

# HOT & COLD REACTIONS

## PRE LAB DISCUSSION:

Chemistry is the study of matter, energy, and change. This experiment will focus on energy. Chemical reactions can be endothermic or exothermic. The chemist not only needs to know whether a reaction takes in energy or gives off energy but also needs to know exactly how great the energy change will be per mole of reactant. The chemist can better control the reaction by limiting the total amount of reactants and by regulating the flow of energy into or out of the reaction vessel. For example, chemical engineers often design elaborate cooling systems for commercial size reacting vessels.

Heat energy is measured in a unit called calories. A calorie is the amount of heat needed to raise one gram of water one degree Celsius. The energy value of food is measured in kilocalories. Nutritionists use the word *Calorie* with a capital C instead of using the term *kilocalorie*.

CHEMICALS/EQUIPMENT: Sodium hydrogen carbonate [baking soda], zinc [granular or shavings], acetic acid [vinegar], 1M hydrochloric acid, sodium hydroxide [lye], graduated cylinder, balance, thermometer, Styrofoam cup

## PROCEDURE

### ***PART I***

1. Place 100 ml of acetic acid in a large Styrofoam cup, and determine and record its temperature.
2. Weigh out 2 grams of sodium hydrogen carbonate.
3. Place the sodium hydrogen carbonate in the Styrofoam cup and determine and record the temperature of the system immediately after the reaction is completed.

## ***PART II***

### **CAUTION- use a scoopula to handle sodium hydroxide pellets**

1. Place 100 ml of water in the foam cup and determine and record its temperature.
2. Weigh out 2 grams of sodium hydroxide.
3. Place the sodium hydroxide in the foam cup and stir gently. When all of the pellets have dissolved, determine and record the temperature.

## ***PART III***

1. Place 100 ml of 1 M hydrochloric acid in the foam cup and determine and record its temperature.
2. Weigh out 2 grams of sodium hydroxide.
3. Place the sodium hydroxide in the cup and stir gently. When the reaction is completed, determine and record the temperature.

## ***PART IV***

1. Place 100 ml of 1 M hydrochloric acid in the foam cup and determine and record its temperature.
2. Weigh out 0.5 grams of granular zinc.
3. Place the zinc in the foam cup and when the reaction is complete, determine and record the temperature.

