

STEM Experiment #1

The Beauty of Bubble Bath



Background Information

Research Activity

Great scientists like to know as much information as they can about their topic before they start their experiments. Use the questions below to guide your research on how bubbles form. This will help you to understand the science behind your product! You can use sources such as a dictionary or trusted science education websites on the Internet (with your teacher's permission, of course) and books from the library.

? **Question 1: Define the word "bubble."**

? **Question 2: How do bubbles form?**

? **Question 3: What is a preservative? Give two examples.**

Pre-Lab Activity: The Beauty of Mathematics

Before we began making bubble bath, we must complete the **formulation**.

A formulation is like a recipe the chemists follow in order to create their product. As a GPS chemist, you will need to edit the formulation below to make your bubble bath unique - like you!

Let's start with the **additives**, or the ingredients added to preserve or enhance the product. The fragrance oil, preservative and colorant are additives. You can add as little as 1% or as much as 4% of the additives to your product. The higher the percentage, the stronger the additive will be. For example, if you would like your bubble bath to have a strong fragrance, add 4% fragrance oil. If you are looking for a more mild scent, try 2%, and for a very light scent, try 1%. We suggest starting with 1% and increasing the amount by 1% until the desired fragrance is reached.



☑ **Predict:** What will happen to the color of the bubble bath if the percentage of the colorant is increased to the maximum 4%?

☑ **Calculate:** If you add 4% of colorant to 2 oz of soap base, how many teaspoons (tsp) of colorant will be added to your soap base?

- (a) .36 tsp (b) .48 tsp (c) .12 tsp (d) .24 tsp

☑ **Answer:**

1. **Convert oz to tsp:** 2 oz = 6 tsp
2. **4% of 6 tsp:** $.04 \times 6 = .24$ tsp
3. **Answer:** .24 tsp

☑ **Choose the amount of fragrance oil and colorant (additives) you will be adding to your soap base mixture using the reference chart below.**

% of Additive Desired	Milliliters (mL)	Tsp (tsp)	Pipette Drops (drops)
1%	0.6 mL	.12	12
2%	1.2 mL	.24	24
3%	1.8 mL	.36	35
4%	2.4 mL	.48	47

Example: I will use 2% of the fragrance oil, which is equivalent to 24 mL / tsp / drops.

I will use _____ % of the fragrance oil, which is equivalent to _____ mL / tsp / drops.

I will use _____ % of the colorant, which is equivalent to _____ mL / tsp / drops.

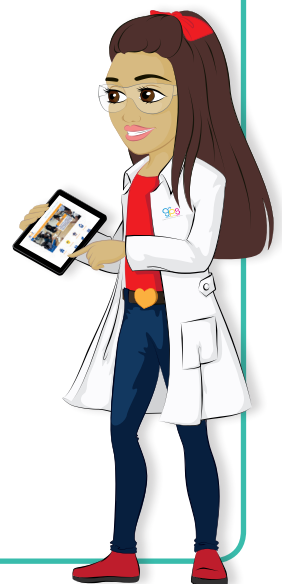
Hypothesis

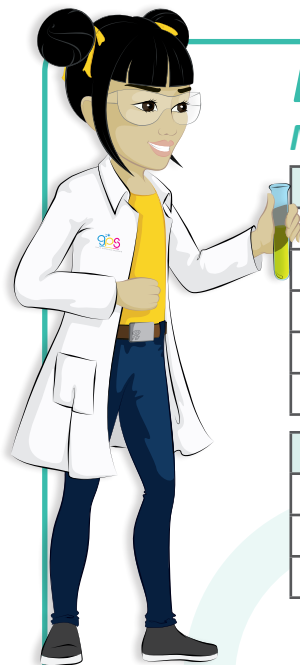
A **hypothesis** is a prediction that scientists make based on their research and prior knowledge. Based on the background information and research you have completed, write a hypothesis about changing the formulation for the fragrance oil and the colorant.

! To write like a GPS scientist, use the following format to guide you:

If I add more **fragrance oil** to my bubble bath, **then** my bubble bath will _____, **because** _____.

! **Hypothesize:** Write your own hypothesis for adding more or less colorant below.





Let's Make Bubble Bath!

Materials

EQUIPMENT IN YOUR KIT	QUANTITY	CLASSROOM EQUIPMENT	QUANTITY
Safety Glasses	1	GPS Lab Jacket	1
Pipette	1	Paper Towels	As needed
Product Bottle	1	Gloves	2
Stirrer	1	Beaker or Bowl	1
		Funnel (optional)	1

INGREDIENTS IN YOUR KIT	FORMULATION	CLASSROOM INGREDIENTS	FORMULATION
Soap Base	15 mL (½ oz)	Distilled Water	30 mL (1 oz)
Fragrance Oil	1% - 4%	Salt (Preservative)	0.62 mL (⅛ tsp)
Colorant	1% - 4%		

NOTE!

The materials list and formulation are for each person. If you are working in a group, multiply the quantity by the number of girls in your group!

Procedure

NOTE!

*Use caution when using the ingredients in your kit.
Be careful not to make any spills.*

DO NOT INGEST ANY OF THE INGREDIENTS!

Step 1: Read through all of the steps **before** you begin.

Step 2: Clean off your work surface and put on your safety glasses and your GPS Lab Jacket to protect your face and clothing.

Step 3: Gather all of your **ingredients** and **materials** (see list above) and arrange them in the order that they will be used.

NOTE!

Do not start making your product before you have all ingredients, supplies and equipment in front of you!

Step 4: Slowly pour 15 mL (½ oz) of the **Soap Base** into your **beaker**.

Step 5: Use a **pipette** to add _____ mL of **fragrance oil** to the Soap Base.

NOTE!

The amount of fragrance oil used is based on the percentage of oil you calculated in the pre-lab.



Step 6: Stir the mixture **slowly** until mixed well.

Step 7: Add 29.6 mL (1 oz) of **distilled water** and stir **slowly** until mixed well.

NOTE!

Make sure to stir SLOWLY or the mixture will result in too many bubbles!

Step 8: Add 0.6 mL ($\frac{1}{8}$ tsp) of salt as a **preservative** and stir slowly until mixed well.

Step 9: Measure out the amount of colorant you decided to use.

NOTE!

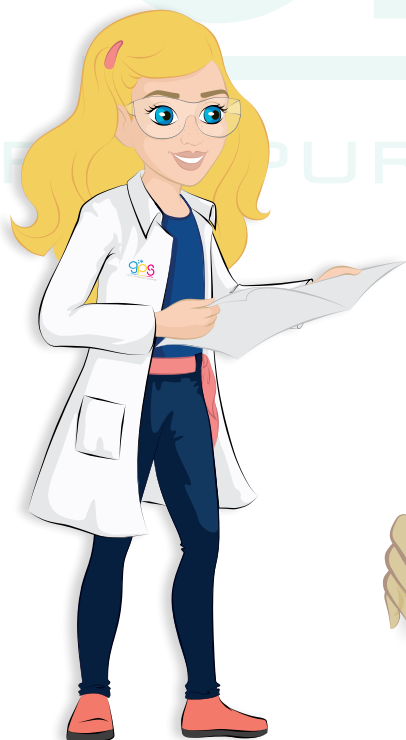
The amount of colorant used here is based on the percentage of oil you chose in the pre-lab.

Step 10: Using your pipette, add 1 tiny drop of **gel colorant** and stir until there are no visible color streaks. Add tiny drops until you have reached your desired color.

Step 11: Stir your mixture for about 2 - 3 minutes using gentle agitation with your stirrer.

Step 12: Fill your **bottle**. Screw on the cap.

DONE!



Analysis and Conclusion

After completing an experiment, scientists ask themselves questions in order to see what they have learned about their topic. Answer the following questions about your experiment in creating your own bubble bath.

? **Question 1: Did your bubble bath product turn out the way you wanted it to? Why or why not?**

? **Question 2: Describe how “bubbly” your bubble bath product is. Can you think of a way to make your product more “bubbly”?**

? **Question 3: Why is it important for scientists to follow procedures in the correct order? Explain the possible errors that could occur if they do not follow the procedure.**

GIRLS PURSUING SCIENCE

