

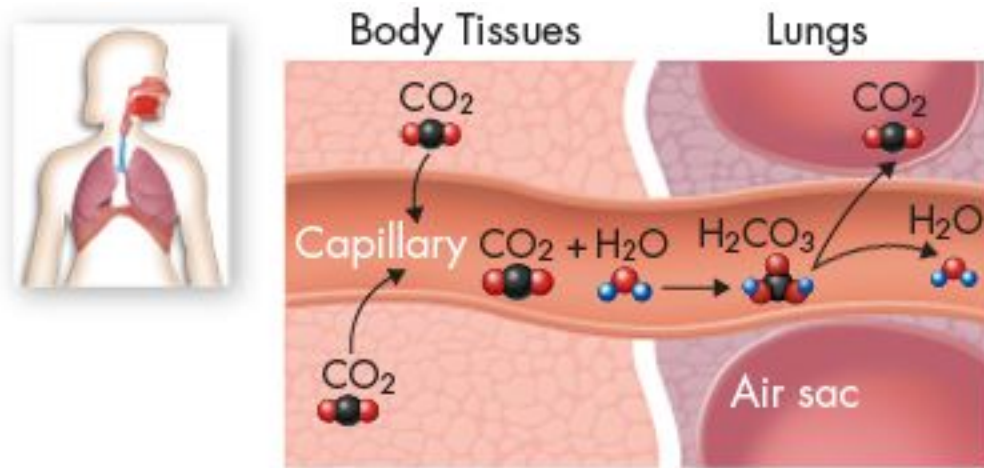
Chemical Reactions

Chemical Reactions

- A **chemical reaction** is a process that changes, or transforms, one set of chemicals into another by changing the **chemical bonds** that join atoms in compounds.
- The elements or compounds that enter into a chemical reaction are known as **reactants**.
- The elements or compounds produced by a chemical reaction are known as **products**.

Chemical Reactions

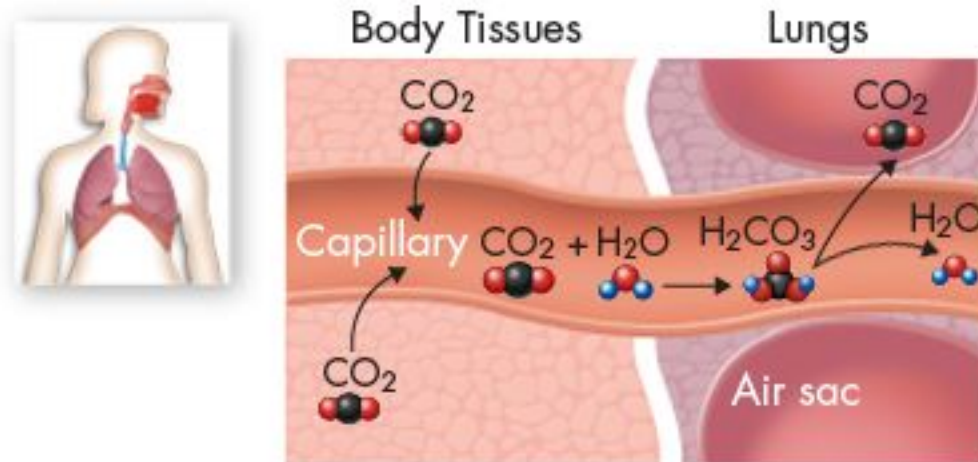
An important chemical reaction in your bloodstream enables carbon dioxide to be removed from the body.



Chemical Reactions

As it enters the blood, carbon dioxide (CO_2) reacts with water (H_2O) to produce carbonic acid (H_2CO_3), which is highly soluble.

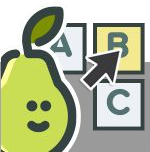
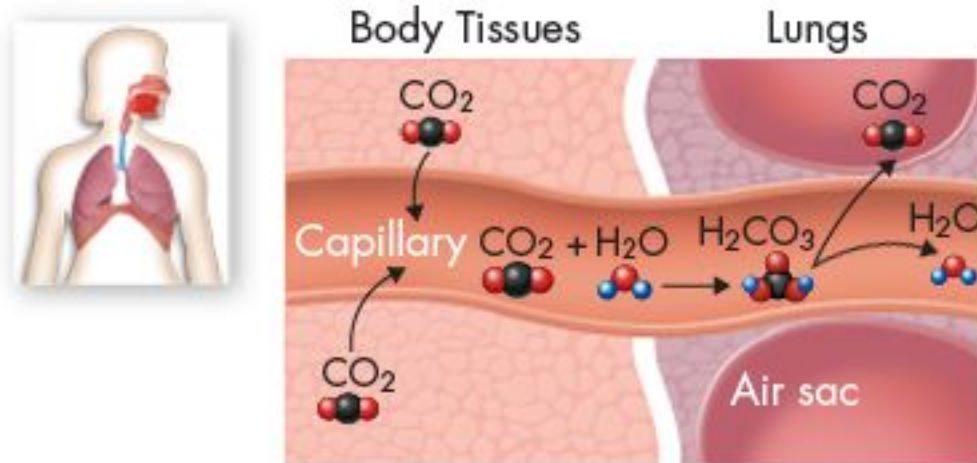
This chemical reaction enables the blood to carry carbon dioxide to the lungs.



Chemical Reactions



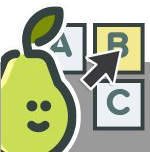
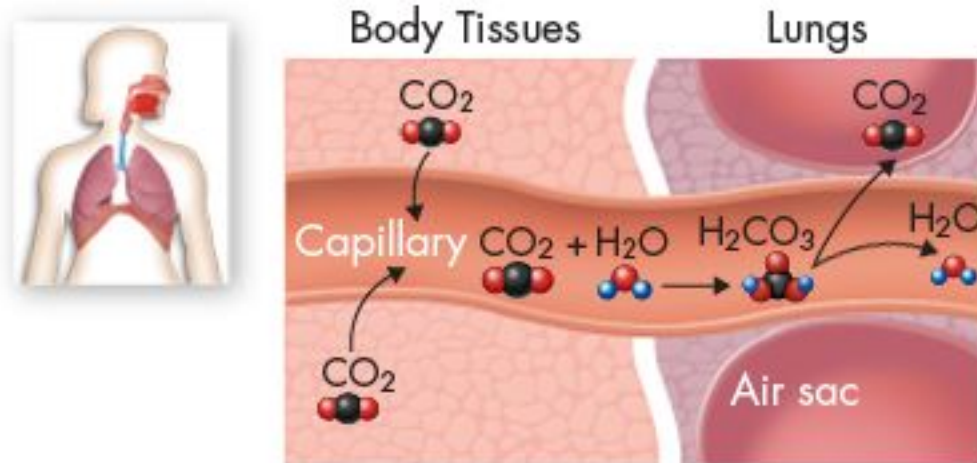
Identify the reactant(s).



Chemical Reactions

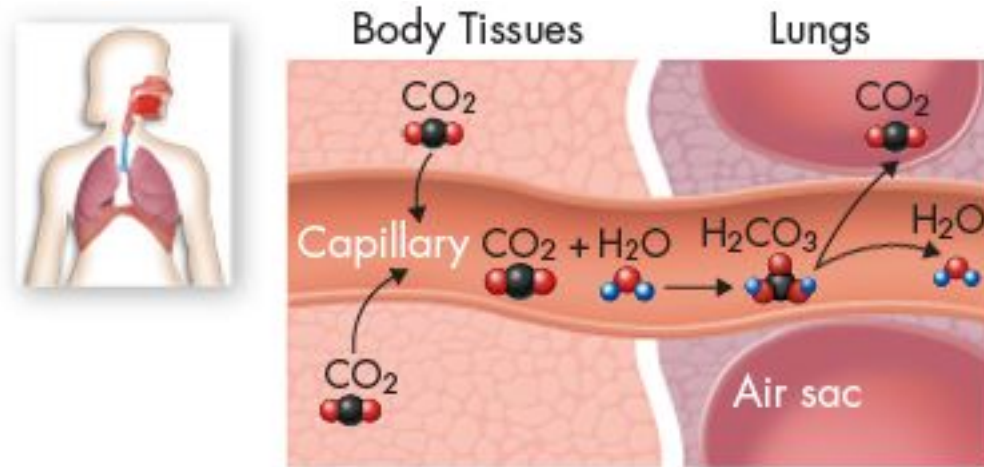


Identify the product(s).

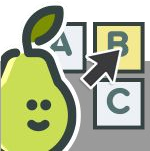


Chemical Reactions

In the lungs, the reaction is reversed and produces carbon dioxide gas, which you exhale.

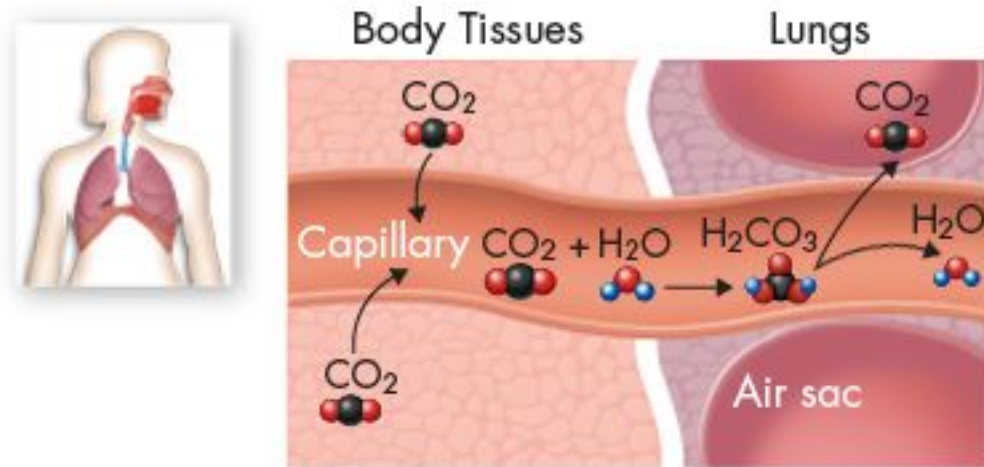


Identify the reactant(s).

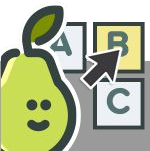


Chemical Reactions

In the lungs, the reaction is reversed and produces carbon dioxide gas, which you exhale.



Identify the product(s).



Energy Changes

- Some chemical reactions **release energy**, and other reactions **absorb energy**.
- Chemical reactions that release energy often occur on their own, or spontaneously.
- Chemical reactions that absorb energy will **NOT** occur without a source of energy.

Energy Changes

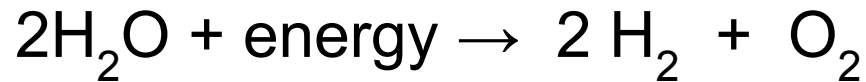
An example of an energy-releasing reaction is the burning of hydrogen gas, in which hydrogen reacts with oxygen to produce water vapor.



The energy is released in the form of heat, and sometimes—when hydrogen gas explodes—light and sound.

Energy Changes

The reverse reaction, in which water is changed into hydrogen and oxygen gas, absorbs energy.



The only practical way to reverse the reaction is to pass an electrical current through water

Thus, in one direction the reaction produces energy, and in the other direction the reaction requires energy.

Energy Sources

Every organism must have a source of energy to carry out the chemical reactions it needs to stay alive.

Plants get energy through photosynthesis

Animals get energy by eating plants/animals

Humans release energy by metabolizing, or breaking down, digested food.

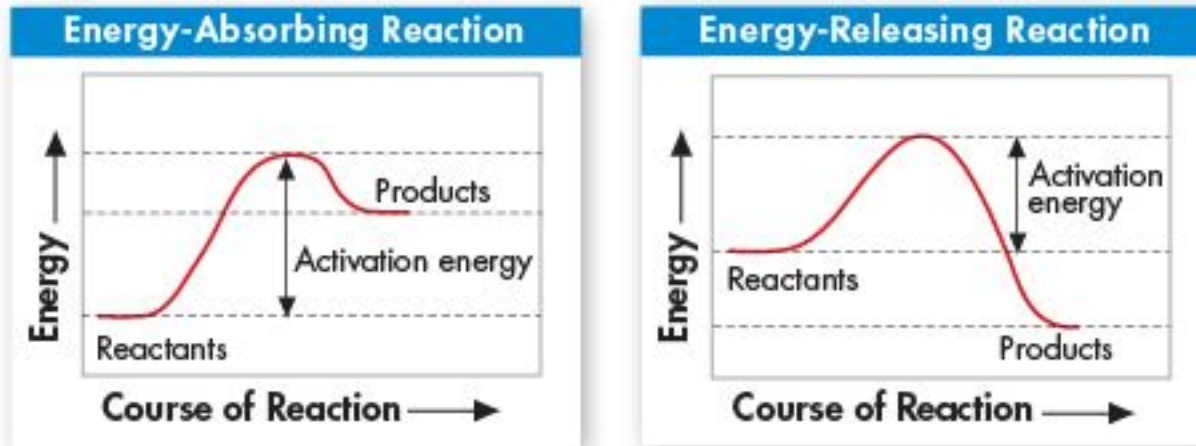
Activation Energy

The energy that is needed to get a reaction started is called the **activation energy**.

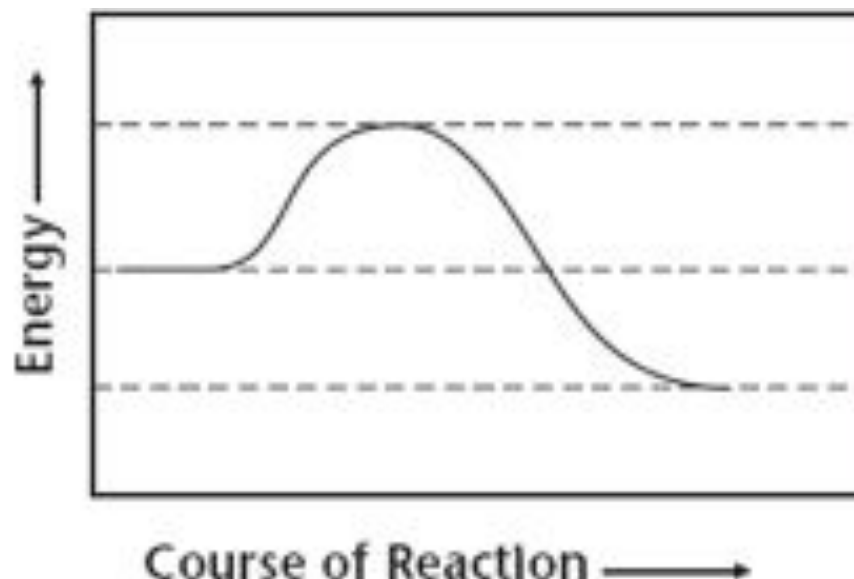
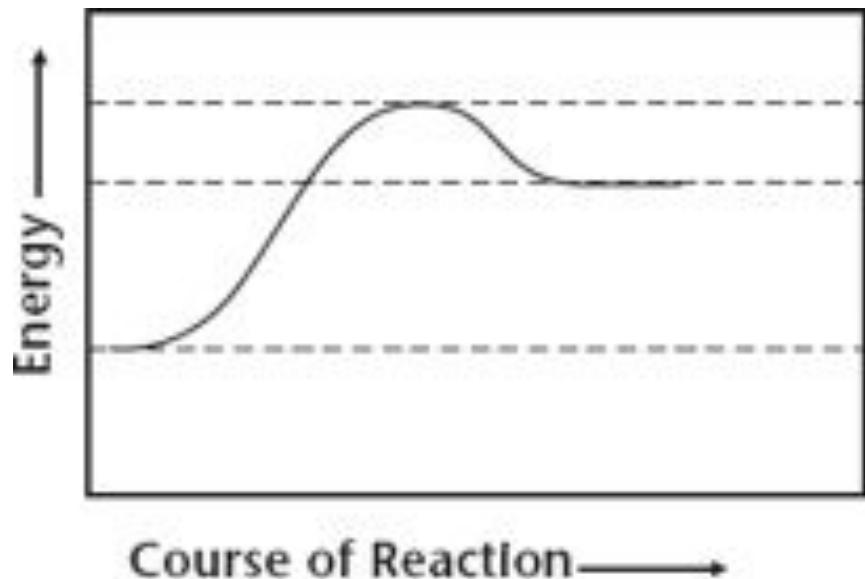
Activation Energy

The **peak** of each graph represents the energy needed for the reaction to go forward.

The **difference** between the required energy and the energy of the reactants is the activation energy.

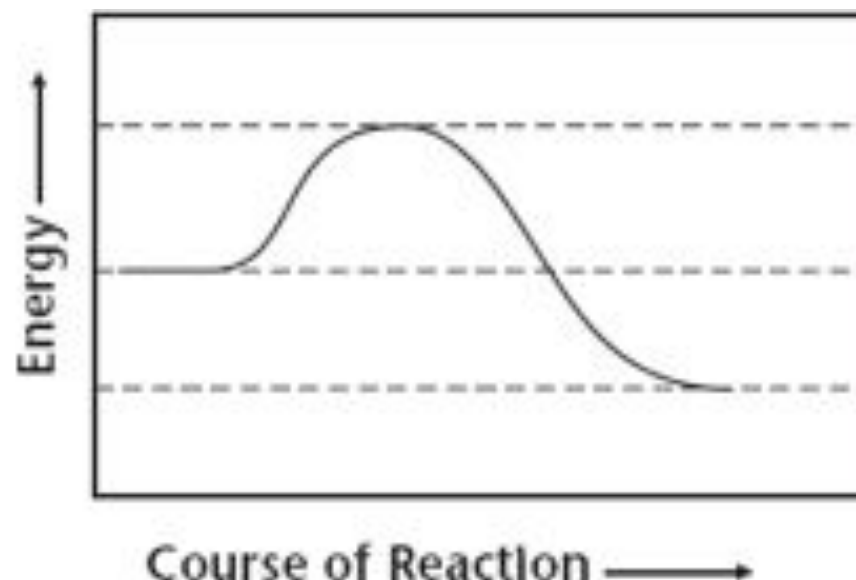
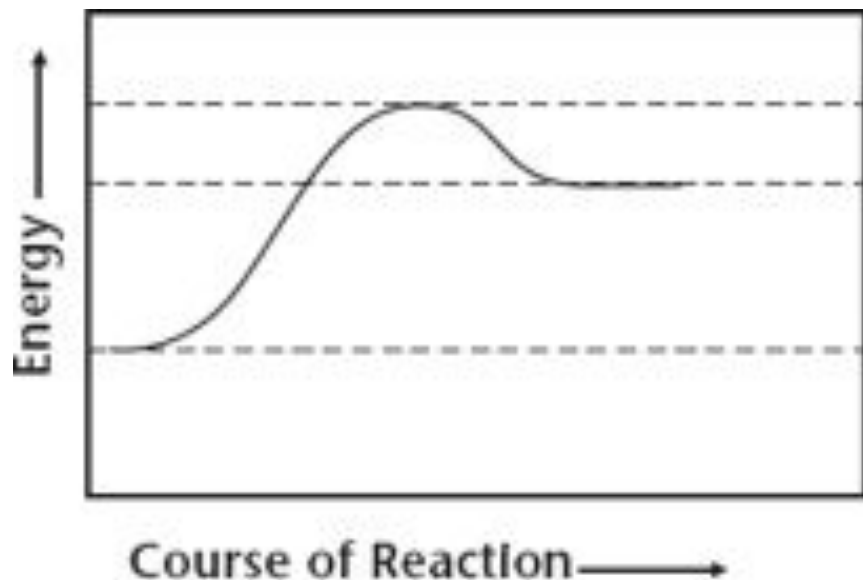


Label the energy level for the reactants in the following chemical reactions.



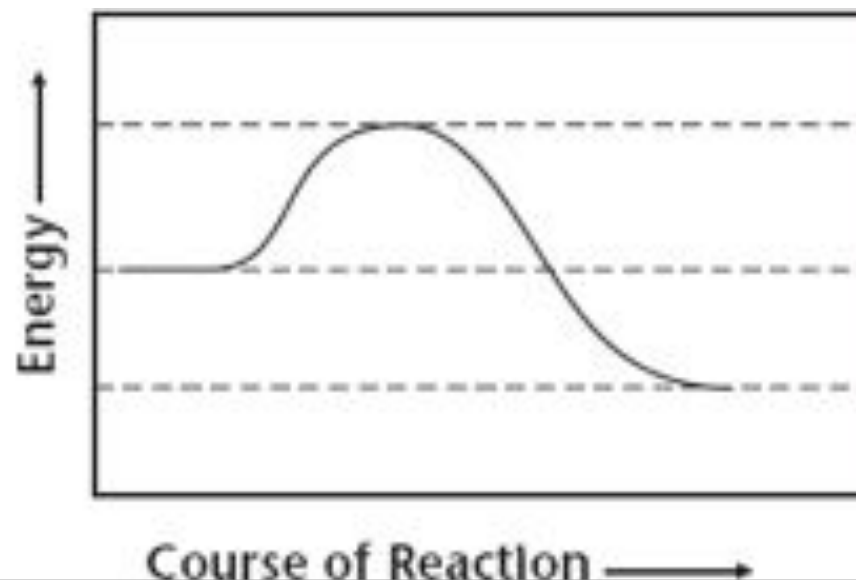
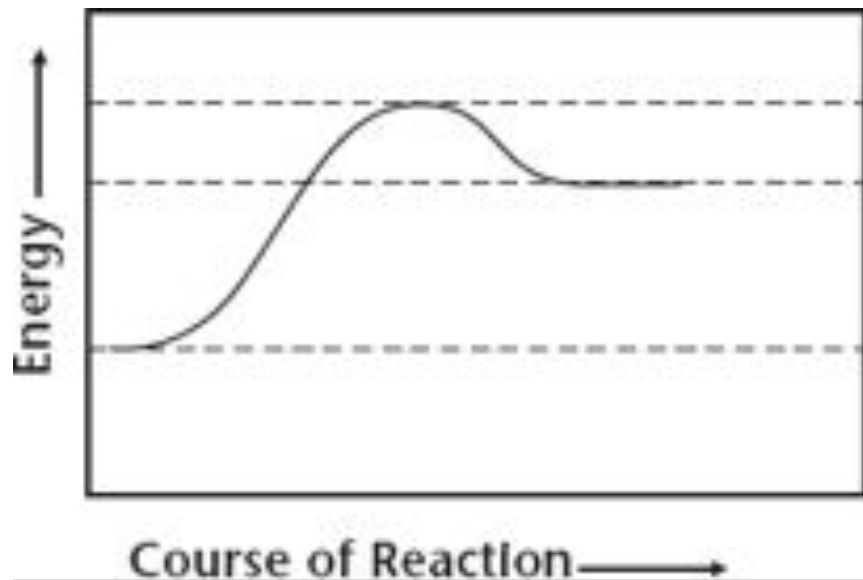
Students, draw anywhere on this slide!

Label the energy level for the products in the following chemical reactions.



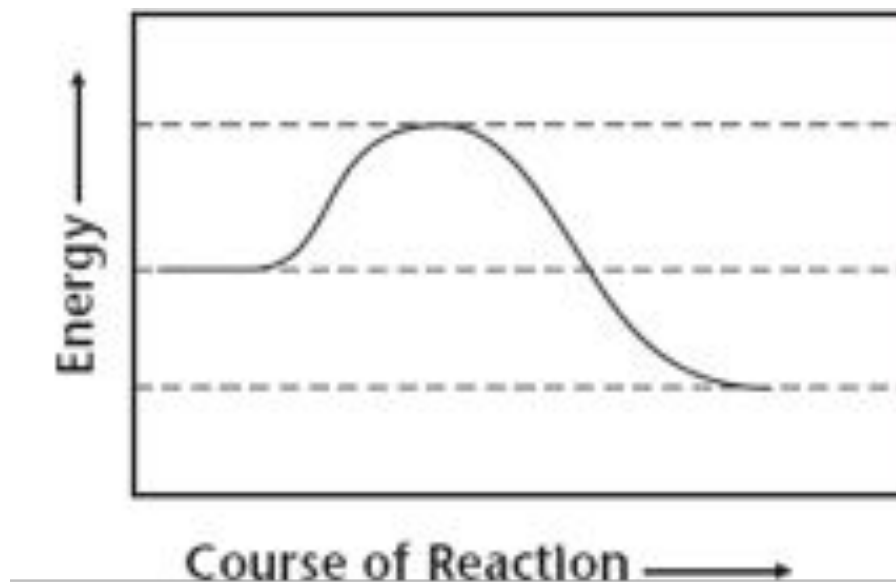
Students, draw anywhere on this slide!

Label the activation energy in the following chemical reactions.

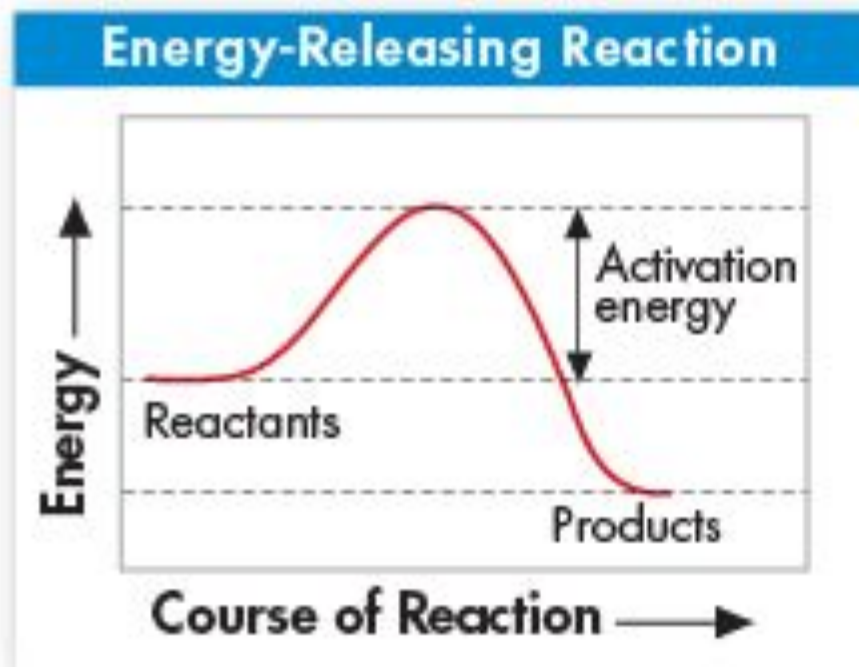


Students, draw anywhere on this slide!

Identify the type of chemical reaction.

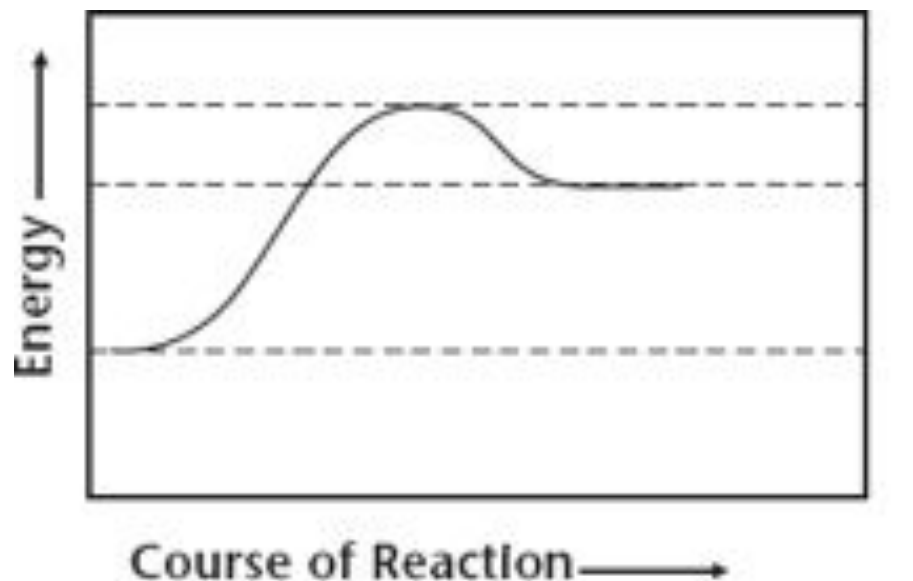


Energy-Releasing Reaction

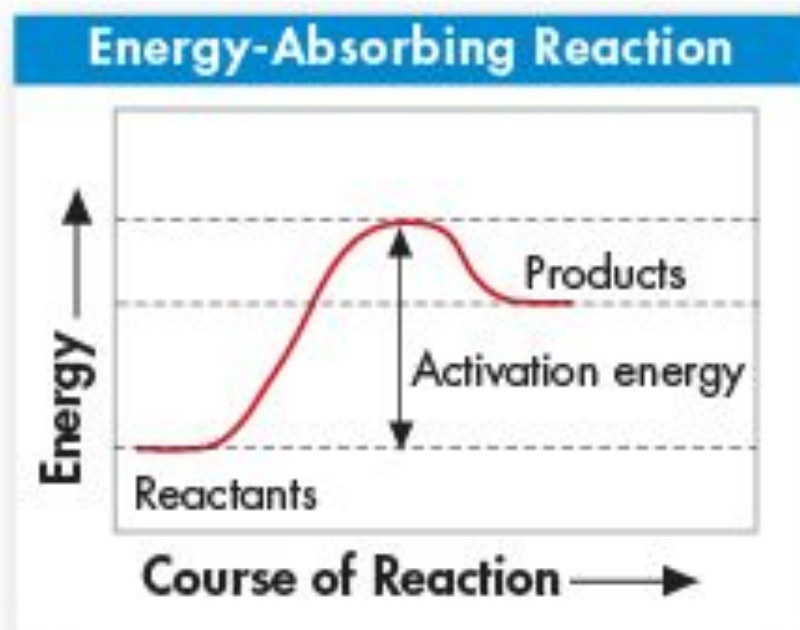


Exothermic Reaction = Energy is released when the products contain less energy than the reactants.

Identify the type of chemical reaction.



Energy-Absorbing Reaction



Endothermic Reaction = Energy is absorbed when the products contain more energy than the reactants