

Pharmaceutical Scientist: Medication for Lactose Intolerance

Adventure Description:

In this adventure, students will think like a pharmaceutical scientist and test how well lactase enzymes work.

Activity

Step One: Background Information on Lactose, Lactase and Pharmaceutical Scientists (5-10 minutes)

- Ask students if they have ever heard of lactose and if they know what it is. Explain to students that food products that are made from milk, like cheese and ice cream, contain a sugar molecule called lactose.
- Explain to students that lactose is a complex sugar. Complex sugars have several sugar molecules linked together. This is important because complex sugars must be broken down into simple sugars by the digestive system before we can absorb the sugar into our bodies. Show [Handout: Digesting Sugars](#).
- Ask students if they know anyone who is “lactose intolerant”. People who can eat milk products produce an enzyme called lactase that lets them digest lactose. People who are lactose intolerant don't produce this enzyme, and therefore can't digest lactose. They can have a lot of gas and/or diarrhea if they eat milk products.
- Explain to students that pharmaceutical scientists help people find medicines that will help them digest the lactose molecule in milk products. One medicine they use is lactase enzyme tablets that introduce lactase into a person's body.
- Tell students that today they will think like a pharmaceutical scientist and perform an experiment to determine how much lactase is needed to digest lactose.

Step Two: Testing for Lactose (20-25 minutes)

- Explain to students that they will be testing different drinks to see if they contain lactose.
- Provide students with [Handout: Testing for Lactose](#).
- Students will complete Steps 1-3 first to test which types of drinks have lactose.
- Provide students with the following materials:
 - 4 bowls 1/2 cup of water
 - 1/2 cup of sports drink
 - 1/2 cup Regular
 - 2% Milk
 - 1/2 cup Lactose Free

Please contact Allison Bischoff, Director of Teacher Support, at allison@rozzylearningcompany.com or 314-272-2560 with questions.



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- 1/2 cup Lactose Free 2% Milk
- glucose test strips
- While students are working, ask them the following questions:
 - Were you surprised at the glucose test results? (Answers will vary, but most will be surprised that lactose free milk had such a high glucose value. This is because the manufacturer added lactase to the milk, which broke down all of the lactose into glucose).

Step Three: Adding Lactase to Regular Milk (10 minutes)

- Explain to students that they will now be testing to see how many lactase tablets are required to turn all of the lactose in milk to glucose. Remind students that lactose must be turned into glucose to be digested.
- Provide students with the following materials:
 - Lactase tablets
 - Bowl and metal spoon for crushing tablets
- Have students complete Step 4 on their handouts.
- While students are working, ask them the following questions:
 - What do you think adding lactase enzyme to regular milk do? (It will change lactose into glucose and raise glucose test value.)
 - Why do you think you crushed the lactase tablets before adding them to the milk? (Because otherwise we would have had to wait for them to dissolve in the milk)

Step Four: Discussion (5-10 minutes)

- Have groups present and compare their results.
- Discuss the number of lactase enzyme tablets needed to turn all of the lactose in the regular milk into glucose.
- Explain to students that the directions on the lactase enzyme tablets container tell people to take 1 or 2 tablets with a meal to avoid having stomach problems. Did student results reflect this?
- Student results showed that more tablets are needed to turn all of the lactose into glucose. As a class, discuss why this might be different. Explain that in the test, only lactase enzyme was added to break down the lactose. In a person's stomach, there are other acids and enzymes helping to break down the lactose.

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Materials List

Provided online:

- Handout: Digesting Sugars
- Handout: Testing for Lactose

Not provided (each student or group needs):

- 4 bowls
- 1/2 cup of water
- 1/2 cup of sports drink
- 1/2 cup Regular 2% Milk
- 1/2 cup Lactose Free 2% Milk
- lactase tablets
- bowl and metal spoon for crushing tablets
- glucose test strips

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