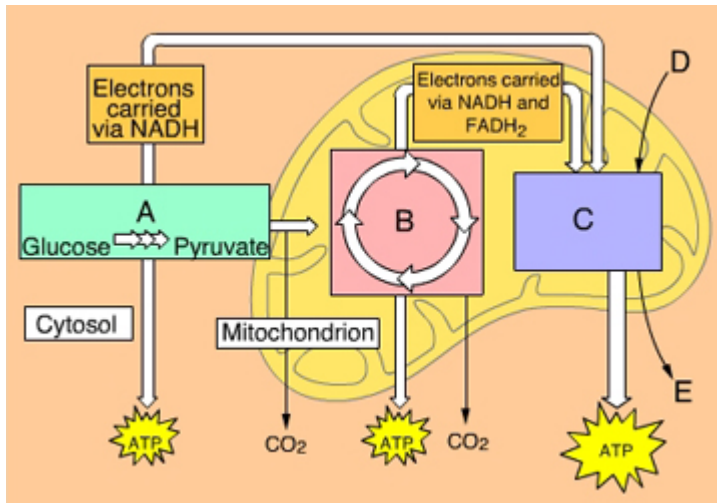
Many newborn mammals are born with a substance called brown fat, this substance is used to generate heat for the organism. How is the ATP synthase protein used in generating heat? (Hint, the answer relates to the question above and to the first law of thermodynamics)

Nigericin is a drug that when added to mitochondria causes the inner membrane to become permeable to K^+ . How does this affect the function of mitochondria.

Define active transport. What is the difference in the mechanism of active transport driven by coupled transport vs ATP.

Where in the mitochondria and/or chloroplast would you likely use: ATP, H^+ , NADH, NADPH, FADH₂, PYRUVATE?

In the diagram below what processes are represent A, B, and C. If D is O_2 what molecule is indicated by E?



Draw a simple diagram of a plant cell and label the compartment(s) where the following reactions occur: b.) Carbon Fixation c.) capture of light energy by photosystems I and II

Answer the following questions about photosynthesis.

- What happens to the energy from a photon of light and how does this energy affect the chlorophyll in the reaction center of photosystem II .
- How many places are protons pumped across the thylakoid membrane into the thylakoid space?
- What is the final acceptor of photosystem I? What is the reduced form of this final acceptor?
- Where is ATP Synthase found?
- What space of the chloroplast is ATP made?
- What powers the production of ATP?
- What substrates must be present to make ATP?
- List the inputs and outputs of the Light and Dark reactions and how they are interconnect?

Question 14-16 in Text page 494

Question 14-22 in Text page 495.

How does the product of cyclic photophosphorylation differ from non-cyclic and why would an organism use cyclic vs. non-cyclic?

What are the inputs and outputs of the chloroplast and the mitochondria? How do they interact?

The electrochemical gradient of H⁺ ions is a necessary component for both mitochondrial and chloroplast function. What produces this gradient and what is its relationship to ATP?

What is the significance of reduced vs. oxidized molecules and what is role they play in ATP synthesis in the mitochondrion?

What is the second law of thermodynamics, and how is it related to the energetic needs of a cell?

What is ATP synthase? Briefly describe the mechanism of ATP synthesis.