THE RATE OF PAPERASE

PURPOSE

To determine the rate of enzyme reactions using an imaginary enzyme and sugar paperase and paperose.

INTRODUCTION

In this lab, your hands are the enzyme paperase. This enzyme splits the sugar paperose into subunit A and subunit B. You will split this molecule by ripping the paper model down the middle.

Each member of a group of four students will take turns ripping paperose in time trials to determine the rate of reaction of the enzyme paperase.

MATERIALS

Paperose Models
Scissors
Container
Graph Paper
Calculator
Clock/Timer

PROCEDURE

1) Your teacher will assign you into groups of four or five.

2) Each member of the group will cut out 50 molecules of paperose from the paper templates that your teacher gives you.

3) Place those 50 molecule models in a container.

4) One member will do the following:

   a) When told to, you will grab one paperose molecule and rip it down the middle. Only rip one paperose molecule at a time.

   b) Place the pieces back into the container and grab another paperose molecule.

   c) Repeat steps a and b, as fast as you can for 10 seconds. A member of your group will be timing you for 10 seconds.

   d) Empty you container and count the number of ripped paperose molecules. Record that number in Table 1.

5) Other members will repeat Step A - Step D for 30, 60, 120, and 180 seconds.
Remember: A member of your group should act as a timer.

6) Graph results.

7) Determine the rate of reaction for the following times:
0-10 seconds, 10-30 seconds, 30-60 seconds, 60-120 seconds, and 120-180 seconds. Record this information in Table 2.

8) The instructor may gather the data from each group to obtain a class average for each time trial. Graph these results and calculate the class rate of reaction (use Tables 3 and 4).

9) Answer the questions.

RESULTS

Table 1: Time Trial Results

Time (seconds)	10	30	60	120	180
Number of Paperose Molecules Ripped					

Graph the Table 1 data.

Table 2: Rate of Reaction for Each Time Trial

Time (seconds)	0-10	11-30	31-60	61-120	121-180
Rate of Reaction in Molecules per Second					

Table 3: Class Average for Time Trial Results

Time (seconds)	10	30	60	120	180
Number of Paperose Molecules Ripped					

Graph the results of Table 3.

Table 4: Class Rate of Reaction For Each Time Trial

Time (seconds)	0-10	11-30	31-60	61-120	121-180
Rate of Reaction in Molecules per Second					

CONCLUSION / QUESTIONS

1) Graph the results from Table 2 and compare with the graph from Table 1. Explain what you see.

2) Graph the results from Table 4 and compare with the graph from Table 3. Explain what you see.

3) If you were allowed to continue this lab and rip paperose molecules for 240 and 300 seconds. What will happen to the rate of reaction and why will this happen?

4) If I took the paperose molecules and dispersed them around the room:

   a) Would the molecules be more or less concentrated?

   b) Would there be more or less reactions (ripped paperose molecules)? Explain your answer.

5) What can you say about the concentration of substrates in relation to the rate of reaction?

6) What can you say about the length of time of a reaction and the rate of the reaction?

PAPEROSE MOLECULES

A	B	A	B	A	B
A	B	A	B	A	B
A	B	A	B	A	B
A	B	A	B	A	B
A	B	A	B	A	B
A	B	A	B	A	B
A	B	A	B	A	B
A	B	A	B	A	B
A	B	A	B	A	B