

Name _____

Course/Section _____

Date _____

Professor/TA _____

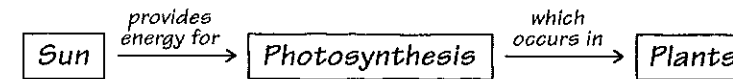


Activity 8.1 What factors affect chemical reactions in cells?

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 sticky 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	activation energy	activator
proteins	ΔG / free energy	four-step enzyme-mediated reaction sequence or metabolic pathway (A \rightarrow B \rightarrow C \rightarrow D)
α helix	endergonic	intermediate compound
primary structure	exergonic	end product
secondary structure	enzymes	feedback inhibition
tertiary structure	catalysts	
β pleated sheet	competitive inhibitor	
R groups	noncompetitive inhibitor	
hydrogen bonds	active site	
substrate or reactant (ligand)	product	
	allosteric regulation	

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: $\text{CH}_4 + 2 \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{CO}_2$ (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.
- What characteristics do all enzymes share?
 - What characteristics can differ among enzymes?

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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?