42.4: Procedures

Safety

Rubber gloves and safety goggles are recommended for this lab.

Warnings

- Handle the kitchen knife with caution; it is sharp.
- Hydrogen peroxide can irritate eyes and skin

You will witness a variance in reaction rates related to differing chemical factors.

1. Draw a table in which to list the observations for your first mini-experiments. **Do not fill in data until you have read the instructions for obtaining that data.**

Table 42.4.1: Rates of Reactions Data

Mini-Experiment	Fastest Rate (choose one for each set)	Indicator(s)
Apple & Air (coated)		
Apple & Air (uncoated)		
Escaping Oxygen (with potato)		
Escaping Oxygen (no potato)		
Better Faster (whole)		
Better Faster (crushed)		
Making Kool-Aid (sugar)		
Making Kool-Aid (Kool-Aid)		

Apple & Air

1. Use the mortar and pestle to crush one vitamin C tablet. Transfer the crushed contents to the petri dish and add enough water to make a paste; use the plastic spoon to mix the water with the crushed vitamin C.
2. Cut open an apple, and immediately cover the entire surface of one half of the apple with the vitamin C paste. Leave the other half of the apple uncovered in the open air. Set both halves of the apple aside for **30-60 minutes**, and proceed with the other mini-experiments while you are waiting.
3. After 30-60 minutes have passed, rinse off the vitamin C, and compare the apple halves. Determine which half of the apple exhibited the fastest rate of reaction, and check the appropriate box in your *rates of reactions* data table. List any indicators of chemical change for each half of the apple; if there were no indicators of chemical change then write “none”.

Clean-up

- Wash and dry your mortar and pestle, petri dish, and plastic spoon
- Discard apple halves in trash

Escaping Oxygen

1. Add 100 mL of hydrogen peroxide to each of the 2-250 mL beakers.
2. Add the slice of potato to one of the beakers of hydrogen peroxide. Use the grease pencil to draw a line at the top level of the liquid, on each beaker.

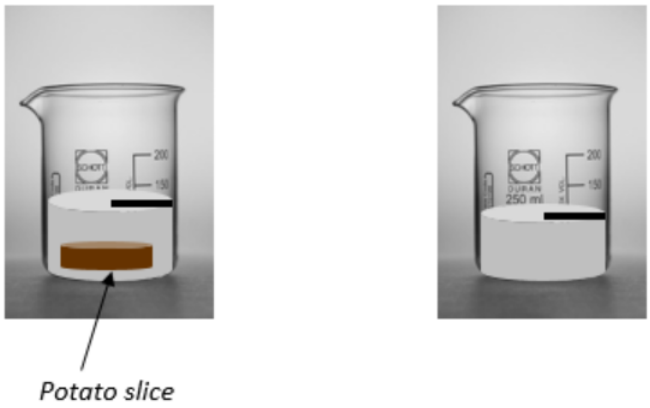

Figure 42.4.1: Slice of potato in hydrogen peroxide

3. Set the beakers side-by-side and view the beakers every few minutes for **30-60 minutes**. Hydrogen peroxide (H_2O_2) will naturally decay to water and oxygen, and your goal is to observe if the potato alters the natural reaction rate. The beaker which shows more gas bubbles is releasing oxygen atoms at the faster rate. Proceed with the other mini-experiments while you continue to check the reaction rates of the hydrogen peroxide.
4. After 30-60 minutes have passed, determine which hydrogen peroxide exhibited the fastest rate of reaction, and check the appropriate box in your *rates of reactions* data table. Check the level of the liquid in each beaker, and note whether there is a change in the level of the liquid compared to the grease pencil line. List any indicators of chemical change; if there were no indicators of chemical change then write “none”.

Clean-up

- Discard potato slice in trash
- Pour liquid contents from beakers into sink
- Wash and dry beakers

Better Faster

5. Fill two 250-mL beakers with 150 mL of cold water, and measure the temperature. Leave the thermometers in each beaker of cold water.
6. Use the mortar and pestle to completely crush one Alka-Seltzer tablet; leave the other tablet whole. At exactly the same time, add the crushed tablet to one beaker and the whole tablet to the other beaker. Stir the contents in each beaker with a plastic spoon until the contents are dissolved, and hold the thermometer steady in the water while you stir; **do not use the thermometer for stirring**.
7. Record whether the crushed tablet or the whole tablet exhibited the fastest rate of reaction; check the appropriate box in your *rates of reactions* data table. Determine whether there was a temperature change. List any indicators of chemical change; if there were no indicators of chemical change then write “none”.

Clean-up

- Pour contents form beakers into sink
- Wash and dry your mortar and pestle, beakers, thermometers, and plastic spoons

Making Kool-Aid

8. Fill two 250-mL beakers with 150 mL of cold water.
9. Place one of the beakers on the heat source and heat the water to nearly boiling; you may use foil as a lid to speed up the heating process. Turn off the heat source once the water is hot, and use beaker tongs or heat gloves to set the hot beaker on the lab table.
10. Simultaneously add one sugar cube to each beaker. Stir the contents of each beaker until all sugar is dissolved. Record whether the hot or cold water exhibited the fastest rate of reaction; check the appropriate box in your *rates of reactions* data table. List

any indicators of chemical change; if there were no indicators of chemical change then write “none”.

11. Simultaneously add one package of Kool-Aid to each of the beakers with sugar water and observe; **do not stir**. Record whether the hot or cold water exhibited the fastest rate of reaction; check the appropriate box in your *rates of reactions* data table. List any indicators of chemical change; if there were no indicators of chemical change then write “none”.

Clean-up

- Wash and dry your beakers and plastic spoons

Weak or Strong

Warning

Alka Seltzer in Vinegar may result in some “spray” of vinegar out of the beakers.

16. Draw a table in which to record your data for the *weak or strong* investigation. Read the instructions for obtaining the data.

Table 42.4.2: Weak or Strong Data

Beaker	Vinegar (mL)	Water (mL)	Mass of Beaker with Liquid (grams)	Mass of Tablet (milligrams)	Final Mass of Beaker contents (grams)	Δ mass
1	5	30				
2	10	25				
3	15	20				
4	20	15				
5	25	10				
6	30	5				

17. Use the grease pencil to label each of your 6 beakers with a number, 1-6.
18. Use the graduated cylinder to fill beakers 1-6 with 5, 10, 15, 20, 25, and 30 mL of vinegar as indicated in the *weak or strong* data table. Rinse the graduated cylinder with water.
19. Use the graduated cylinder to add the appropriate amounts of deionized water (DI) water to each beaker as indicated in the *weak or strong* data table. The beaker may not show that it is filled to the 35 mL level.
20. Measure and record the mass in grams, of each beaker full of liquid. Measure and record the mass of each individual Alka Selter table to the closest milligram (0.000 grams), and place each tablet next to a specific beaker.
21. Add the Alka Seltzer table to beaker #1, gently swirl the contents of the beaker to ensure tablet completely dissolves. Once the reaction has ended, measure and record the final mass of beaker #1. Repeat this process for each beaker. Indicate which beaker seemed to have the fastest rate of reaction.
22. Measure and record the mass in grams, of each beaker with its contents.
23. Calculate the mass loss (Δmass) for each beaker; this is the difference between the final mass of beaker contents and the combined initial mass of the reactants.

Clean-up

- Pour contents from beaker into sink
- Thoroughly wash and completely dry all beakers
- Place graduated cylinder on drying rack
- Clean your lab table

Contributors and Attributions

- Template:ContribCCPhySc101L
