14 Breakdown

You already know the organs in the digestive system. But what exactly do they do? One important function of the digestive system is to break down food into smaller pieces. Only then can the nutrients in the food be absorbed by your body.

When you chew food, **mechanical breakdown** occurs. Most mechanical breakdown occurs in your mouth with help from your teeth and tongue. Some mechanical breakdown continues in your stomach as it churns the food around. During **chemical breakdown**, substances in your digestive system break down food into even smaller particles. Chemical breakdown begins in your mouth, but occurs mostly in your stomach and intestines.

Does it matter if mechanical breakdown occurs? Find out by modeling the process of food breakdown.

CHALLENGE **Why is it important to chew your food?**

MATERIALS

For the class

access to watch or wall clock with a second hand
balances (optional)

For each group of four students

4 antacid tablets
1 120-mL bottle of vinegar
2 SEPUP trays
2 30-mL graduated cups

For each student

1 Student Sheet 14.1, "Your Digestive System"

PROCEDURE

Part A: Testing the Model

The Model	
Material/Process	**Represents**
Antacid tablet	Food
Breaking the tablet	Mechanical breakdown
Adding vinegar	Chemical breakdown

1. Model mechanical breakdown by breaking one antacid tablet into four equal-sized pieces. Imagine that each piece is a small piece of food. Place one piece of food into Cup A of a SEPUP tray.
2. Measure 5 mL of vinegar into a 30-mL cup.
3. Model chemical breakdown by adding the vinegar to Cup A. Observe the reaction until it is over. Then record your observations in your science notebook.
4. Based on your observations, discuss in your group why you think it is important to chew your food.

Part B: Designing the Experiment

5. Using the materials in the Materials List, design an experiment to show the effect of chemical breakdown on food particle size.
6. Record your hypothesis and your planned experimental procedure in your science notebook.
7. Make a data table that has space for all the data you need to record. You will fill it in during your experiment.
8. Obtain your teacher's approval of your experiment.
9. Conduct your experiment and record your results.
10. Create a bar graph of your data. Be sure to label your axes and title your graph.
11. If you have time and additional materials are available, revise your procedure and repeat your experiment.

ANALYSIS

1. **a.** In your experiment, what variables did you keep the same?
   b. Were there any variables (except for the one being tested) that you could not keep the same?
   c. How could you or did you improve the design of your experiment? Explain.

2. **a.** What part of digestion was modeled by breaking the tablet?
   b. What part of digestion was modeled by adding vinegar?
3. **a.** What qualitative data did you collect?
   b. What quantitative data did you collect?

4. How does the size of your food affect the speed at which chemical breakdown occurs? Explain how your conclusions are based on the data collected during your experiment, and whether your hypothesis was supported or disproved.
5. Besides preventing choking, why is it important to chew your food?