

Food Explorations Lab: Explicit Enzymes

STUDENT LAB INVESTIGATIONS

Name: _____

Lab Overview

In this investigation, you will test three types of milk for the sugar glucose before and after adding the digestive enzyme lactase to determine which milk(s) contain the sugar lactose.

Lab Objectives

In this lab, you will learn how to...

1. Explain the chemical digestion of lactose.
2. Differentiate between monosaccharides and disaccharides.
3. Describe the function of enzymes in digestion.
4. Identify milk alternatives for people who are lactose intolerant.

Lab Safety: Before beginning ANY investigation you should put on your safety goggles and apron. Always wash your hands following completion of an investigation. When handling food, you should also wash your hands prior to beginning an investigation.

Lab Question

What types of milk will react with the enzyme lactase?

Soy Milk

Rice Milk

Cow's Milk

Predictions: I predict the _____ milk type will react with the lactase drops because...

Predict if the lactose enzyme (lactase) will increase, decrease, or not change the glucose concentrations of the milk (Circle your answer).

Cow's Milk: INCREASE DECREASE NO CHANGE

Soy Milk: INCREASE DECREASE NO CHANGE

Rice Milk: INCREASE DECREASE NO CHANGE

Observation of an Enzymatic Reaction

MATERIALS

12 glucose strips	Labeled test tube containing Unknown Milk Sample B
2-3 paper napkins	Labeled test tube containing Unknown Milk Sample C
1 ½ crushed lactase enzyme pills	Test tube rack or beaker
Glucose Reference Color Chart	Safety goggles
Kitchen timer or stopwatch	Aprons (optional)
Labeled test tube containing Unknown Milk Sample A	

PROCEDURE

1. Obtain three labeled unknown samples of milk from your teacher (Cow's Milk, Soy Milk, Rice Milk). Through observation of enzymatic reactions you will determine the identity of each unknown sample.
2. Measure the glucose concentration of each milk type (before adding the enzyme) by dipping 1 glucose strip into 1 unknown milk sample. Dip the side of the glucose strip that has the colored pad into the milk. *Be sure to keep track of which strip belongs to each milk type.* After dipping, blot each side of the strip onto a paper napkin or towel to remove the excess fluid. Not removing the extra fluid from your strip can result in an incorrect measurement. Wait two minutes for the color of the strip to develop.
3. Compare the color of the strip to the provided color chart. Record your answers in Table A under the column "Before Adding Enzyme."
4. Repeat steps 2 and 3 for the other two milk samples.
5. Add ½ of a crushed lactase pill to each milk type and stir. Then, measure the glucose concentrations of each milk type at 2 minutes, 3 minutes, and 4 minutes using the glucose strips. Record your answers in Table A.
6. Based on your observations, identify each milk sample (Soy Milk, Rice Milk, or Cow's Milk) and provide a brief explanation supporting your answer. Record your answers in Table B.

Table A: Sample Observations

Sample	Before Adding Enzyme	2 Minutes	3 Minutes	4 Minutes
Sample A				
Sample B				
Sample C				

Table B: Sample Identification

Sample	Identity of Substance	Explanation
Sample A		
Sample B		
Sample C		

Conclusion:

1. Compare and contrast the glucose concentrations PRIOR to adding the lactase enzyme to each sample. Explain any differences observed.
2. Compare and contrast the glucose concentrations AFTER adding the lactase enzyme to each sample. Explain any differences observed.
3. Infer which of the original milk samples contained monosaccharides and which contained disaccharides.

4. Which type of milk needs lactase enzyme in order to be digested? Explain the function of the lactase.

5. Describe why the lactase enzyme is important for human digestion.

6. If your body doesn't produce the lactase enzyme, what milk should you drink and why?

Student Investigations Lab Extension

As a class, compare your results. Record class totals and percentages in Table C. Circle the correct milk for each sample.

Table C: Class Comparisons

Sample	Class Comparison of Results					
Sample A	Cow's Milk		Soy Milk		Rice Milk	
	_____	_____	_____	_____	_____	_____
	# of groups	% of class	# of groups	% of class	# of groups	% of class
Sample B	Cow's Milk		Soy Milk		Rice Milk	
	_____	_____	_____	_____	_____	_____
	# of groups	% of class	# of groups	% of class	# of groups	% of class
Sample C	Cow's Milk		Soy Milk		Rice Milk	
	_____	_____	_____	_____	_____	_____
	# of groups	% of class	# of groups	% of class	# of groups	% of class

1. Compare and contrast your results to the class results.