

Control the Reaction Rate of a Foaming Reaction

Name: _____

Date: _____

Student worksheet

Investigation Goal

Find the hydrogen peroxide concentrations that result in the following foam heights (the foam height includes the reaction liquid in the test tube as well as the foam itself):

- 3 cm
- 5 cm
- 7 cm

Investigation Procedure

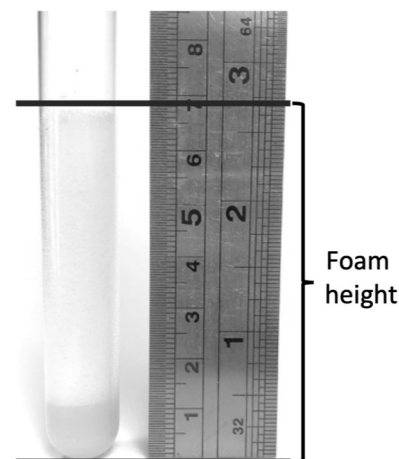
Important information before you start your experiment.

- You will need to keep the total reaction volume the same for every reaction to be able to compare your results in between experiments. The total reaction volume will be 1.5 mL.
 - You will also need to keep the amount of enzyme the same for every reaction to be able to compare your results in between experiments. To each reaction, add 0.5 mL of the prepared yeast solution.
 - You will perform your reactions in triplicates to make sure your results are reproducible.
 - Read the foam height 2 minutes after starting the reaction.
1. First, prepare the yeast solution in a cup by adding 1 package (7 g) of dry yeast to 100 mL of room-temperature water. Stir the solution until all the yeast has dissolved.
 2. Then prepare the reaction solution for your first hydrogen peroxide concentration. Make enough solution for all three replicates.
 - a. In a cup, add 0.5 teaspoon (tsp.) of detergent and 2 tablespoons (tbsp.) of hydrogen peroxide solution.
 - b. Mix the solution by *gently* swirling the cup. Try not to create too much foam.
 - c. Note: If you want to lower the hydrogen peroxide concentration, dilute the hydrogen peroxide solution with water. Then add 2 tbsp. of the diluted hydrogen peroxide solution to the reaction solution. Keep track of your dilutions for your records. For example, if you mix 1 tbsp. of hydrogen peroxide solution with 1 tbsp. of water, your concentration would be 50% of the original hydrogen peroxide (undiluted hydrogen peroxide = 100%).
 - d. Once your reaction solution is mixed, add 1 mL of that solution into each of the three test tubes using the pipette. Again, avoid foam formation in the test tube.
 3. Set a timer for 2 minutes.

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- Next, add 0.5 mL of yeast solution to each of the three test tubes using a fresh pipette. Start the timer as soon as the yeast is added.
- Swirl the test tube slightly and put it back into the test tube rack.
- After 2 minutes, use the ruler to measure the foam height in each test tube. It is best to take the test tube out of the rack and set it on a table to do so. Line the ruler up next to the tube and read the height of the foam from the bottom to the top, as shown on the right. This measurement will include some of the liquid at the bottom.
- Make sure to rinse out the test tubes and pipettes in between experiments. Then test the next hydrogen peroxide concentration.



Investigation Results

Perform each reaction in triplicate and record your results in the table below. Calculate the average foam height for each H_2O_2 concentration and write your results in the table.

H_2O_2 Concentration [%]	Foam Height (cm)			
	Trial #1	Trial #2	Trial #3	Average

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Final Results

Goal Foam Height (cm)	H ₂ O ₂ Concentration (%)
3 cm	
5 cm	
7 cm	