

Dentist: Effects of pH on Teeth

Adventure Description:

In this adventure, students will think like a dentist and test the effects of different acidic drinks on tooth enamel!

Activity

Teacher Note: This activity is long. We suggest performing the activity over two days. See suggestions and teacher preparation on [Handout: Teacher Prep](#).

Step One: Background Information on Dentists and the Effects of pH on Teeth (5 minutes)

- Explain to students that a dentist is a doctor who takes care of people's teeth and gums. Dentists work to teach their patients how to keep their teeth healthy.
- Ask students if they know that some drinks are bad for their teeth. Many drinks that are bad for your teeth contain acid that make them taste tangy. Juices, like apple juice and orange juice, have natural citric acid. Sodas and sports drinks have acid added to give them a tangy taste. Show [Handout: Examples of Acidic Drinks](#).
- Explain to students that one of the things that dentists warn people about is drinking too many drinks that can cause tooth decay, like cavities or enamel loss! Cavities happen when the inside of the tooth rots, and enamel is a protective layer on the outside of the tooth. Show [Handout: Tooth Decay](#).
- The problem is the acid in our favorite drinks can corrode our teeth! Teeth corrode when a chemical reaction happens to form a new material. When this happens the white, hard enamel that make up the outside of teeth turns into a crumbly brown material that easily wears away.
- Explain to students that most people don't know which drinks are the worst for their teeth. Today, students will think like a dentist and perform an experiment to figure out which drinks are worse for enamel on teeth!

Step Two: Activity Set Up (5 minutes)

- Explain to students that they will be testing the pH of several different drinks to determine which drink is worst for teeth.
- Provide students with [Handout: pH](#). Go over the handout together as a class.
- After students test the pH of each drink, they will then perform tests to see how these drinks effect egg shells. Egg shells are made up of molecules that are similar to the molecules in tooth enamel.

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Step Three: Testing the pH of Different Drinks (5-10 minutes)

- Tell students that they will now test the pH of different drinks.
- Provide students with [Handout: Testing pH](#). Walk through the handout together as a class.
- Provide students with the following materials:
 - pH test strips
 - Variety of prepared drinks
 - Paper towels
- While students are working, ask them the following questions:
 - Were you surprised by any of the pH readings? (Answers will vary, but expect answers such as, “I didn’t expect sports drink to be as acidic as soda.”)

Step Four: Testing pH with Egg Shells (3-5 hours)

- Explain to students that they will now test the liquids by observing their effects on egg shells. The egg shells and tooth enamel are made of similar molecules.
- Provide students with [Handout: pH and Egg Shells](#). Walk through the handout together as a class.
- Allow students to complete the steps listed under Day 1 on the handout. While students are working, ask them the following questions:
 - Why do you think its important to use water as a control? (That way we can see if egg shells just dissolve in water. We can compare the liquids that have acid to plain water.)
 - What does it mean when a liquid has a lower pH? (A lower pH is more acidic than a higher pH.)
- Explain to students that they will leave the eggshells in the drinks for 3-5 hours. Then, you (the teacher) will remove them from the drinks. The next time your class meets, students will make observations about the corrosion of the eggshells.
- Collect student handouts before they leave your classroom.

Step Five: Making Observations (10 minutes)

- Teacher note: This step should be completed on Day 2.
- Explain to students that they will now make observations about what happened to the egg shell after it set in the acidic drink.
- Provide students with their copy of [Handout: pH and Eggshells](#).
- Give students time to complete their observations.
- Teacher Note: Results will vary based on the drinks used, but our results can be seen on [Handout: Teacher Key](#).

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Step Six: Discussion (5 minutes)

- Have students discuss the results of their testing with each other. Which drinks corroded the egg shells the most? The least?
- Have a concluding class discussion about the effects of different drinks on eggshells. Remind students that eggshells contain molecules that are very similar to those found in tooth enamel, which means that acidic drinks have some of the same effects on our tooth enamel. Acidic drinks can cause tooth decay!
- Extra Time? Have students write a script and record a YouTube video or a PSA to educate others, explaining what acidic drinks are, and why acidic drinks are bad for tooth enamel.

Materials List

Provided online:

- Handout: Teacher Prep
- Handout: Examples of Acidic Drinks
- Handout: Tooth Decay
- Handout: pH
- Handout: Testing pH
- Handout: pH and Egg Shells
- Teacher Key

Not provided (each student or group needs):

- 4 shallow bowls for liquids
- 1/2 cup of water for control
- 1/2 cups of liquids kids like to drink such as; cola, lemon-lime soda, fruit punch sports drink
- pH strips
- Paper towels
- Egg shell halves

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