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Course/Section _____

Date _____

Professor/TA _____

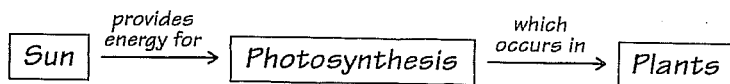


Activity 8.1 What factors affect chemical reactions in cells?

Construct a concept map of general metabolism using the terms in the list below. Keep in mind that there are many ways to construct a concept map.

- Begin by writing each term on a separate Post-it note or piece of paper.
- Then organize the terms into a map that indicates how the terms are associated or related.
- Draw lines between terms and add action phrases to the lines to indicate how the terms are related.
- If you are doing this activity in small groups in class, explain your map to another group when you finish it.

Here is an example:



Terms

peptide bonds

proteins

α helix

primary structure

secondary structure

tertiary structure

β pleated sheet

R groups

hydrogen bonds

substrate or reactant
(ligand)

activation energy

ΔG / free energy

endergonic

exergonic

enzymes

catalysts

competitive inhibitor

noncompetitive inhibitor

active site

product

allosteric regulation

activator

four-step enzyme-mediated
reaction sequence or
metabolic pathway

(A \rightarrow B \rightarrow C \rightarrow D)

intermediate compound

end product

feedback inhibition

Use the understanding you gained from doing the concept map to answer the questions.

1. Reduced organic compounds tend to contain stored energy in C—H bonds. As a general rule, the greater the number of C—H bonds, the greater the amount of potential energy stored in the molecule. Answer each question in the chart as it relates to the two reactions shown at the top. Be sure to explain the reasoning behind your answers.

	Reaction 1: $\text{CH}_4 + 2 \text{O}_2 \rightarrow 2 \text{H}_2\text{O} + \text{CO}_2$ (methane)	Reaction 2: $6 \text{CO}_2 + 6 \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2$
a. Is the reaction exergonic or endergonic?		
b. Is the reaction spontaneous?		
c. Is the reaction anabolic or catabolic?		
d. Is ΔG (the change in free energy) positive or negative?		

2. All metabolic reactions in living organisms are enzyme-mediated. Each enzyme is specific for one (or only a very few similar types of) reaction. Given this, there are approximately as many different kinds of enzymes as there are reactions.

- a. What characteristics do all enzymes share?

- b. What characteristics can differ among enzymes?

3. How can enzyme function be mediated or modified? To answer, complete a and b below.

a. What factors can modify enzyme function?	b. What effect(s) can each of these factors have on enzyme function?

c. What role(s) can modification of enzyme function play in the cell?