



SILVER AWARD PROJECT IDEAS



typically 30 hours of project work



Testing toothpastes

Before you start your investigation, you should carry out a risk assessment and have it checked by your teacher. For help with this, read through our health and safety information and look out for health and safety warnings in the text.

In this project, you will make your own toothpaste and compare it to toothpastes you can buy in the shop. You will then do some tests to find out which toothpaste cleans the best.

Getting started

You should start by writing down the ingredients of numerous different brands of toothpaste and how much they cost. How do the compositions of toothpastes vary? Do toothpastes that claim to remove stains from smoking, for example, have any different ingredients? What are they? Try to find out what the various ingredients do. Decide which you think gives the best value for money.

Choose a few different brands to test. Also, make your own toothpaste to see how it compares to shop-bought stuff (see below for a recipe). How do the ingredients differ between the shop-bought brands and your homemade toothpaste?

Toothpaste recipe

You will need: bicarbonate of soda, salt, glycerol, flavouring (e.g. peppermint or cinnamon) and food colouring.

1. Mix six tablespoons of bicarbonate of soda with two tablespoons of salt.
2. Add three teaspoons of glycerol, 10-20 drops of flavouring and 1 drop of food colouring.
3. Mix the ingredients thoroughly in a bowl and add just enough water to make it toothpaste-like.



If you are going to test your toothpaste on people (e.g. a taste test), you will need to make it in a food technology room using clean, hygienic equipment and only use chemicals that are fit for human consumption.

Remember, some people are allergic to certain food colourings.

Testing toothpaste's cleaning power

You'll need something to clean! Egg shells provide a reasonable alternative to teeth, which might be hard to get hold of, and they have similarly high calcium content. Using hard boiled eggs is probably your best option, try using white eggs, as these will show stains better.

You'll then need to think about how you're going to stain the egg shells. One method is to place your egg in a mixture of 120 cm³ boiling water, 1 teaspoon of vinegar and 20 drops of food colouring (red or blue is best).

Leave it for half an hour or so then dry the eggs on a paper towel. You could also try leaving the egg in a cup of tea, coffee or fruit drink. Make sure each egg is stained using the same procedure.

When you've got some stained eggs, you'll need to think how to clean them. Brushing is the obvious way, but there are many things to consider. For example:

- What sort of brush will you use? Make sure you use the same brush for each egg.
- How long will you brush each egg for?
- How will you control how hard you brush?
- Make sure you use the same amount of each toothpaste.
- How will you decide which egg is the cleanest? Will you just look at them and make a decision, or is there a way you could measure how much stain has been removed?

The results

Put the toothpastes in order of stain-removal (putting the one that removed most of the stain at the top). Now think about these questions:

- Which toothpastes were most abrasive, in other words, which were 'scratchiest'? You can test this simply by rubbing a small amount between your fingers. What are the advantages and disadvantages of abrasives in toothpaste? How could the abrasiveness be measured more accurately?
- Measure the pH of the different toothpastes. What method will you use? How could pH affect the cleaning ability of toothpaste?
- Would your homemade toothpaste help prevent cavities?
- What would you add to your homemade toothpaste to make 'whitening' toothpaste?
- How might your results differ if you were able to use actual teeth instead of eggs?

For a similar project at Bronze level try 'Make your own toothpaste'.

