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Toothpaste Truths: the chemistry of toothpaste

Read the article about the chemistry of toothpaste:

https://education.australiascience.tv/toothpaste-truths-the-chemistry-of-toothpaste/

In this, we learn about the ingredients that make up our toothpaste, and why they're all in there.

Activity:

This article explained that toothpaste was a non-Newtonian fluid: a liquid or gas that becomes thicker or thinner when a force is applied.

Toothpaste gets thinner when pressurised whereas other non-Newtonian fluids get thicker. One example of a fluid that gets thicker when a force is applied, is slime.

In this activity, we will make our own non-Newtonian slime.

Apparatus:

- 1/4 cup dry cornstarch
- Small jug of water
- Food colouring
- Large mixing bowl
- Large spoon / lolly stick to stir

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Method:

1. Add a couple of drops of food colouring to the water and stir it until it's mixed.
2. Add 1/4 cup of dry cornstarch to a bowl.
3. Slowly stir in 2 tablespoons (1/8) cup of water until all the cornstarch is wet.

You now have your non-Newtonian slime. Try picking it up and moving it quickly between your hands. What happens when you slow down?

Tip: do this over a bin-bag or similar to make the clean-up easier.

The theory:

Not all materials are obviously a solid, liquid or gas. Some seem to change when they are put under stress. These are called non-Newtonian fluids. They seem to change to become more solid or liquid when a force is exerted on them. The cornstarch mixture should act like a liquid when stirred slowly, it will run and can be poured. If a force is applied, like you hit the surface or compress it, try to pick it up (keep it moving quickly it should act more like a solid. Ketchup adn toothpaste do the opposite – they will act like a solid until they are shaken or pressurised when they will become more of a liquid.

Want more?:

- Watch the experiment: https://education.australiascience.tv/d-i-y-science-slime/
- Learn more about slime: https://education.australiascience.tv/scinema-2019-smart-slime/
- More non-Newtonian fluids: https://cosmosmagazine.com/science/physics/the-physics-of-the-chocolate-fountain/
- Non-Newtonian experiments in space: https://www.nasa.gov/mission_pages/station/research/experiments/explorer/Investigation.html?#id=7403