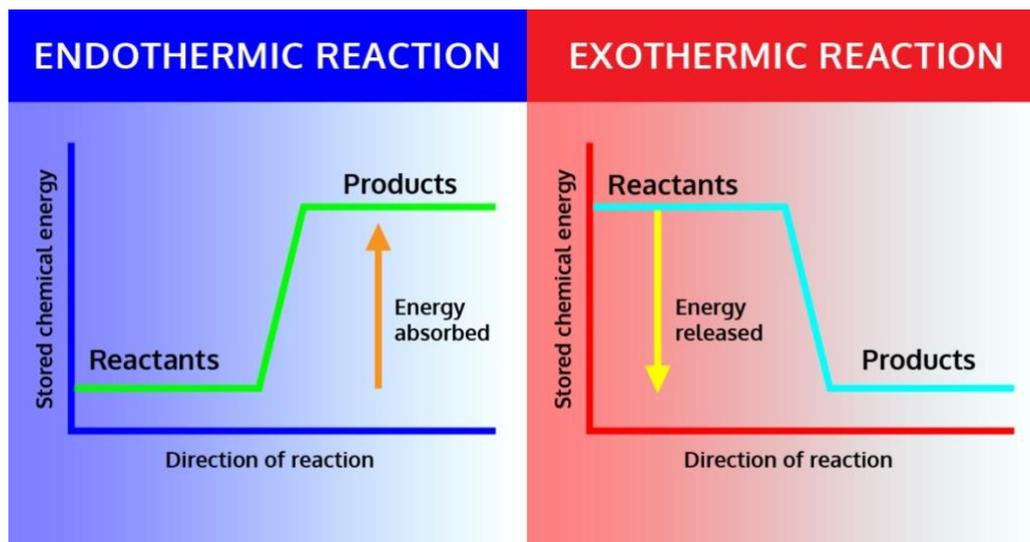


Bond Energy and the Types of Reactions Lab

Exothermic or Endothermic?

Background Information and Theory:

During a chemical reaction, energy is either transferred to or from its surroundings. Reactions which involve heat energy being released into the surrounding environment are called exothermic reactions. By contrast, endothermic reactions draw heat energy from their surroundings. This causes the temperature of the surrounding environment to decrease.



Curriculum Link:

- **HS-PS1-4.** Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Objectives:

- Accurately read temperatures on a thermometer
- Classify a reaction as exothermic or endothermic based on observation.
- Draw energy level diagrams to represent endothermic and exothermic reactions

What you'll need:

- Test tubes
- Thermometers
- Reagents : Hydrochloric acid (0.5M), magnesium ribbon, ammonium nitrate, sulfuric acid (0.5M), iron filings, sodium carbonate, ethanoic acid (0.5M),
- Distilled water

What to do:

1. Measure 3ml of reactant 1 into a clean test tube.
2. Place thermometer into the test tube and record the initial temperature.
3. Add 3ml of reactant 2 and watch the reaction for 1 minute (approximately) before recording the final temperature.
4. Calculate the change in temperature

Name: _____ Period: _____ Date: _____

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5. Classify the reaction as endothermic or exothermic.

Reaction	Reactant 1	Reactant 2	Initial temperature (°C)	Final temperature (°C)	Change in Temperature (°C)	Endothermic or Exothermic?
1	Hydrochloric acid (0.5M)	Magnesium ribbon				
2	Water	Ammonium nitrate				
3	Sulfuric acid(0.5M)	Iron filings				
4	Water	Sodium carbonate				
5	Ethanoic acid (0.5M)	Sodium carbonate				

Post-lab Analysis

1. Write the balanced chemical equations for each of the five reactions from the lab.
2. Draw an energy profile diagram for the reaction between ethanoic acid and sodium carbonate.
3. Draw an energy profile diagram for the reaction between hydrochloric acid and magnesium ribbon.

Questions

1. Using the terms “breaking and making bonds”, explain the net energy change for the chemical reaction between ethanoic acid and sodium carbonate.
4. Using the terms “breaking and making bonds”, explain the net energy change for the chemical reaction between hydrochloric acid and magnesium ribbon.
2. How might you use exothermic or endothermic processes to solve a real-world problem? Are there any instances when it would be useful to quickly make something hot or cold? Explain how it is useful to know which processes absorb or release energy.