

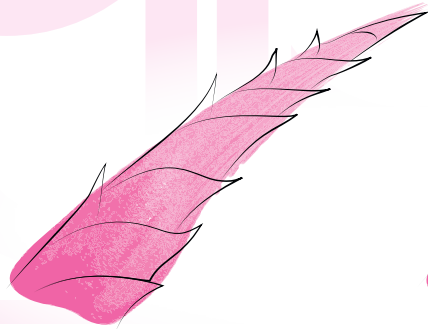
STEAM Experiment #6

The Beauty of Conditioner

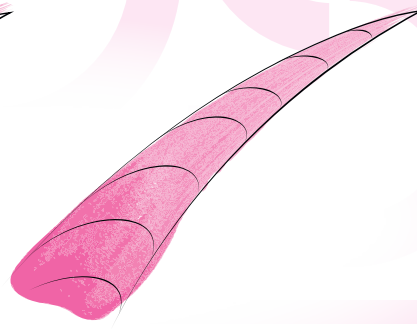


Science

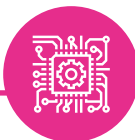
After washing your hair with shampoo, the next step is to use hair conditioner. Your hair is left feeling clean and smooth! But how does it do this? Is there something magic in conditioner that leaves it untangled and shiny? The answer is in the science! Your hair, at the microscopic level, looks like a frayed rope. As the days go by, your hair becomes more and more frayed. Conditioner works to bind the frayed strand together to make one solid strand of hair. This leaves your hair feeling silky and smooth!



Hair before Conditioner



Hair after Conditioner



Technology

Conditioner works by binding your hair into one, smooth and silky strand, but what specific ingredients are actually doing this work? What causes it to bind? In this section, you will research ingredients in conditioners and find out what each one is doing to play a part in conditioner's effectiveness.

INGREDIENT	FUNCTION





Engineering

Now that you know how conditioner works and what ingredients are needed to make it, you will engineer (design and create) your own conditioner. Follow the procedure below and be sure to think about your final product along the way. Good engineers are constantly thinking of new ways to make their product better and more advanced!

EQUIPMENT IN YOUR KIT	QUANTITY	CLASSROOM EQUIPMENT	QUANTITY
2 oz Conditioner Bottle	1	None needed	N/A
8 oz Beaker	1		
Pipette	1		
INGREDIENTS IN YOUR KIT	FORMULATION	CLASSROOM INGREDIENTS	FORMULATION
Conditioner Base	1 oz	Distilled Water	0.5 oz
Lavender Essential Oil	1 - 4 %		
Colorant (optional)	1 drop		

Part 1: *Imagine Your Product*

In order to make your own conditioner, you need to determine how much of each ingredient you will need. Answer the questions below to make decisions about your final product.

? *What color will you select for your conditioner? Why did you choose this color?*

? *Do you want your conditioner to have a strong scent? Why or why not?*

Part 2: *Plan Your Product*

Based on your responses above, determine how much of each ingredient you will need.

? *You will need the following ingredients and the amounts listed.*

1. 1 oz of conditioner base
2. 0.5 oz of distilled water

? *Determine how much of the Lavender Essential Oil you will need based on your product design. Circle which amount you think is appropriate.*

1. 1 drop of Lavender Essential Oil (faint scent); or
2. 2 drops of Lavender Essential Oil (medium scent); or
3. 3 drops of Lavender Essential Oil (strong scent).



? Determine how much of the Colorant you will need based on your product design. Circle which amount you think is appropriate.

1. 1 drop of Colorant (light color); or
2. 2 drops of Colorant (medium color); or
3. 3 drops of Colorant (dark color).

Part 3: Create Your Product

Follow the procedure below using the 4 ingredients and the amounts you selected.

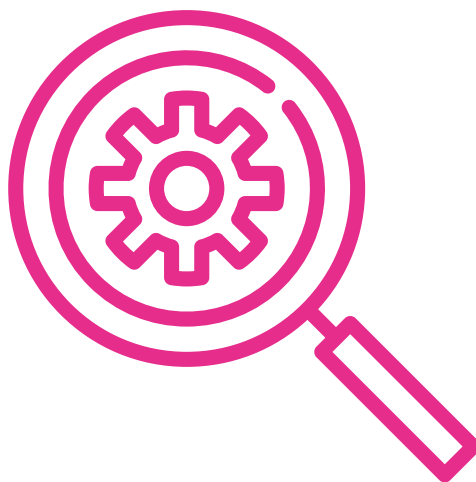
1. Pour 1 oz of the Conditioner Base into your beaker.
2. Add 0.5 oz distilled water.
3. Add your chosen amount of Lavender Essential Oil to the conditioner and water mixture.
4. Add your chosen amount of colorant, one drop at a time.
5. Stir the mixture until mixed well.
6. Pour the mixture into your conditioner bottle, screw the top on tightly and shake vigorously.

Part 4: Evaluate Your Product

Reflect on the final product you have created. Answer the questions below in order to consider changes you could make that would improve your product.

? Did your product turn out the way you imagined it would be in Part 1? Why or why not?

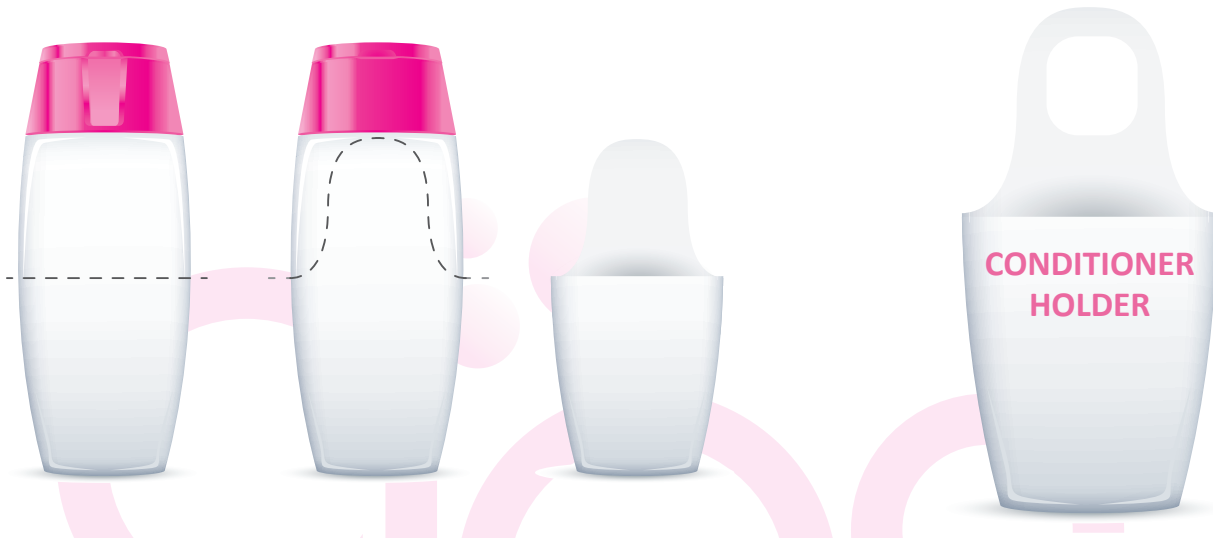
? What are some additions you could make to the formula of your product? Are there any ingredients you would like to add that would improve the quality? Give an explanation for each addition.





Art

Now that you have made shampoo and conditioner, let's design the matching conditioner holder to hang in the shower! Follow the same instructions that you used to make your shampoo holder.



Mathematics

Consider the following: Your main retail customer has decided they want to sell an economy-sized version and a travel-sized version of your conditioner. Currently, you are selling your product in 2 oz bottles for individual sales. Your customer would like the economy size to be double the current amount and the travel size to be $\frac{1}{2}$ of the current size. Calculate the new product sizes and the amount of each ingredient you will need to create each bottle.

☑ **Example:** I have 10 g of sugar and need double the amount for a recipe. To figure out how much I need, I have to determine double the amount of 10.

$$10 \text{ g} \times 2 = 20 \text{ g of sugar needed!}$$

☑ **Example:** Now, make half of the recipe. Instead of 10 g of sugar, I only need half the amount of sugar.

$$10 \text{ g} / 2 = 5 \text{ g of sugar needed!}$$

TRAVEL SIZE ($\frac{1}{2}$)	CURRENT SIZE	ECONOMY SIZE (2x)
Final Product ___ oz	Final Product 2 oz	Final Product ___ oz
Conditioner Base Amount ___ oz	Conditioner Base Amount 0.5 oz	Conditioner Base Amount ___ oz
Distilled Water Amount ___ oz	Distilled Water Amount 0.5 oz	Distilled Water Amount ___ oz
Lavender Oil and Colorant Amount ___ ounce	Lavender Oil and Colorant Amount $\frac{1}{2}$ ounce	Lavender Oil and Colorant Amount ___ ounce