Potato Enzyme Lab

INTRODUCTION

An enzyme is a protein that speeds up or slows down a specific chemical reaction in an organism. A good rule of thumb is to remember that enzyme names end in "-ase". This will help in identifying enzymes in further readings. Generally enzymes are catalysts.

Hydrogen peroxide is a toxic chemical that is produced in many organisms during metabolism. Organisms must get rid of this toxin to survive. One reaction turns the hydrogen peroxide into water and oxygen. The enzyme that helps with this reaction is called catalase. This is found in both plants and animals. In this lab we will use potatoes as our catalase source. The reaction equation is:

$$2H_2O_2 \xrightarrow{\text{Catalase}} 2H_2O + O_2$$

PURPOSE

1. Observe the breakdown of hydrogen peroxide toxin by potato's enzyme catalase.
2. Determine factors that influence how quickly the reaction takes place.
3. Determine factors that influence how well enzymes function.
4. Use graphic analysis (graphing) to analyze our results.

PRELAB QUESTIONS

1. Read the purpose and the procedure. After having read these what is the dependent and independent variable in the experiment?

2. What test tube is the control group? Why?
3. Formulate an If/then hypothesis. Remember if/then hypothesis always follow the same form of if the _____(dependent variable) is related to the _____(independent variable) in _____ way, then given _____(condition) I predict _____(outcome).
4. What is the point of adding sand to test tube one?

Materials: 4 test tubes, test tube rack, graduated cylinder, hydrogen peroxide, potato (ground, diced, diced and cooked), sand, timer

PROCEDURE Mark test tubes 1-4.

1. Fill each test tube with 5mL hydrogen peroxide.
2. Make initial observations of test tube one.
3. Add a pinch of sand to test tube one.
4. Observe and record observations.
5. Obtain about 1g ground potato. To grind the potato use a mortar and pestle and a pinch of sand. Record the exact mass and add it to test tube 2.
6. Time how long it takes for the reaction to take place. You'll know the reaction is taking place because bubbles are made.
7. Obtain about 1g of diced potato. Record the exact mass and add it to test tube 3.
8. Time how long it takes for the reaction to take place. You'll know the reaction is taking place because bubbles are made.
9. Obtain about 1g of cooked potato. Record the exact mass and add it to test tube 4.
10. Time how long it takes for the reaction to take place. You'll know the reaction is taking place because bubbles are made.

DATA AND OBSERVATIONS

Test tube	Observations	Time for reaction (s)
1.		
2.		
3.		
4.		

DATA ANALYSIS

1. Calculate a rate of reaction per gram of potato for each trial. Rate = time/grams
2. Graph the data.
3. Conclusion: *use complete sentences. Each of the following answers MUST include the word "because"*
   (Summarize and explain the results.)

a. Did you support or refute your hypothesis? Why? What data leads you to that conclusion?
b. What did the catalase do? How do you know?

c. What did grinding the potato up do to the rate? Why did this change the rate?
d. What did cooking the potato do to the rate? What conclusion can you draw about that result?