

SOAP LAB



WHEN MAKING BASIC SOAP USING THE COLD-PROCESS METHOD, IT IS A CHEMICAL REACTION BETWEEN THE LYE AND THE MELTED FATS THAT MAKES IT POSSIBLE. JUST ABOUT ANY FAT OR COMBINATION OF FATS MAY BE USED WHEN MAKING COLD-PROCESS SOAP. SOAP QUALITIES- SUCH AS THE HARDNESS OR SOFTNESS OF THE BAR, WHETHER IT IS HARSH OR MILD, THE SIZE AND AMOUNT OF BUBBLES IT PRODUCED- ARE DETERMINED BY THE TYPES USED.

PURPOSE: TO MAKE SOAP USING THE SAPONIFICATION OF FATS AND LYE.

HYPOTHESIS:

MATERIALS: STIRRING ROD, FATS, THERMOMETER, NaOH (LYE), MOLD, TRIPLE BEAM BALANCE, GRADUATED CYLINDER, HOT PLATE, BEAKERS, DISTILLED WATER, WOODEN SPOON



CAUTION:

Lye(sodium hydroxide), lye/water and freshly-made soap can burn and irritate skin. You'll notice itching before burning. Lye/water on skin is first noticed by a slippery feeling. Rinse your hands with vinegar and immediately rinse them with running water.

Since lye(sodium hydroxide), can burn skin, you can imagine what it does to eyes! Always wear eye protection! Lye(sodium hydroxide), can be fatal if swallowed.

Drinking lye/water is like drinking liquid fire. If someone ingests lye/water, do not induce vomiting or otherwise try to treat them. Take them to an emergency room immediately.

Fumes from lye/water. Some people are extremely sensitive to fumes that come from the lye/water. Fumes also come from the stirring container. Fumes from small batches usually isn't enough to cause a problem.

With prolonged contact, fumes can burn the eyes and skin of sensitive people. If you make soap in large amounts and afterward

feel as if your face is "sun burned," chances are it was caused by fumes.

Lye(sodium hydroxide), reacts with some metals: aluminum, zinc, and tin. Safe containers include heatproof stoneware, glass, enamel, stainless steel and plastic.

Lye(sodium hydroxide), can remove paint. If lye, lye/water or freshly-made soap splatters onto a painted surface, wipe it off immediately. Wash the area with water and detergent; wash it with clear water, then wipe it dry. Use old rags, because lye(sodium hydroxide), weakens cloth fiber.

Thousands of people make soap without mishap. In order to do so, you must be aware of all safety hazards. Children, pets and *feeble-minded people* should not be in the soap making area or have access to stored soap making ingredients, especially lye(sodium hydroxide), and essential oil.

BASIC Soap RECIPE

Ingredients:

- 225 grams lard or beef tallow
- 31 grams lye (sodium hydroxide)
- 88 mL water

Estimated tracing 45 minutes. Fat and lye/water temperature about 50 degrees C. Time in molds: 24 hours. Age: 3 weeks

PROCEDURE:

The 9-step Procedure

- 1) Put on eye protection and rubber gloves.
- 2) Heat the fat. Put the fats in a lye-resistant container and place a glass or stainless steel thermometer into the fats. Be sure the thermometer doesn't touch the bottom of the container and give a false reading. Heat the fat to the temperature specified in the recipe.
- 3) Use a heat-proof container to measure the amount of cold water (21 to 24 degrees C) specified in the recipe. Cold water is important. If you add lye to hot or boiling water, the water could "boil-up" out of the container.

If you add lye to **really** cold water, the lye/water might not reach the high temperatures required to make some recipes.

Stir the water and slowly add the lye. The water will get hot and turn cloudy. Continue to stir until the lye dissolves. Don't breathe or intentionally smell the fumes coming from the cup because they are quite "choky." If you wait too long to stir the water, the lye could harden in the bottom of the container. This is not a problem. You can still stir it, but it will be more difficult. Add a glass or stainless steel thermometer to the lye/water and wait until it reaches the temperature specified in the recipe.

- 4) When both the fat and the lye/water reach the temperature specified in the recipe, add the lye/water to the fat. It's sometimes a balancing act to get the fat mixture and the lye/water mixture to specific temperatures at the same time. Never place lye/water in a microwave (the cup could break).

It takes lye/water longer to cool than it takes fat to heat. Most soap makers wait for the lye/water to cool to about five degrees above the desired temperature, then heat the fat. When both the lye/water and the fat are within five degrees of the temperatures specified in the recipe, use a pot holder and move the bowl to a sink (to contain splatters).

Slowly pour the lye/water into the fats while stirring.

Temperatures for small one-pound batches of soap poured into individual molds aren't critical. As long as the lye/water and fats are between 50 and 60 degrees C you will have good success. Larger batches or batches poured into a single mold, require lower temperatures.

- 5) Stir the soap until it "traces."

When lye, water and fat first combine, the mixture is thin and watery.

Gradually, as the lye and fat react chemically to form soap, the mixture thickens and turns opaque.

"Tracing" is a term to describe the consistency (thickness) of soap when it's ready to pour into molds.

To test for tracing:

a. Drip some soap onto the surface of the soap in the stirring bowl. It should leave a "trace" or small mound.

b. Draw a line in the soap with a spoon or rubber spatula. If a "trace" of the line remains for a few seconds, the soap has traced.

Tracing is easy to recognize, yet it causes new soap makers a lot of worry. Relax and know that the soap will trace eventually. Just stir the soap constantly for the first 15 minutes or so, then stir the soap every fifteen minutes until it thickens and traces, no matter how long it takes.

6) Pour the soap into molds and wait for it to harden. The recipe states this length of time as 'time in mold.'

7) Unmold the soap.

Soap is still harsh when it's time to remove it from the molds. Put on rubber gloves and press the back of each mold compartment to release the soap. It's a lot like removing ice cubes from a tray. Sometimes the soap doesn't release easily from the mold. To overcome this problem, leave the soap in a freezer for a few hours. Freezing soap causes it to contract slightly, become hard and release from the plastic mold.

8) Wait the time specified in a recipe for the soap to "age" (usually 3 weeks). During the aging time the pH of the soap decreased (the soap becomes mild) and the bars harden. It's a good idea to write the following information on a piece of paper and place it with the soap: the date you made the soap, the date the aging time is over, and recipe.

9) Step 9 is *enjoy your soap!*

As soap ages, a fine, white powder may appear on the surface. This is soda ash (sodium carbonate) formed by a reaction of lye with carbon dioxide in air. This white powder is mostly on the surface exposed to air while the soap was in the molds. Soap that contains wax develops little or no soda ash.

There are three ways to deal with soda ash:

Try to prevent it.

Immediately after pouring soap into molds, cover the soap with plastic wrap or waxed paper. Press the wrap or paper onto the surface of the soap to prevent air contact.

Cut it away.

Overfill the molds slightly. Later, when the soap hardens, take a knife and cut the soap level with the mold. This also cuts away the soda ash.

Wash it away.

Wait until the soap ages and hardens. Wash the powder away by rubbing the soap with your hands under running water or by rubbing the soap over a wet dishcloth. Set the soap aside to dry then enjoy your soap!

CAUTION: IF HARD, SHINY SPOTS APPEAR IN THE SOAP, IT HAS NOT PROPERLY SAPONIFIED AND LYE HAS BEEN LEFT IN THE SOAP. IN THIS CASE THE SOAP MUST NOT BE USED!

Super fattening soap

The following recipes result in soap with very little excess fat. This soap leaves skin perfectly clean and smooth feeling. Some people like excess fat in recipes. To superfat soap, add 15 to 30 mL additional fat, such as castor oil. Castor oil is emollient and contributes to soap lather.

OPTIONAL Homemade Soap Recipes :

Soap II Pure Soap Recipe.

Ingredients:

- 226.5 grams coconut oil
- 38 grams lye (sodium hydroxide)
- 125 mL water

Fat and lye/water temperature about 50 degrees C

Estimated tracing time: 1 1/2 hours

Time in molds: 48 hours

Age: 3 weeks

This is the only recipe I've discovered that remains scent-free without adding fragrance to the recipe. This soap is a bit too harsh for bath soap, but great for cleaning, washing dishes, delicate laundry, etc. Great lather and no fragrance

Soap III

Ingredients:

- 85 grams coconut oil
- 85 grams olive oil
- 70.8 grams vegetable shortening
- 36 grams lye (sodium hydroxide)
- 125 mL water

Fat and lye/water temperature about 50 degrees C

Time in molds: 48 hours. Age: 4 weeks

Soap IV

- 128 grams vegetable shortening
- 56.6 grams coconut oil
- 42.5 grams lard
- 33 grams lye (sodium hydroxide)
- 89 mL water

Fat and lye/water temperature about 50 degrees C

Time in molds: 24 hours. Age: 3 weeks

Soap V -- Beeswax Castile

Ingredients:

- 226 grams olive oil
- 15 grams beeswax
- 15 grams palm oil
- 29 grams lye (sodium hydroxide)
- 115 mL water
- (melt the beeswax with the fats)

Fat and lye/water temperature about 66 degrees C

Tracing time: about 12 minutes FAST! Time in molds: 48 hours. Place the soap in a freezer for 3 hours, then remove it from the mold.

OBSERVATIONS:

Draw and describe the soap you made. (texture, color, smell, density, hardness, lather, etc.)

CONCLUSIONS:

1. SUMMARIZE the safety required in this lab:
2. Describe the process to make soap:
3. What chemistry did you use or learn?
4. How would you change or improve this lab?

