

Biology 10 - Introduction to Biology

West Valley College - Norris

Cell Energy: Photosynthesis & Cell Respiration

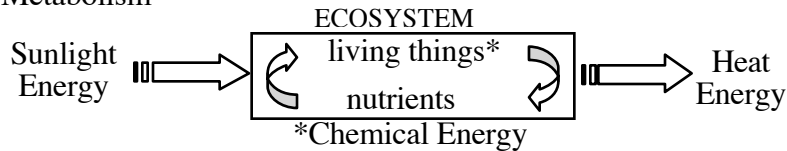
I. Definitions

A. Metabolism

- anabolism
- catabolism

B. Energy

II. The Nature of Metabolism



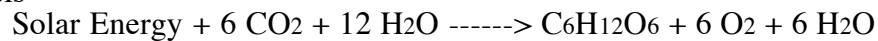
A. Enzymes - catalysts of chemical reactions

B. Adenosine-Tri-Phosphate (ATP) - the energy "currency" of the cell

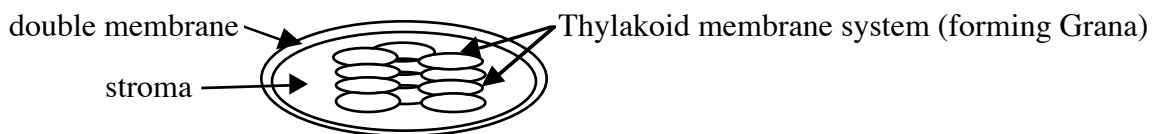
III. Energy Acquiring Pathways

A. Chemosynthesis

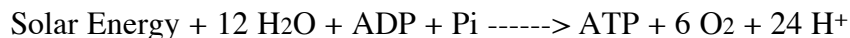
B. Photosynthesis



Chloroplast Structure:



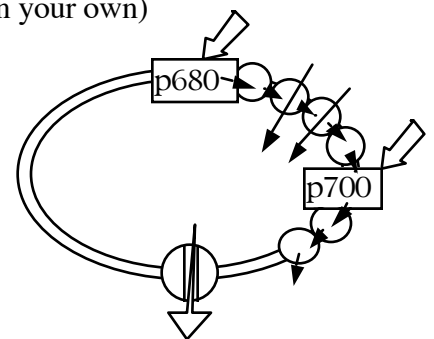
1. Light-Dependent Reactions



a. Absorption of Energy

i. Pigments and the Visible Spectrum (ROY G BIV)

b. Transfer of Energy - Cyclic Pathway Illustrated: (try to label on your own)



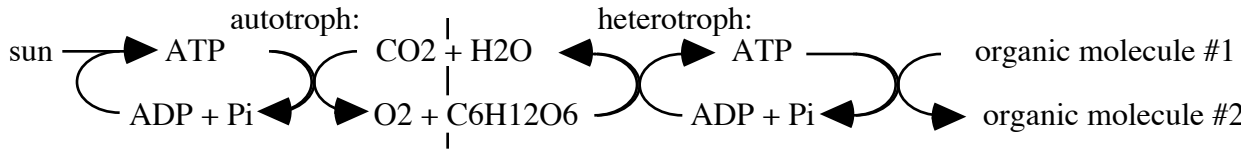
2. Light-Independent Reactions ("Dark" reactions)



a. Calvin-Benson Cycle

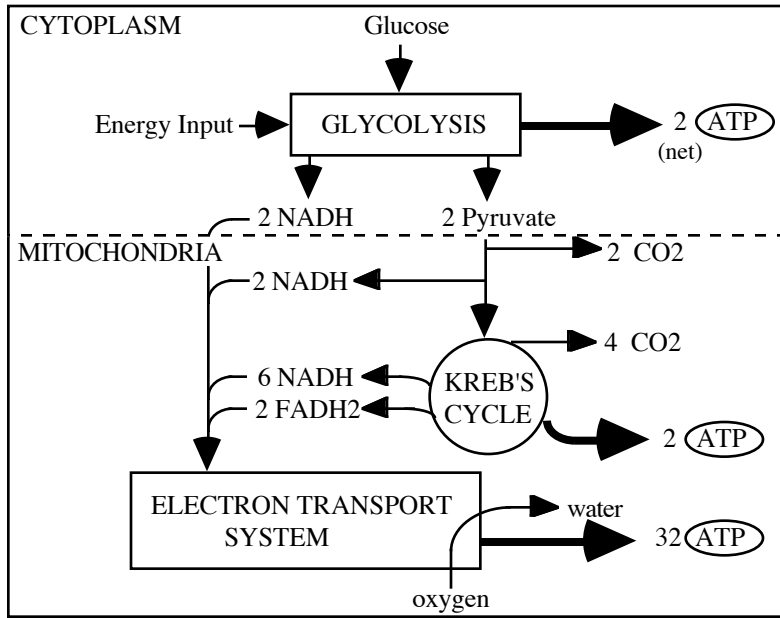
IV. Energy Releasing Pathways

general: $Solar\ Energy + CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O + Energy$



A. Aerobic Energy Releasing Pathways (Aerobic Respiration)

"Fuel" $(C_6H_{12}O_6) + O_2 \rightarrow CO_2 + H_2O + Energy$



1. Glycolysis

reactants:

products:

2. Kreb's Cycle (aka Citric Acid Cycle, TriCarboxylic Acid cycle (TCA))

reactants:

products:

3. Electron Transport System (ETS)

reactants:

products:

B. Anaerobic Energy Releasing Pathways

1. Alcoholic Fermentation

2. Lactate Fermentation

V. Additional Selected Key Terms

aerobic	anaerobic	ATP	carbon fixation	carotenoids	chlorophyll	electron
FAD	fermentation	glycolysis	NAD	pigment	photolysis	
photosystem	stroma	thylakoid				

Study Questions – Cell Energy:

1. Compare and contrast “anabolism” and “catabolism”.
2. Describe the 1st and 2nd laws of thermodynamics.
3. Compare and contrast “potential” and “kinetic” energy.
4. Define “activation energy”.
5. Describe the characteristics of enzymes.
6. Describe how enzymes effect chemical reactions.
7. Explain the significance of ATP.
8. Define “photosynthesis”.
9. What is a “pigment”? What do “pigments” do? Where specifically are the photosynthetic “pigments” found?
10. Describe the structure of chloroplasts.
11. Why are leaves green?
12. Where do the “light dependent” reactions occur in the cell?
13. What occurs during the “light dependent” reactions of photosynthesis? What is needed for the “light dependent” reactions to occur and what are the products of this reaction?
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15. What occurs during the “light independent” reactions of photosynthesis? What is needed for the “light independent” reactions to occur and what are the products of this reaction?
16. What are the three major steps in aerobic respiration?
17. Describe “glycolysis”. Where in the cell does this metabolic step occur, what are the reactants needed for it to occur, and what are its products?
18. What are the different names for the “citric acid cycle”?
19. Describe the “citric acid cycle”. Where in the cell does this metabolic step occur, what are the reactants needed for it to occur, and what are its products?
20. Describe the “electron transport system”. Where in the cell does this metabolic step occur, what are the reactants needed for it to occur, and what are its products?
21. Compare and contrast the “light dependent” reactions of photosynthesis and the “electron transport system” of aerobic respiration.
22. Why is “aerobic respiration” given the name “aerobic respiration”?
23. What is the final step in “aerobic respiration”?
24. What is the function of NAD in “aerobic respiration”?
25. Compare and contrast “aerobic respiration” and “anaerobic respiration”.
26. Describe the two different forms of “anaerobic respiration”. What are the products of each?

“In all things of nature there is something of the marvelous.”
Aristotle (384 BC - 322 BC)