

Virtual STEAM

Science and Math

Toothpaste Challenge

Goal: I can improve my dental health by creating my own toothpaste using simple household ingredients.

Science Indicator: SC.5.3.1.D Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Math Indicator: MA 5.3.3 Measurement: Students will perform and compare measurements and apply formulas.

Math Indicator: MA 5.4.2.b Formulate questions that can be addressed with data and make predictions about the data.

Materials:

- 1 teaspoon Calcium Carbonate
- ½ teaspoon Sodium Bicarbonate (baking soda)
- 1 oz. Jar with Lid
- 1 - Popsicle Stick
- 1 - ½ Teaspoon
- 1 - Pipette
- 1 - 5ml vial Mint Extract
- 2 - Splenda Packets
- Toothbrush
- 5 - Paper Towels (for cleaning)
- 2 ½ ml of Water (not included)

Book Extension:

[The Toothpaste Millionaire](#)
[Jean Merrill](#)

Instructions:

1. Watch YouTube Video for background knowledge: PrairieSTEM Toothpaste

Challenge

Video https://www.youtube.com/watch?v=_tIRglcPNJQ
https://youtu.be/_tIRglcPNJQ



2. On your Chemical Reaction Log, make a prediction of whether mixing the dry substances together will make a new substance. Then make the same prediction for the liquids. After adding each set of substances, write your observations on your log. If you have a chemical reaction, then you have created a new substance.
3. You are going to use the provided materials to create a





usable toothpaste from minerals used by most people every day.

4. Take notes on the back of your Chemical Reaction Log of how much of each substance you add. This is your recipe. Next time, you may want to make changes to it.
5. Basic Toothpaste Recipe:
 - a. 1 teaspoon (tsp) Calcium Carbonate (2 spoonfuls)
 - b. ½ teaspoon of Baking Soda (1 Spoonful)
 - c. 2 Splenda Packets
 - d. Add just enough water with the pipette to make a paste.
 - e. Add one drop of mint at a time using the pipette. Mix after each drop of mint and taste. Stop when it tastes minty enough for you.
6. Create your improved recipe and keep track of your measurements.
7. Compare your recipe to the ingredients in your store bought toothpaste.
8. Reflect on your design:
 - a. How did your recipe compare to a store bought toothpaste?
 - b. What other minerals are added to fight cavities?
 - c. Research what other brands of toothpaste have

the same minerals you added into your toothpaste.

- d. Which were more expensive: the toothpastes with more minerals or the toothpastes with less minerals?

9. Document the challenge using video, photos, drawings, etc.

Extension:

- Create a marketing campaign to sell your toothpaste.

Video Extensions:

- “How We Keep Plastics Out of the Ocean” National Geographic - <https://www.youtube.com/watch?v=HQTUWK7CM-Y>



Social Emotional Connection:

- **Social Awareness:**
Generosity/Selfless Giving - Putting others before ourselves. Being willing to give or share with those without expecting anything in return. One generous idea with this toothpaste recipe is you could make toothpaste for a friend. Share your recipe with them!



Chemical Reaction Log

Use this log to record your predictions and observations

If you see any of these changes after adding a substance, a chemical reaction did occur

Substances	Predictions	Color Change	Smell or Odor Change	Liquid to Solid	Gas Bubbles / Fizzing	Notes - New Substance?
Mix your dry substances: Calcium Carbonate, Baking Soda, and Splenda						
Mix in your liquids: Water and Mint						