

Soy Beautiful

Soy Lip Balm Challenge

Background Info

Cosmetics chemists choose from thousands of ingredients when they create new products, but they are always careful to select ones with chemical properties that enhance the look, feel, and use of the product they are making. For instance, no one wants lip balm to be too hard, which is why most homemade lip balm recipes call for some type of oil or butter.

Oils are generally thick, viscous liquids at room temperature and are usually **emollients**, meaning that they soften and smoothen the skin. **Butters** are another kind of emollient; they are soft, but not liquid, at room temperature. On the other hand, a super soft, runny lip balm would be too messy, so **waxes**, like beeswax or soy wax, which are solids at room temperature, are added to thicken the recipe. The "perfect" product means getting just the right **ratio** of emollients to waxes.

Oils, butters, and waxes are excellent ingredients for lip balms because they are **occlusive agents**, which means they create a physical barrier between the moisture in the lips and the outside environment. A "good" product creates a protective barrier with just one or two swipes across your lips. No one wants to go over their lips again and again before there is enough to adequately protect their lips!

Design Challenge:

In small teams of 2-3 lab technicians, you will use SLOP#503 to create a basic soy-based lip balm as your team's control sample. Then your team will need to alter the standard SLOP to create a better soy-based lip balm that will create a protective barrier with no more than 2 swipes of coverage (you may swap out or add ingredients but must use vegetable oil and soy wax within the new recipe).

SLOP #503: Basic Soy-Based Lip Balm

Procedure

1. Weigh 12.5g of soy wax and place into a 100mL Pyrex beaker.
2. Using a serological pipette, measure 12.5mL of vegetable oil, and add to the soy wax in beaker.
3. Place beaker on hot plate or wax burner to melt soy wax completely into vegetable oil (stirring often to prevent burning).
4. Remove beaker from hot plate, then add 0.1g of cocoa butter shavings, 0.1g of sweetener and 100uL of flavoring oil. Mix until all shavings have dissolved, then pour mixture into lip balm tubes. (need at least 2 vials)
5. Allow tubes to sit for 5 minutes to solidify.

SLOP #504: (Your Team's Lip Balm – Create a name for your lip balm sample #1)

Procedure (Your team needs to manipulate the basic recipe to create a smoother, greater barrier protective lip balm, etc.) For example...Your team can use a blend of soy & bees wax, a blend of oils, add in butters, etc. Make sure to type up new SLOP. Your team will need to make 2 vials.

SLOP #505: (Your Team's Lip Balm – Create a name for your lip balm sample #2)

Procedure (Your team needs to manipulate the basic recipe to create a smoother, greater barrier protective lip balm, etc.) For example...Your team can use a blend of soy & bees wax, a blend of oils, add in butters, etc. Make sure to type up new SLOP. Your team will need to make 2 vials.

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Product Testing

Testing the Water Seal

Lip balm is used to prevent the sensitive skin on our lips from drying out. This test will verify if a layer of lip balm can create a water seal. A good seal acts like a barrier and prevents moisture in the skin from evaporating.

1. Take four strips of construction paper, two for control samples and two for team created sample. Make sure to label the strips with appropriate samples.
2. Rub the lip balm on the paper until you completely cover a small area of the paper. For this test, you should not leave spots uncovered in the small area you are covering. For some lip balms, one rub might be enough. For others, you might need several rubs before the paper is covered. Stop rubbing as soon as you see that a small area on the paper is completely covered.
3. Use a disposable pipette to carefully put three water drops on each area, as shown in Figure 1.
4. Wait 5 minutes and then observe whether a drop stays on the paper surface or soaks into the paper. If the water drop stays on top, that means the lip balm can create a water seal for that drop.
5. Record how many drops stay on top of surface.

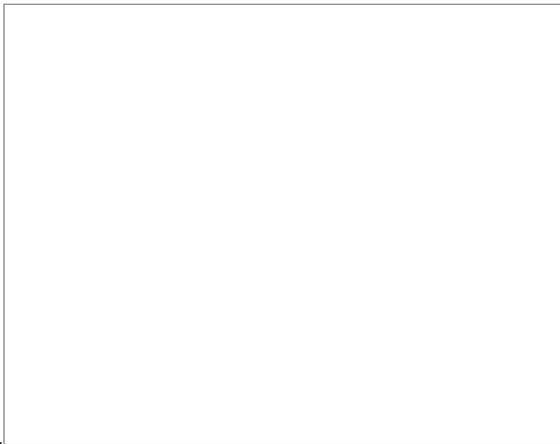


Figure 1: Set up of Water Seal Test

Testing Performance at High Temperatures

1. For each recipe, cut off a 5 mm cylinder off a lip balm stick, as shown in Figure 2. Place each tiny cylinder on a piece of foil and make sure to label sample to identify which SLOP sample testing.
2. Turn hot plate to low setting (2 or no higher than 77 degrees Celsius).
3. Place the foil with sample on hot plate. Start the timer and time how long it takes to melt.
4. Record the time it takes for each recipe to melt completely. You might need to be patient. It could take 15 minutes before the first melting is observed.
5. Repeat the steps 1–4 two more times for a total of three trials for each sample



Figure 2

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Testing Stickiness at Different Temperatures

1. For each SLOP recipe, cut off three 5 mm cylinders of lip balm from a stick, as shown in Figure 2 in the step-by-step instructions of section **Testing Performance at High Temperatures** (above). Place these tiny cylinders on clean pieces of construction paper labeled with the SLOP # and team initials.
2. Place one set of lip balm samples (this is one cylinder of each recipe) in the refrigerator for 1 hour. Place another set in the freezer for 1 hour and leave your last set out at room temperature.
3. Wash 9 pennies in soapy water, rinse, and let them dry.
4. Perform the stickiness test for your room-temperature sample: Take one room-temperature sample to start with. Press a penny lightly on top of the cylindrical sample, as shown in Figure 4.
5. Turn the paper over so the penny is resting on your workspace, with the sample on top.
6. Remove the paper and press a clean finger lightly into the lip balm sample. Keep the construction paper with the recipe name so you remember which recipe you are testing.
7. Start the timer as you lift up your finger. The sample and penny are now hanging from your finger, as shown in Figure 5.
8. Stop the timer when the sample falls. Repeat your test if the penny falls before the sample. If the sample with penny holds more than 90 seconds, you can stop and write "> 90 seconds" (indicating "more than" 90 seconds).
9. Note the time down in your data table under the correct recipe. Throw away your paper with the recipe name so no confusions arise when testing more samples.
10. Proceed with the next sample until you have tested all recipes.
11. Perform the stickiness test with your refrigerator set and freezer set. Be sure to take out one sample at a time and leave the samples you are not testing in the refrigerator or freezer.
12. This completes one trial. Repeat the steps 1–5 two more times for a total of three trials for each recipe.

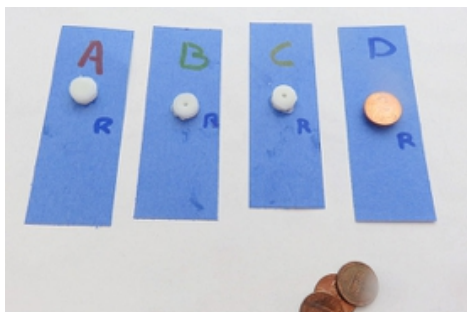


Figure 4



Figure 5

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