

## MINILAB 6.1 Energy changes pg. 196

All chemical reactions involve an energy change. This change may be so slight that it can be detected only with sensitive instruments, or it may be quite noticeable. In today's lab, you will make hot and cold packs, similar to the types that are commercially available. If a process releases energy, it is termed exothermic (energy will be a product). If a process absorbs energy, it is termed endothermic (energy will be a reactant). Releasing energy causes the surrounding to become warmer, and absorbing energy causes the surroundings to become cooler. Both physical and chemical changes can involve the transfer of energy.

**Purpose:** Students will feel the heat given off during an exothermic reaction and the cooling of an endothermic reaction.

**Hypothesis:**

**Materials:** iron powder, NaCl, resealable plastic bags, H<sub>2</sub>O, activated charcoal, graduated cylinder, balance, vermiculite, thermometer, CaCl<sub>2</sub>, NaHCO<sub>3</sub>(baking soda), NH<sub>4</sub>NO<sub>3</sub>, KBr, NaOCl (bleach), Na<sub>2</sub>SO<sub>3</sub>, Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>, NH<sub>4</sub>SCN, Ba(OH)<sub>2</sub> X 8H<sub>2</sub>O, CaO, FRH'S, The Heat Solution, NaC<sub>2</sub>H<sub>3</sub>O<sub>2</sub> X 3H<sub>2</sub>O

Each group will need 11 baggies.

**BRING A BOX OF BAGGIES FOR 5 POINTS EXTRA CREDIT**

## PROCEDURE



### Part A chemical

1. Place 25 g of iron powder and 7 g of NaCl in a resealable plastic bag.

Record description of contents in observation table.

2. Add 10 g of vermiculite to the bag, seal the zipper, and shake the bag to mix the contents.

3. **Crush** 5 grams of charcoal and add to the bag.

4. **Measure** 5 mL of water with graduated cylinder and record its water temperature. Add 5 mL of water to the bag, reseal the zipper, and gently squeeze and shake the contents to mix them. Describe contents of bag when first mixed.

5. Hold the bag between your hands and note any changes in temperature.

Record and describe any temperature changes that may have occurred.

### Part B physical

1. Add 65 mL of water to a baggie. Record the temperature. Add three teaspoons of calcium chloride, seal, and knead gently until it dissolves. Record description of contents in observation table. After it has completely dissolved, or nearly so, record the final temperature. Record description of contents in observation table.

### Part C physical

1. Add 65 mL of water to a baggie. Record the temperature. Add three teaspoons of baking soda (sodium bicarbonate) seal, and knead gently to dissolve. Record description of contents in observation table. Record the final temperature. Record final description of contents in observation table.

### Part D physical

1. Add 65 mL of water to a baggie. Record the temperature. Add three teaspoons of ammonium nitrate, seal, and knead gently to dissolve. Record the final temperature. Record description of contents in observation table.

### Part E physical

1. Add 50 mL of water to a baggie. Record the temperature. Add three teaspoons of potassium bromide, seal, knead gently to dissolve. Record the final temperature. Record description of contents in observation table.



Observations:

PART A	H <sub>2</sub> O temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART B	H <sub>2</sub> O temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART C	H <sub>2</sub> O temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART D	H <sub>2</sub> O temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART E	H <sub>2</sub> O temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART F	H <sub>2</sub> O temperature	description	exothermic endothermic
Initial temperature			
Final temperature			

PART G	H <sub>2</sub> O temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART H	temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART I	temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART J	temperature	description	exothermic endothermic
Initial temperature			
Final temperature			
PART K	temperature	description	exothermic endothermic
Initial temperature			
Final temperature			

## ANALYSIS

**1.** What did you observe at part A?

What type of reaction produces this kind of change?

**2.** What did you observe at part B?

What type of reaction produces this kind of change?

**3.** What did you observe at part C?

What type of reaction produces this kind of change?

**4.** What did you observe at part D?

What type of reaction produces this kind of change?

**5.** What did you observe at part E?

What type of reaction produces this kind of change?

**6.** What did you observe at part F?

What type of reaction produces this kind of change?

**7.** What did you observe at part G?

What type of reaction produces this kind of change?

**8.** What did you observe at part H?

What type of reaction produces this kind of change?

**9.** What did you observe at part I?

What type of reaction produces this kind of change?

**10.** What did you observe at part J?

What type of reaction produces this kind of change?

**11.** What did you observe at part K?

What type of reaction produces this kind of change?

**12.** What practical applications can you think of for these reactions? Be detailed.