

## *Rates of Reactions*

### Introduction

The rate of a reaction is literally the speed it takes the reactants to be converted to products. You are already familiar with reactions that occur quickly (any precipitate reaction for example), but not necessarily with the why behind that observed speed.

In this lab you will explore several factors that affect reaction rates. In each case, you will be timing the reaction to determine how the change affects the speed of the reaction.

### Part 1: Concentration

#### *Materials*

Bleach (8.25% sodium hypochlorite)

Water

Pipets

Six 250-mL beakers

Red, yellow, blue, and green liquids

#### *Procedure*

- 1) Pour 100 mL of each colored water solution into its own 250 mL beaker.
- 2) Add 2–3 drops of household bleach to each of the 250 mL beakers. Start the timer, swirl the contents of each beaker. Stop the timer when the reactions are complete or after 2 minutes.
- 3) Record your observations.
- 4) Pour out and wash your beakers. Then, get 100 mL of each colored water solution into its own 250mL beaker.
- 5) Add 1 dropper full (NOT drops) of household bleach to each of the beakers. Start the time, swirl the contents of each beaker. Stop the timer when the reactions are complete or after 2 minutes.
- 6) Record your observations.

### Part 2: Surface Area

#### *Materials*

2 alka seltzer tablets

DI water

Two 250 mL beakers

Mortar & pestle

#### *Procedure*

- 1) Crush one of the tablets up in the mortar & pestle.
- 2) Add 150 mL of DI water to each beaker.
- 3) Add each tablet to its own beaker and immediately start the timer.
- 4) Record your observations.

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

### Part 3: Temperature

#### *Materials*

Three light sticks

Hot Plate

Three 600 or 1000 mL beakers

Ice

#### *Procedure*

- 1) Fill one beaker with water and put it on the hot plate. When it's steaming, go to step 2.
- 2) Put ice water in one beaker and room temperature water in the third.
- 3) Put one light stick in each beaker and let sit for 5 minutes.
- 4) After the five minutes, bend and snap them to activate. Time each reaction.
- 5) Record your observations.

### Part 3: Temperature Alternate

#### *Materials*

Three alka seltzer tablets

Hot Plate

Three 250 mL beakers

Ice

#### *Procedure*

- 1) Fill one beaker with water and put it on the hot plate. When it's steaming, go to step 2.
- 2) Put ice water in one beaker and room temperature water in the third.
- 3) Put one tablet in each beaker and start the timer.
- 4) Record your observations.

### Part 4: Catalyst & Concentration

#### *Materials*

Three 100 mL graduated cylinders

Dish washing detergent

10 mL 3% H<sub>2</sub>O<sub>2</sub>

Solid KI or NaI (pinch)

20 mL 30% H<sub>2</sub>O<sub>2</sub>

Plastic tray/bin

#### *Procedure*

- 1) Place 10 mL of 3% H<sub>2</sub>O<sub>2</sub> in one graduated cylinder.
- 2) Place 10 mL of 30% H<sub>2</sub>O<sub>2</sub> in each of the other two graduated cylinders.
- 3) Add the dishwashing soap, dropwise, down the sides of each cylinder to produce a layer of soap.
- 4) Add a pinch of solid KI (or NaI) to the 3% cylinder and one of the 30% cylinders.
- 5) The timer must be started as soon as you add the KI (or NaI) to the cylinders.