Understanding Exothermic and Endothermic Reactions

Name: _____ Date: _____

When calcium carbonate ($CaCO_3$) breaks down into calcium oxide (CaO) and carbon dioxide (CO_2), energy is absorbed from the environment. As energy is taken from the environment, it is an **endothermic** reaction. The equation for the reaction is:

$$CaCO_3 + energy \rightarrow CaO + CO_2$$

1. Describe the difference between an exothermic and an endothermic reaction.

2. Where does the energy come from for an endothermic reaction?

3. Match the words to the correct definitions:

1. Exothermic	A. Absorbs energy from the surroundings.
2. Endothermic	B. Releases energy to the surroundings.

4. Identify the reactants and products in the following equation:

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g) + \text{energy}$$

Reactants: _____
Products: _____

a) Is this reaction exothermic or endothermic?

b) Why?

c) You perform this experiment in a beaker. What would you observe when you touch the beaker?

5. Imagine you mix two chemicals in a lab, and the temperature of the mixture decreases. Would you classify the reaction as exothermic or endothermic? Explain your reasoning.

Activation energy is the minimum amount of energy required to start a chemical reaction. It is like an energy barrier that reactants must overcome to transform into products. For a reaction to occur, the molecules involved must collide with enough energy to overcome this barrier. This is normally done by heating the reactants.

Identify the reactants, products and write the word equations.

1. Hydrogen gas reacts with oxygen gas to produce water.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____

2. Methane burns in oxygen gas to give carbon dioxide and water.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____

3. When nitrogen gas combines with hydrogen gas, ammonia is formed.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____

4. Potassium reacts violently with chlorine gas to produce potassium chloride.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____

5. Calcium oxide reacts with carbon dioxide to form calcium carbonate.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____

6. Hydrogen peroxide decomposes to produce water and oxygen gas.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____

7. Sodium reacts with water to produce sodium hydroxide and hydrogen gas.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____

8. When lead(II) nitrate reacts with potassium iodide, potassium nitrate and lead(II) iodide are produced.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____

9. Silver nitrate combined with sodium chloride results in the formation of silver chloride and sodium nitrate.

   Identify reactants: _____

   Identify products: _____

   Word equation: _____