

## **Endothermic and Exothermic Reactions**

**(Honors or AP Chemistry)**

### **Materials:**

Test Tubes and Stoppers

Test tube rack

Thermometer

6M HCl

Zn metal strips

NH<sub>4</sub>Cl

Ba(OH)<sub>2</sub> · 8H<sub>2</sub>O

### **Procedure:**

#### **Reaction I**

Obtain a large test tube. Carefully measure 5 ml of 6 M HCl acid into the test tube.

Place a thermometer down into the acid and put the test tube with the thermometer into the test tube rack.

Take the initial temperature reading, record below. Remove the thermometer, carefully place a piece of zinc (Zn) in the test tube with the acid and replace the thermometer. Observe the reaction answering the questions below.

Watch the thermometer closely and record the highest temperature obtained (final temperature) during the reaction.

When the reaction is completed (~5 min), discard the products of the reaction in the beaker by the sink and thoroughly clean the test tube (use the test tube brush) and thermometer.

**Initial Temp** \_\_\_\_\_

**Final Temp** \_\_\_\_\_

Questions:

1. What type of reaction is this?
2. Was there a gas given off? A smell?
3. Describe the reaction.
4. How much (°C) heat flow?

#### **Reaction II**

Measure out 3.0 g of  $\text{Ba}(\text{OH})_2 \cdot 8 \text{H}_2\text{O}$  and place this into the dry test tube. Place the dry thermometer down into the compound. Take the initial temperature reading. Then, remove and clean off any compound that may have stuck onto the thermometer when it was placed into the tube.

Measure out 1.0 g of  $\text{NH}_4\text{Cl}$  and place this into the test tube. Place a #2 stopper over the mouth of the tube and shake vigorously for 60 seconds. Observe the reaction answering the questions below.

Take the stopper off and place the thermometer down into the test tube and record the lowest temperature obtained (final temperature) during the reaction. When the reaction is completed (~5 min), discard the products of the reaction into the sink with lots of water and thoroughly clean the test tube (use the test tube brush) and thermometer.

**Initial Temp** \_\_\_\_\_

**Final Temp** \_\_\_\_\_

Questions:

1. What type of reaction is this?
2. Was there a gas given off? A smell?
3. Describe the reaction.
4. How much ( $^{\circ}\text{C}$ ) heat flow?

**Reflections:**

Review what are exo- and endothermic lessons? How could we tell which reactions were which?

How could these reactions be useful? What are some practical applications for them? Can you come up with two three **completely different** for each type?