

# Ballard Organics – Soap Making 101

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## A. Locating lye (and safety precautions)

Soap making is a chemical process where oils are mixed with a lye-water solution which converts oils into soap. Soap cannot be made without lye (also known as Sodium Hydroxide or caustic soda). Properly made soap no longer contains lye; it's just soap, glycerin, a bit of excess oils, essential oils, and any additives you've put into the soap mixture.

Lye can be nasty if handled improperly. Be aware of all the dangers present in order to avoid trouble. The following may seem intimidating but thousands of people make soap everyday without mishap.

Most good soap recipes list lye by weight for accuracy. A scale is a necessary part of successful soapmaking and allows you to use any type of lye. Lye in granular form (drain cleaner) measures differently by volume than lye in flake form (the form of lye from laboratory chemical suppliers, pool chemical suppliers, etc) so it is always best to weigh your lye (and all other ingredients as well).

Keep lye tightly capped. Upon opening a container of lye, the lye crystals absorb water from the air, which can weaken the strength of the lye and cause it to form a solid lump. When not in use, keep lye closely capped.


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

Lye 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 weakens cloth fiber.

Lye, 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 can burn skin, you can imagine what it does to eyes! Always wear eye protection! Wear sunglasses if you have to! Keep a bottle of vinegar handy in case of skin contact, vinegar will neutralize lye instantly.

Lye can be fatal if swallowed. If you have small children, keep lye (and essential oils) in a



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4759 Brooklyn Ave. NE  
Seattle, WA. 98105  
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locked cabinet. Lye-water sitting at the edge of a counter can easily be reached by children and even 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.

Some people are extremely sensitive to fumes that come from the lye-water. Fumes also come from the stirring container. Fumes from small batches (1 pound) usually aren't enough to cause a problem.

Be aware than larger amounts of lye (larger batches of soap) create more fumes. 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 is becoming increasingly difficult to find these days. "Red Devil" brand lye was once the standard lye used for home soap makers. This brand has been taken off the market and the rumor is that it was taken off the market because pure lye is a component in the manufacture of methamphetamines. There are still places to find lye locally such as Ballard Organics Soap Company ([www.ballardorganics.com](http://www.ballardorganics.com)). Don't bother looking at liquid drain cleaners (they are not pure lye) and don't try Drano (it contains metal). If you aren't sure the product is pure lye, then order lye from a soapmaking or chemical supplier.


Most people make soap without mishap. In order to do so, you must be aware of all safety hazards. **Children and pets should not be in the soapmaking area or have access to stored soapmaking ingredients, especially lye and essential oil.**

## B. The equipment list:

- one 4-to-6 cup mixing container made of lye-resistant material (I use a stainless steel mixing bowl)
- one heatproof container that holds at least 2 cups (I use a Pyrex measuring cup)
- stainless steel, plastic, wooden spoon or a rubber spatula
- two thermometers made of glass or stainless steel (candy and meat thermometers work well)
- eye protection (wear sunglasses if you have to!)
- rubber gloves (optional)
- accurate scale to weight the oils and lye
- soap molds (any flexible plastic container works well)
- a clock with a second hand or other type timer
- wire whisk (optional)
- pot holders or oven mitts
- measuring spoons

## Today's recipe:

24 oz. Olive Oil  
24 oz. Coconut Oil  
38 oz. Palm Oil



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12 oz. Lye (sodium hydroxide, caustic soda)  
32 oz. water

## C. The 10-step Procedure

**1) Prepare your mold in advance and place it nearby where it will be conveniently available in the event it becomes necessary to pour your batch in quickly. Lining a mold with freezer paper is great for easy removal of the finished soap from the mold as you can unwrap the sides and lift it right out. It is also snap to peel freezer paper off the loaf without the assistance of a lubricant. Also, the freezer paper can be used as a cutting surface when the soap is ready to be cut into bars.**

**2) Heat the oils.**

Put the oils in a lye-resistant container and place a glass or stainless steel thermometer into the oils. Be sure the thermometer doesn't touch the bottom of the container and give a false reading. Heat the oils and optional ingredients to the temperature specified in the recipe. Use a container large enough to accommodate all of your ingredients including lye/water and essential oils as this container will be the one you use to mix the soap in.


I prefer to make bar soap in the 90-110F range. The higher temperatures will make the soap set up faster, I prefer lower temperatures as this make the process take a little longer and allow me to take my time to add essential oils and herbs without being panicked if the soap sets up too quickly.

**3) Put on eye protection and rubber gloves.**

**4) Use a heat-proof container to measure the amount of cold water (70 to 75 degrees F) 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. Some people choose to stir the lye/water outdoors so the fumes aren't stuck in an enclosed kitchen. If you choose to mix the lye/water in your kitchen then I suggest leaving a window open in the kitchen or turning on the fan above the stove. Fumes come from the lye-water solution for only a few minutes after the lye is added to the water.**

For small batches of soap I mix the lye-water in a 1 gallon Pyrex measuring container, the kind with the handle on the side. I fill the Pyrex container with the desired amount of water and then place the container in the kitchen sink. I then fill the sink with enough water to bring the level of water in the sink to the level of water in the Pyrex.

When mixing the lye into the water, the mixture will heat up to 180+ degrees very quickly; the sink full of cold water around the Pyrex will help the lye-water mixture to cool more quickly. Stir the water and slowly add the lye. The water will get hot and turn cloudy. Continue to stir until the lye dissolves and the water becomes clear. Don't breathe or intentionally smell the fumes coming from the cup because they are quite "chokey." 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. Once the lye-water mixture has become clear then you may stop stirring and let it sit until it cools down to the desired temperature.



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**5)** When both the oils and the lye-water reach the temperature specified in the recipe, slowly add the lye-water to the oils. It's sometimes a balancing act to get the oils and the lye-water solution to specific temperatures at the same time. Never place lye-water in a microwave (the cup could break). If your lye-water has cooled down too much then it may be warmed on the stove in a stainless steel pot.

It takes lye-water longer to cool than it takes oils to heat. Some soapmakers wait for the lye-water to cool to about five degrees above the desired temperature, and then heat the oils. When both the lye-water and the oils are within five degrees of the temperatures specified in the recipe then it is time to start mixing. Slowly pour the lye-water into the oils while stirring. NEVER pour oils to lye-water solution.

**6)** Now it's time to add essential oils, herbs, and oils to be used to superfat the soap. Continue stirring your mixture at an even pace making sure to get the sides and bottom of the mixing bowl.

**7)** Stir the soap until it "traces."

When lye, water and oils first combine, the mixture is thin and watery. Gradually, as the lye and oils 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 soapmakers 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

**8)** Pour the soap into molds and wait for it to harden. It usually takes 24-48 hours for the soap to become hard enough to remove from the mold

**9)** 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 15 minute. Freezing soap causes it to contract slightly, become hard and release from the plastic mold. However, you don't want to freeze the soap for too long as it will slow the chemical processes which are occurring in the soap. You may cut your soap now or wait until the soap is done curing. It will be easier to



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cut now, and if you plan to stamp an image on the soap you should do it now, after curing the soap will be too hard to stamp.

**10)** Wait for the soap to cure, 3-6 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.

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:

a. 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.

b. 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.

c. 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!

## D. Herbal soap


You can replace the water in soap recipes with herbal tea, but to be honest, most of the properties (color and fragrance) are lost. The best way to use herbs in soap is to add dry, finely powdered herbs to the fats after adding the lye/water. Use anywhere from 1 tablespoon to 1/4 cup dried herbs to 1 lb soap. Restrict coarsely-ground herbs to about 1 or 2 tablespoons per lb soap because they contribute coarseness to the soap that sometimes makes it uncomfortable during use.

The nicest way to add properties of herbs to soap is the addition of pure essential oils. Use anywhere from 1 teaspoon to 2 tablespoons essential oil per lb soap (depending on the strength of the oil).

Natural colors can be obtained by adding 2 tablespoons red clay, Calendula petals, or yellow palm oil.

## E. Superfatting soap

Superfatting is a technique in soapmaking in which oils are added to the recipe which will not be converted into soap. When mixing the lye-water and oils there will be a “perfect” ratio in which all of the oils are converted into soap and there is no lye-water left over at all. However, in small batches at home it is sometimes hard to tell if one has the perfect



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ratio. Superfating is done to prevent the chance of there being extra lye-water in the soap which would result in the soap being caustic. Superfating is also done to create a bar of soap which will be more moisturizing. 2-10% is generally the range to which soaps are superfatted (2-10% extra oils which are not converted into soap). The one drawback of a highly superfatted soap is that the unsaponified oils are more prone to rancidity which will decrease the shelf life of the soap to as little as 8-12 months.

## F. Taking care of your soap once you get home:


1. Remove your soap from its mold 48 hours after your soap making class.
2. Once the soap block is out of the mold you may then cut it into bars. Use a chef's knife or wire. The soap will be soft enough to cut easily at this point.
3. Place your bars somewhere that they can sit for 3-4 weeks while they cure. A paper bags works great to let the soap breath yet close to keep dust off of your curing soap.

## G. Suggested reading:

Soapmaker's Companion: A Comprehensive Guide with Recipes, Techniques & Know-How... by Cavitch, Susan Miller

Hand Crafted Soap by Delores Boone

The Complete Soapmaker by Norma Coney



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