

Name: _____ Class: _____ Date: _____

Endothermic & Exothermic Reactions

Learner Outcomes:

- Observe and describe patterns of chemical change by:
 - o Observing heat generated or absorbed in chemical reactions and identifying examples of endothermic and exothermic reactions.

Key Terms:

Endothermic

Energy

Produces

Exothermic

Reactants

Background Information: Chemical reactions involve the forming and breaking of chemical bonds. Each time a bond is broken or formed there is a release or absorption of energy that was or is stored within the bonds. The sum of all of these small energy changes determines whether a reaction will be overall endothermic or exothermic.

Research Question: How is heat generated or absorbed in chemical reactions?

Materials:

Stopwatch

50 mL graduated

Steel wool

100 mL Beaker

cylinder

Plastic baggie

Thermometer

Baking soda

Index card

Plastic scoop (5 mL)

Vinegar

Part One - Baking Soda and Vinegar

1. Put 20 mL of vinegar into the plastic Zip-Lock baggie. Set the bag into the 100 mL beaker so it doesn't spill. Record the temperature of the vinegar in the bag.
2. Measure out 2 scoops of baking soda onto the index card.
3. Pour the baking soda into the Zip-Lock with the vinegar and start the timer.

4. Squish the bag to mix the two reactants and record the temperature every 3 seconds for 30 seconds.

Observations:

Title:

Time (s)	0	3	6	9	12	15	18	21	24	27	30
Temp (°C)											

Analysis:

1. What was the highest / lowest temperature reached?
2. Is this reaction Endothermic or exothermic? Why?
3. What has more energy, the chemical reactants or the chemical products?
4. How do you know?
7. Where is the energy stored in this reaction?

Part Two - Steel Wool and Vinegar

Procedure:

1. Add 40 mL of vinegar to a clean, dry 100 mL beaker. Record the temperature of the vinegar.
2. Separate a sample of steel wool about the size of a small egg and place it in the beaker with the vinegar. Be sure all the steel wool is covered and start the stopwatch.
3. Record the temperature of the steel wool and vinegar mixture every 30 seconds for about 5 minutes. Record your observations.

Observations:

Title:

Time (s)	0	30	60	90	120	150	180	210	240	270	300
Temp (°C)											

Part Two Lab Questions

1. Is this reaction Endothermic or exothermic? Why?
2. What has more energy, the chemical reactants or the chemical products?
3. How do you know?
7. Where is the most energy stored in this reaction?

Conclusion:

Extension:

1. List as many possible uses for these types of reactions (endothermic and exothermic) as you can and explain how the change in energy is used.
2. Identify 3 examples of endothermic reactions and 3 examples of exothermic reactions that you might encounter in your daily life.