

# Chemical Processes: Energy and Factors Affecting Chemical Reactions



# Key Terms

- Catalyst
- Rate of reaction
- Surface area
- Rate of reaction
- Endothermic
- Exothermic

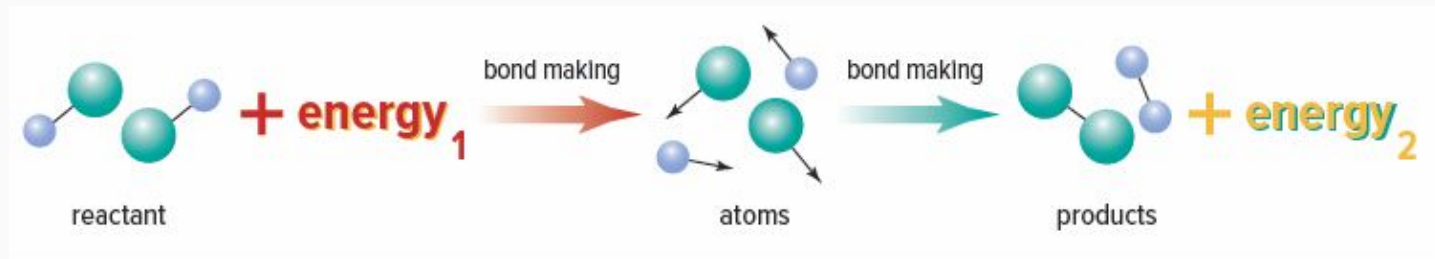
# Energy affecting chemical reactions

- **Activation energy:** minimum amount of energy needed for a reaction to happen
- Reactants must collide with enough energy to break bonds for a chemical reaction to occur.
- Energy transfers between the *system* and the *surroundings*:
  - Energy that leaves the system enters the surroundings.
  - Energy that enters the system came from the surroundings.

# Exothermic and Endothermic Reactions

**Exothermic reaction:** a chemical reaction in which there is net release of energy to the surroundings

**Endothermic reaction:** a chemical reaction in which there is net absorption of energy from the surroundings

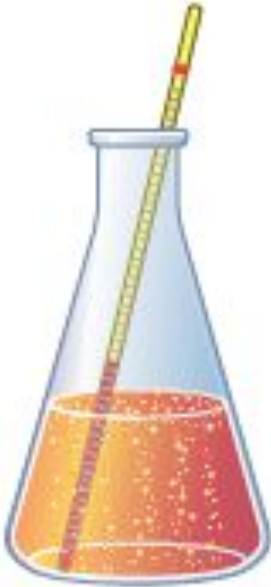


When  $\text{energy}_2$  is greater than  $\text{energy}_1$  = exothermic.

When  $\text{energy}_1$  is greater than  $\text{energy}_2$  = endothermic.

# Measuring Energy Changes

A



**EXOTHERMIC**

Temperature  
increases with  
reaction

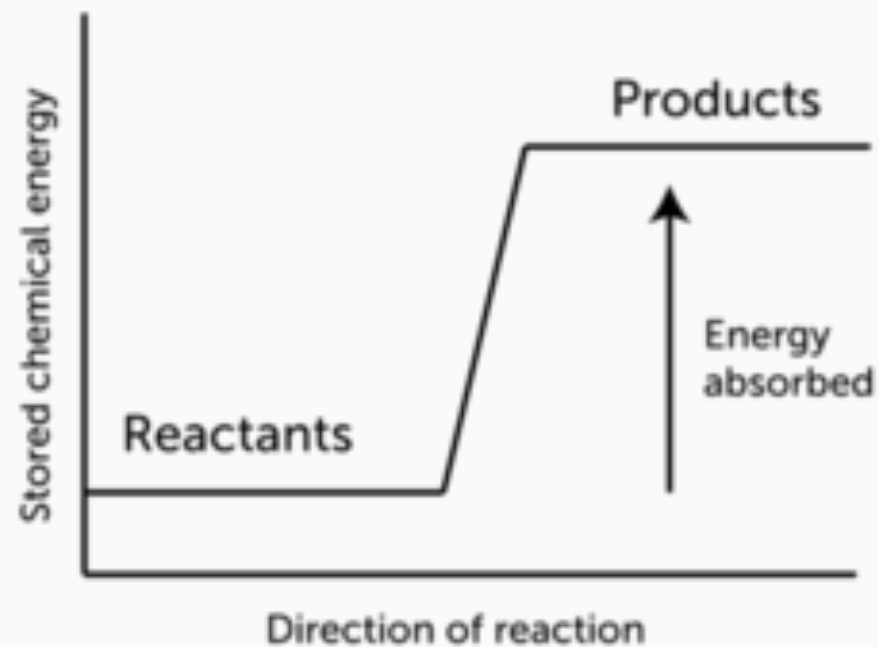
B



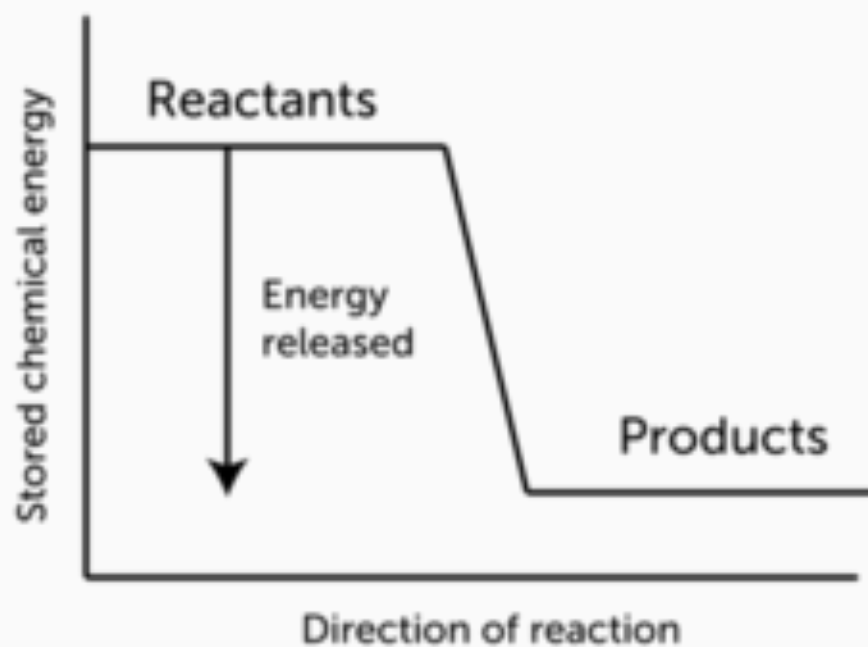
**ENDOTHERMIC**

Temperature  
decreases with  
reaction

## Endothermic Reaction



## Exothermic Reaction



# Factors Affecting the Rate of a Chemical Reaction

## 1. **Temperature:**

Heating causes atoms and molecules of the reactants to move more quickly resulting in more collisions and more energy. An increase in temperature results in an increase in reactions rate.

## 2. **Concentration:**

The greater the concentration the greater the chance of collision between atoms/molecules. An increase in concentration results in an increase in reaction rate.

### 3. **Surface Area:**

The more surface area available, the faster the reaction rate.

### 4. **Catalyst:**

A substance that speeds up the rate of a chemical reaction without being used up in the reaction. A catalyst is not included when we write out a chemical equation. Enzymes are an example of a catalyst in biological systems.



# Practice

- select the button from the website for practice questions

[https://docs.google.com/document/d/e/2PACX-1vSMIadBvnXSPmJC\\_Hd9eOYyA8Im4CXbqxt40cvnK93zQcswakhWkeVzUyr3VV7xtcJJJ8wiNHbG9Dk6/pub](https://docs.google.com/document/d/e/2PACX-1vSMIadBvnXSPmJC_Hd9eOYyA8Im4CXbqxt40cvnK93zQcswakhWkeVzUyr3VV7xtcJJJ8wiNHbG9Dk6/pub)

- BC Science 10 connections AT ISSUE- page 146 in Science 10
  - Choose one of the dig deeper questions to investigate
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