

Fluoride protects teeth



What is fluoride for in toothpaste?

Protection against acids

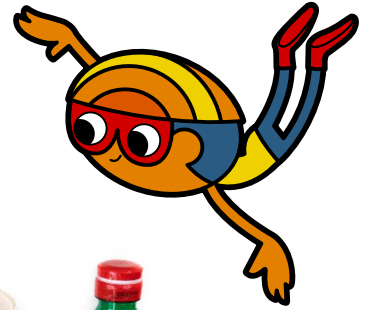
Research question

Acids attack the tooth enamel. This is how caries develops. Fluoride in toothpastes is supposed to protect against this. But how? We are investigating this question using a substitute: eggshells! Like our tooth enamel, eggshells contain acid-sensitive calcium compounds.

Does toothpaste with fluoride protect against the harmful effects of acids?

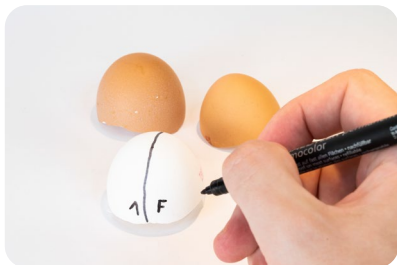
Materials needed

- 4 eggshell halves (preferably 2 dark and 2 light halves each)
- Marker pen,
- Fluoride gel
- Table vinegar
- Paper towels
- 4 jam jars
- 4 teaspoons
- Stop watch
- Measuring jug



How to do it

Step by step



Mark the eggshells

1. Draw a line down the middle of each of the eggshell halves.
2. Mark one of the sides with an "F" and then number the eggshells from "1-4".
3. Caution: The eggshells are fragile.



Apply fluoride gel

1. Rub the sides marked with "F" with the fluoride gel for about 3 minutes – this is how long you should be brushing your teeth.
2. Rinse the fluoride gel carefully with tap water and dab dry with a kitchen towel.



Add vinegar

1. Place the two dark and two light eggshells in one glass each.
2. Pour vinegar over the eggshells until they are covered. You can use light and dark vinegar, like in the photo.
3. Wait 15 minutes and observe what happens. Do the eggshell halves all look the same?



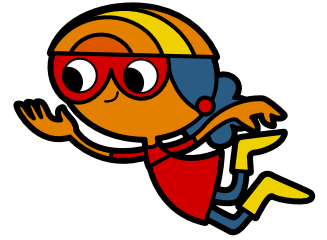
Compare

1. Remove the eggshells from the vinegar and carefully pat them dry.
2. What do the surfaces look like? Are there any differences? Did the fluoride gel protect the eggshells?



Additional information

For parents and teachers



Context

Within the teaching unit children learn that caries is caused by acids and not by sugar. Bacteria in plaque replace acid as a metabolic product. The tooth enamel contains calcium compounds which are acid soluble, similar to calcium carbonate. Using eggshells containing calcium carbonate, we can study in a model way how acids work and how the surface can be protected by gels and pastes containing fluoride.

Fluoride

Most toothpastes contain fluoride. The fluoride remineralizes the teeth. It hardens them and makes them more resistant to acids. Fluoride also inhibits the growth of bacteria. Experiments have shown that fewer bubbles form on eggshells treated with fluoride gel when they come into contact with vinegar. The shells dissolve more slowly.

