Energy and Chemical Reactions

Name _____

Part 1: The Chemical Reaction of Ethanol

The overall reaction formula of combustion of ethanol is: $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$

1. What is the amount of energy needed to start a reaction called?

2. Where does the energy to start the combustion of ethanol come from?

Use the lab kit, and the instructions on the lab placemat, to model the reaction and fill in the data:

How many…	Reactants		→	Products	
	___ C_2H_5OH	___ O_2		___ CO_2	___ H_2O
Carbons?					0
Hydrogens?	6				
Oxygens?				4	
High energy bonds?					

1. Matter:

a. How many total carbons are in the **reactants**? _____ How many total carbons are in the **products**? _____

How many total hydrogens are in the **reactants**? _____ How many total hydrogens are in the **products**? _____

How many total oxygens are in the **reactants**? _____ How many total oxygens are in the **products**? _____

b. Write a summarizing statement about what happens to MATTER during chemical reactions:

2. Energy:

a. How much energy (number of twist ties) was **stored** in the reactants? _____

b. How much energy (number of twist ties) was **stored** in the products? _____

c. What happened to the energy?

d. Write a summarizing statement about what happens to ENERGY during chemical reactions:

3. How are matter and energy related?

4. What is the original source of ALL energy in living systems?

5. How does this energy ***flow into*** **living systems**?

Part 2: The Chemical Reaction of Photosynthesis

The overall reaction formula for photosynthesis is: $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

1. What are the reactants of photosynthesis?

2. What are the products of photosynthesis?

Use the lab kit to model photosynthesis. START WITH THE PRODUCTS AND WORK BACKWARDS TO THE REACTANTS:

How many…	Reactants		→	Products	
	___ CO_2	___ H_2O		___ $C_6H_{12}O_6$	___ O_2
Carbons?	6				0
Hydrogens?		12			
Oxygens?					
High energy bonds?					

3. Matter:

a. Why does the reaction have to start with 6 molecules of carbon dioxide?

b. Where does the matter for photosynthesis come from?

4. Energy:

a. How many high energy bonds were there in the reactants?

b. **Where does the energy for photosynthesis come from?**