Soap Making

Soap making is simple chemistry, but are a few important things to know before you start.

1. Why Precision Matters

- **Always measure your ingredients carefully.** Use a digital scale and try to be exact—measure to the gram if you can. Even being off by 5 grams can change how your soap turns out.
- **Don't guess or estimate.** Accurate measurements help your soap harden properly and keep it gentle on your skin.

2. Choosing and Using Oils

1. **Every oil is different.** Some oils make soap harder, some make it softer, some add lather, and some are more moisturizing.
2. **Don't swap oils without checking.** If you want to use a different oil, you must recalculate how much lye you need. Using the wrong amount of lye can make your soap too harsh or too soft.
3. **Find a good balance.** A mix of oils usually works best. Too much of one kind can make your soap either too soft (it won't harden) or too harsh (it might irritate your skin).

3. Common Pitfalls and How to Avoid Them

- **Soap that's too soft:** This usually means you used too much soft oil or didn't measure carefully.
- **Soap that's too harsh:** This can happen if you use too much lye or the wrong oils.
- **Tip:** Always double-check your recipe and measurements before you start. AND USE A SOAP CALCULATOR !!! A MUST !!! I use SoapCalc http://soapcalc.net/calc/soapcalcwp.asp
- **Tip:** Check with In Country coordinator to find oil available and affordable. Practice making the soap with the Oils they have in country.

4. Helpful Tips for Beginners

1. **Start small.** Try making a small batch first to practice. And use the oils they will have in country. For example – Fiji does NOT have affordable Olive Oil or Palm Oil. We could only find Coconut, Sunflower and Canola. So practice with the oils available (and affordable). Make a good recipe (balance hardness, moisturizing and lather) and test it before you go!
2. **Take notes.** Write down what you do and how your soap turns out. This will help you improve each time.

3. **Be patient.** Soap needs time to cure and harden, so don't rush the process.

5. Safety First

- **Wear gloves and goggles.** Lye can be dangerous if it touches your skin or eyes.
- **Work in a well-ventilated area.** Always add lye to water (never the other way around) to avoid splashes.

Soap Process Basics and Supplies:
Essential Ingredients:

4. Oils or Fats: Vegetable oils (like olive oil, coconut oil, palm oil) or animal fats (like lard or tallow). Other oils can work if they are easier and less expensive - like Avocado, Canola Oil (rapeseed) or vegetable oil
5. Butters: Cocoa Butter, shea butter ,mango butter (optional)
6. Lye: Also called Caustic Soda or sodium hydroxide (NaOH) - can be found in plumbing supplies as a drain cleaner
7. Water: Used to create a lye solution.

Optional Additives:

- Essential oils or fragrance oils: For scent.
- Colorants: To add color to the soap.
- Other additives: Like ground herbs, seeds, or powders to enhance texture or appearance.

Essential Tools:

4. Heat Source (microwave, stove, slow cooker)
5. Scale: Kitchen scale (0-12 lb capacity) Must be able to measure precisely --- like 4.5 ounces – prefer digital scale if possible
6. Soap molds: To shape the soap. Can use loaf molds, individual molds, silicon molds, boxes, milk cartons, plastic tubs
7. Thermometer: To monitor temperatures during the soap-making process. (Candy or meat or gun style thermometer)
8. Immersion blender: To mix the oils and lye solution thoroughly.
9. Safety gear: Goggles and gloves to protect yourself from the lye and hot mixtures. Mask is also recommended.
10. Heavy duty Plastic, glass, or stainless steel container (for measuring lye and water)
11. Stainless steel pot: For melting oils. *** Do NOT use aluminum ***
12. Spatula and spoon: For stirring and mixing. Silicon, stainless or plastic
13. Soap cutter (optional): For cutting the soap into bars.

14. Pipets to measure fragrance and colorant
15. Table Clothes, Cleaning rags and supplies … making soap is MESSY!
16. Vinegar can neutralize lye. Keep a bottle of vinegar nearby when using lye. If you spill on yourself, rinse your skin with water and then with vinegar.
17. isopropyl alcohol (the higher percentage the better - like 99% - but 70% works if cannot find 99%)
18. Wax Paper
19. Spray Bottle
20. online soap calculator * to calculate correct amount of oils and lyes
    a. http://www.soapcalc.net/calc/SoapCalcWP.asp

Soap Making Tutorial for Beginners

Basic Cold Process Soap Recipe

Ingredients:

8. 175g distilled water
9. 96g sodium hydroxide (lye)
10. 70g shea butter, cocoa butter, mango butter, tallow, lard, or palm oil
11. 140g coconut oil
12. 490g olive oil or a blend of liquid plant oils (see below for substitutions)
13. Optional: essential oils, colorants, botanicals

Equipment:

- Safety gear (gloves, goggles)
- Digital scale
- Heat-resistant containers
- Stick blender
- Soap mold

Steps:

21. **Prepare the Lye Solution:** Slowly add lye to water (never the reverse) in a well-ventilated area. Stir until dissolved and let cool.
22. **Melt Oils:** Gently melt solid oils/butters, then add liquid oils.
23. **Combine:** When both lye and oils are around 100–120°F (38–49°C), slowly pour the lye solution into the oils.
24. **Blend:** Use a stick blender to mix until “trace” (the batter thickens and leaves a mark on the surface).
25. **Additives:** Stir in essential oils, colorants, or botanicals if desired.
26. **Pour:** Pour into a lined mold, cover, and insulate.
27. **Cure:** After 24–48 hours, unmold and cut into bars. Cure for 4–6 weeks before use. [ellyseveryday.com]

Video Demonstration:

- Beginner Soap Tutorial and Recipe (with oil substitutions)
- Step-by-step cold process soap making

Modifying Soap Recipes Based on Local Oil Availability

Why Modify?

- Local oils may be more affordable, sustainable, or accessible.
- You may want to avoid certain oils (e.g., palm oil) for ethical or allergy reasons.

Key Principles

1. **Soap Making Is Chemistry:** Each oil reacts with lye differently. Substituting oils changes the amount of lye needed and the soap’s qualities (hardness, lather, moisturizing, etc.). [lovelygreens.com]
2. **Always Use a Soap Calculator:** After making substitutions, recalculate the lye amount to ensure safety and proper saponification. Free calculators are available online (e.g., SoapCalc, Bramble Berry Lye Calculator). [soapqueen.com]

How to Substitute Oils

- **Match Oil Properties:** Substitute oils with similar properties (hard/soft, lathering, moisturizing). For example:
    - **Olive oil:** Substitute with canola, sunflower, rice bran, or a blend of these.
    - **Coconut oil:** Substitute with babassu or palm kernel oil.

    - **Shea/cocoa/mango butter:** Substitute with each other, or with tallow/lard if not vegan.
    - **Tallow/lard:** Substitute with palm oil or a blend of hard plant butters.
- **Check Usage Rates:** Some oils are best used at certain percentages. For example, coconut oil is usually kept below 30% to avoid drying skin. [brambleberry.com]

Example Substitutions Table:

If Recipe Calls For	Substitute With
Olive oil	Canola, sunflower, rice bran
Coconut oil	Babassu, palm kernel
Palm oil	Tallow, lard, cocoa butter
Shea butter	Mango butter, cocoa butter
Sweet almond oil	Apricot kernel, sunflower

More detailed substitution guidelines:

- Oil Substitutions in Soap Making: A Guide by Soap Academy [thesoapacademy.com]
- How to Substitute Oil in Cold Process Recipes – Soap Queen [soapqueen.com]

Steps for Modifying a Recipe

1. **Identify the Oil to Replace:** Understand its role (hardness, lather, moisturizing).
2. **Choose a Similar Oil:** Use the table above or consult a soapmaking oil chart.
3. **Adjust the Recipe:** Enter the new oils into a soap calculator to get the correct lye and water amounts.
4. **Test Small Batches:** Try a small batch first to check the soap's texture and performance.

Safety Note

- Always wear gloves and goggles when handling lye.
- Never substitute oils without recalculating the lye amount.
- Label your soap with the oils used, especially if gifting or selling.

Back to Basics: Simple & Gentle Cold Process Soap

Time: 1-2 hours

Yields: About 2-3 pounds of soap

The recipe includes ***the three most common soaping oils, olive, palm and coconut.*** Colorants or fragrances are optional. In addition, you can use almost any box or container that you may have on hand for your mold.

Basic Cold Process Recipe (Super fat 5%):

8 oz. Coconut Oil (24%)
15 oz. Olive Oil (44%)
11 oz. Palm Oil (32%)
4.8 oz. Lye
1 oz Fragrance
11.2 oz. Distilled Water

Soap Making Steps:

28. **Prepare your Mold:** You can use a box or a mold. To turn any box into a soap making mold, it first needs to be lined with freezer paper. Freezer paper is heavy duty and durable, and has one side that is shiny. This side needs to be facing up.
29. **Set Up Your Area:** Before soaping, it's helpful to have your soaping area prepared before you start. While soaping, you don't want to be running around looking for a spatula or whisk! Because this recipe does not have any complicated designs, the tools are minimal. But you will need your fully lined mold, prepared lye water, pre-mixed oils, stick blender, and a spatula.
30. **SAFETY FIRST:** Suit up for safe handling practices! That means goggles, gloves and long sleeves. Make sure kids, pets, and other distractions and tripping hazards are out of the house or don't have access to your soaping space. Always soap in a well-ventilated area. Vinegar can neutralize lye. Keep a bottle of vinegar nearby when using lye. If you spill on yourself, rinse your skin with water and then with vinegar.
31. **Make Lye/Water:** Using scale - measure lye and water in their separate bowls. Slowly and carefully add the lye to the water and gently stir until the lye has fully dissolved and the liquid is clear. Set aside to cool.

32. **Prepare Oils:** Measure out your oils using the scale and bowls. Using your heat source - melt any oil that is solid. Combine the coconut oil, olive oil and palm oil.
33. **Color/Fragrance:** Decide on color / fragrance and mix with a little of your melted oil. .5 oz fragrance per lb of soap. This recipe is 2 lbs – so add about 1 oz (30ml) fragrance. Add

one scoop per lb of soap of mica colorant. So add 3-5 scoops of mica colorant. Use a couple ounces of your oils to mix in your fragrance and color.

34. **Allow the lye water and the oils to cool** to 130°F or below (and are ideally within 10 degrees of each other). For this recipe, both the oils and lye were around 120°F.
35. **Combine oils and Lye water.**
    a. Place your stick blender into the oils. Gently tap the blender on the bottom of the bowl several times to release any bubbles that got trapped by the stick blender head. This is called, “burping the stick blender.”
    b. Once bubbles no longer rise to the surface of the oils, gentle pour the cooled lye water down the shaft of the stick blender and into the oils.

    c. Turn on the stick blender and pulse several times. You will immediately see the lye and oils begin to come together, and begin to create a creamy yellow color. Alternate between using the stick blender to stir the mixture, and pulsing the stick blender. After about 30 seconds, test for trace. Because this recipe contains a large amount of olive oil, it will stay at a thin trace longer than recipes with fast moving oils such as butters.
    d. As you continue to pulse and stir with the stick blender, you may notice the soap starting to lighten in color. It will also start to become thicker. Below is a good example of medium trace. The soap is thick enough to support the trailings and drops on the surface. It’s slightly thinner than pudding. This is a great consistency!
    e. If you want color or fragrance or other additives - add it now.
    f. Optional: You can get fancy and split your soap mixture into multiple colors / fragrance and pour together to make cool swirls and designs
36. **Pour it into the mold** until all the soap is in the mold. Scrape the sides of the bowl to ensure you get every last bit of soap!
37. **Final Steps**
    a. Once the soap is all poured into the mold, firmly tap the box on the counter. Doing so will help bubbles within the soap come to the surface. Make sure you still have your goggles on!
    b. Optional: Add any additives to top
    c. Spray the top of the soap with 99% isopropyl alcohol. Doing so helps to avoid soda ash from forming.
    d. Wrap molds in a towel to keep the heat in, promoting the saponification.
38. **WAIT**!
    a. Allow the soap to sit in the mold for 2-4 days. Unmold, and cut into bars. Soap is safe now.
    b. To test that your soap is fully cured and no leftover lye remains, touch your bar of soap to your tongue. If it tastes like soap, it is ready. If you feel a small zap or buzz, it is not yet cured.

c. Allow the soap to cure for 4-6 weeks. During this time, water evaporates from the soap making it firmer and longer lasting in the shower.
d. The soap can be used before the full cure time, but will not last as long. It's best to wait!

Basic Cold Process Soap Terms

Saponification: Saponification refers to the chemical reaction that occurs when oil and lye molecules create new soap molecules.
Trace: Trace is a point in soap making when oils and lye water have emulsified and begins to thicken. Once the soap has reached thin trace, it will continue to thicken over time.
Emulsification/Emulsify: Emulsification is when the oils and lye solution have mixed together, and will not separate from each other. The term emulsify and trace are often used interchangeably.
Superfat: Soap is made by lye turning oil molecules into soap molecules. Any extra oil left in the soap and not attacked by the lye is called a 'superfat.' The terms 'superfat' and 'lye discount' can be used interchangeably.
Gel Phase: 'Gelling' and 'gel phasing' in cold process soap refers to a part of the saponification (soapmaking) process where the soap gets warm and gelatinous – up to 180 degrees. Gel phase results in brighter colors and a shinier, more translucent appearance.
Soda Ash: Soda ash forms when unsaponified lye reacts with naturally occurring carbon dioxide in the air. The result is a white "ashy" appearance on the top of the soap. Soda ash is a harmless, and it's most common on the surface of your cold process soaps, but sometimes soda ash can form throughout the middle of the bars. To minimize soda ash soap can be sprayed with alcohol.

Online Soap / Lye Calculator:

http://www.soapcalc.net/calc/SoapCalcWP.asp

Soap Making Project Implementation

Soap is a necessary item for good hygiene. Teaching people how to make soap can be a good addition to any water, sanitation and hygiene project.

Making soap is an inexpensive way to provide soap for a person's family. It can also be a business opportunity for individuals to earn extra income for their family.

When considering a soap making project, there are some factors to think about:

1. Project Objectives — what is the objective of introducing a soap making project in the community? Will soap be produced for hygiene promotion? Will it be used as an incentive for people to practice good hygiene? Will soap be used as an income generating project?

It's important to know your project's objectives and design the project to meet those objectives.

2. Locally Available Materials — consider what materials are available locally. A large variety of oils and fats can be used to make soap. Lye can be bought or made. Soap can be made in most places. Design the type of soap based on locally available materials.

3. Local Practices and Uses — consider the type of soap already used and what soap qualities are desirable to the community. These factors will help you decide what type of soap to make. Some groups may prefer soap with small grains in it like pumice or poppy seeds for removing dead skin, while others may prefer smooth soap. Other groups may prefer a soft soap instead of a hard soap.

4. Cost — consider the cost of locally available soap and the cost of making soap. If soap cannot be made for less than locally available soap, starting a soap making business may not be realistic. However, if locally available soap does not meet a group's needs or it is more expensive, then there may be demand for homemade soap. There may also be a market for specialty soaps both within the community or in other markets.

Qualities of Soap

When creating soap recipes, ingredients can be adjusted in order to control the qualities of the soap produced. There are seven qualities of soap.

Hardness: The hardness value describes how hard the soap is. Different fats create soaps with different hardness values. The higher the hardness value, the harder the soap will be.

Cleansing: The cleansing value describes well the soap grabs onto oils and, therefore, how well it cleans. However, a soap that has too high of a cleansing value may grab both the dirty surface level oils and deeper, protective oils in your skin. This will have a drying effect on your skin.

Condition: The condition value describes the soap's emollient content. Emollients—or moisturizers—stay on the skin to help the skin retain moisture. Emollients make skin feel soft and soothe the skin.

Bubbly: The bubbly value describes how much lather or bubbles the soap will create. Higher values produce foamy, fluffy lather while lower numbers will produce a creamy lather with fewer bubbles.

Creamy: The creamy value is almost the reverse of the bubbly value. As the creamy value increases, the creamier the lather of the soap will be. The lower the value, the more foamy lather the soap will create. Soap made with olive oil creates creamy soaps that has no bubbles.

Iodine: The iodine value is another indicator of the hardness of a bar of soap. The lower the iodine value, the harder the soap will be. e iodine value, the harder the soap will be.

Natural Colors and Scents:

Color	Scent	Texture
· Yellow - turmeric	· Peppermint	· Oatmeal
· Green - parsley	· Spearmint	· Flower petals
· Brown - cinnamon, cocoa powder, chocolate, cloves	· Lavender	· Coffee grounds
· Orange - paprika	· Vanilla	· Tapioca pearls
· Clay - can also be added for color	· Essential Oils	· Poppy seeds
		· Pumice
		· Cornmeal
		· Tea leaves

Some things to note:

- Butters accelerate trace quickly. This can make it more difficult if you do not work quickly.
- Because Palm generally makes a harder bar and stable lather, when you eliminate it, you may consider using sodium lactate to harden your bar faster and sugar can help with bubbles.
- I do not always bring my batter to full emulsion before I split it, but I do before I pour. This is important!
- Temperatures and fragrances make a big difference in how fast your soap will trace.

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How to Substitute Oils

- **Match Oil Properties:** Substitute oils with similar properties (hard/soft, lathering, moisturizing). For example:
    - **Olive oil:** Substitute with canola, sunflower, rice bran, or a blend of these.
    - **Coconut oil:** Substitute with babassu or palm kernel oil.
    - **Shea/cocoa/mango butter:** Substitute with each other, or with tallow/lard if not vegan.
    - **Tallow/lard:** Substitute with palm oil or a blend of hard plant butters.
- **Check Usage Rates:** Some oils are best used at certain percentages. For example, coconut oil is usually kept below 30% to avoid drying skin.

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Palm oil alternatives

The closest substitute for palm oil is babassu oil, which comes from a native Brazilian palm tree. It adds the same firming and moisturizing properties as coconut and palm. However, the babassu does have a lighter feeling on the skin and it absorbs quickly. You can replace some or all of the palm with babassu. Just remember to run your recipe through the Lye Calculator after any substitutions. You can also use tallow or lard in place of palm. They add similar hardening properties in cold process soap.
Another option is to increase the coconut oil up to 33%. A higher amount of coconut oil can be drying, so you can increase the superfat or add moisturizing oils like avocado and sweet almond.
Add hard butters like mango, cocoa, and shea up to 15% in the recipe. This will make harder bars and also add moisturizing properties your skin will love.

Palm Free:

35% rice bran oil
25% sweet almond oil
25% coconut oil 1
0% refined shea butter
5% babassu oil
Lye concentration: 1.9 parts water to 1 part lye (1.9:1)
Superfat: 5%

Palm free soap recipe 2:
Oils:
192 g alkanet root infused olive oil (32%)
42 g castor oil (7%)
36 g grapeseed oil (6%)
168 g coconut oil (28%)
90 g shea butter (15%)
72 g cocoa butter (12%)
Lye solution:
125 g distilled water
10 g citric acid
89.8 g sodium hydroxide (83.8 g if not using citric acid)
(40% lye concentration, 5% superfat)
Additives: 45 g coconut cream 10 ml fragrance oil for a light scent

My basic recipe for a 42oz mold:
6% castor oil
10% mango butter
15% shea butter
23% coconut oil

46% olive oil
Mango Lassi and Twilight micas from Mad Micas
Cavalier fragrance oil from Nurture Soap

Soap Queen Recipies:

Lots of Lather
(my most favorite, tried and true, teach this in every class, really, really hard soap bar)
16 oz. Coconut Oil
16 oz. Palm Oil
16 oz. Olive Oil
2 oz. Castor Oil
16.5 oz. water
7.3 oz. lye
Recommend 3% superfat for best bubbles

Moisturizing
4 oz. Avocado Oil
8 oz. Coconut Oil
1 oz. Jojoba Oil
16 oz. Olive Oil
8 oz. Palm Oil
4 oz. Shea Butter
13.5 oz. water
5.6 oz. lye

Nourishing
2 oz. Sweet Almond Oil
2 oz. Avocado Oil
8 oz. Coconut Oil
2 oz. Hempseed Oil
16 oz. Olive Oil
8 oz. Palm Oil
4 oz. Shea Butter
2 oz. Wheatgerm Oil
2 oz. Vitamin E
14.5 oz. water
6 oz. lye