

# Cold Process Soap Making with Beeswax (and other Bee Products)

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*Last night, as I was  
sleeping,  
I dreamt - marvelous error!  
-  
that I had a beehive  
here inside my heart.  
And the golden bees  
were making white combs  
and sweet honey  
from my old failures.*

~Antonio  
Machodao  
Translated by  
Robert Bly

## The Bare Bones

### Soap Making 101

#### Before We Start

Cold Process Soap making is a process of adding fats to sodium hydroxide in solution, the resulting reaction, called *saponification*, produces soap and glycerin. A chemical equation for the nerds amongst us is;



Though the process described is called *Cold Process* soap making, in fact the ingredients are heated, as saponification requires heat to get started. The range of temperature is between 60 – 140°F. The recipe may state the temperature to use, if not, I use 110°F as a safe bet.

Saponification occurs in a potential batch of soap, I say potential because things have been known to go wrong, when the fats and lye are mixed and the agitated together by gentle mixing. Saponification generates heat and the total saponification of the batch of soap requires that it be cooled at a very slow rate. Insulating the batch when it poured into molds is the best way to achieve this.

Bar soap requires sodium hydroxide NaOH, whereas liquid soap, the bottled, hand pump variety requires KOH and a totally different method of production. NaOH is easily obtainable from your local supermarket in the form of Red Devil Lye; KOH is less available than NaOH, higher up the Periodic Table I guess it's considered a more hazardous. You can find it through Internet sites but often there is an additional shipping charge because of the potential risk.

Each batch will possess different qualities depending on the types and amounts of fat used. It may have a good lather with plenty of big bubbles if Castor oil is used, it may be hard if Palm oil is used and it may be gentle on the skin if Shea butter is an ingredient.

Most soap makers will use a combination of fats rather than just one single type, though soap can be made from just one; tallow or animal fat was used in original soap recipes.

Soap can be made using liquids other than plain water, milk for example, or herbal infusions. It is suggested that where plain water is the ingredient that distilled water be used but I have not found that to be strictly necessary.

Saponification will usually change the chemistry of additives to a soap batch, so whilst cream and honey and oats etc can be added, it is under dispute as to whether they retain their properties once the soap is saponified and cured.

Soap takes about 8-12 weeks to *cure*, some leave it longer, I do. I leave my soap for several months before I use it. The longer it is left the milder it becomes and it ensures the complete process of saponification has occurred and all caustic qualities have been oxidized. Soap will change appearance as time goes by too and harden as moisture is drawn out. This makes for a mild and durable bar.

Hand made soap is far gentler than its store bought counterpart. Commercial soap makers remove the glycerin that is left in the homemade variety, this gives store bought soap a longer shelf life but detracts from its natural emollient qualities.

Homemade soap has been found to have a beneficial effect on skin conditions such as psoriasis.

The ratio of fats and oils to sodium hydroxide is precise, it requires calculation. Each fat is measured in ounces and using a saponification table (see appendix A) the number of ounces is multiplied by that fat's SAP value. This is done for all fats included in the recipe except the *superfating* ingredient, but we will come to that later.

A SAP value is the number of ounces of sodium hydroxide required to saponify one ounce of fat. Each fat has a different SAP value.

So if the recipe calls for 2oz Olive oil, Olive oil has a SAP value of .134oz NaOH per ounce of oil, therefore the resulting calculation is  $2 \times .134 = 0.268$ .

The amount of NaOH used will affect the amount of water used. So will the amount of fats and oils. **Water is always measured on a scale not by volume.** If you are not going to use one of the many online soap calculators (see Appendix B for Resources) then a general rule is 6 ounces of water to every one pound of fats/oils.

Batches of soap are usually made in pounds, so a one-pound batch will have a total of 16oz fat to be saponified. Superfating ingredients are not counted in the SAP equation.

*Superfating* is a term used to describe the process of adding a little more fat, usually between 2-4 percent of the size of the batch, to the process once *trace* has occurred. Gentle and often the more expensive ingredients are used as they will retain some of their qualities, so avocado or jojoba oil might be used.

*Trace* is the signal that the saponification reaction is well under way, it is a term used to describe the consistency and appearance of the 'soap'. There are varying descriptions but my favorite is melted chocolate when you lift the spoon out and drizzle some chocolate across the surface, it leaves a trace before disappearing back into the melted whole.

Trace time can vary depending on the fats used. There are ways to speed up the trace time and there are ingredients that will speed up the process too. Essential oils have a tendency to speed the process and in some cases cause the soap to *seize*.

*Seize* is a term to describe soap when it traces very rapidly in the pot and making it difficult to get into the mold. It can still be used; you can make your best effort to mold it and using a spatula level off the top but it's messy and something you want to try to avoid. Cassia and Clove essential oil, some fragrance oils and extreme temperatures (too high or too low) as well as too high a percentage of saturated fats in the recipe may cause this to happen

**TIP: Use a hand blender alternately with a wire whisk to speed the trace time. It is advised not to use the blender for more than a couple of minutes as it creates bubbles and they may remain in the soap after saponification. Be careful with the blender, as the soap mixture is still highly caustic.**

That leads me on to some words of caution. It's a no-brainer that the solution of Red Devil Lye and water is hazardous and will burn if it comes into contact with your skin. Be aware that the soap mixture is also caustic until total saponification occurs, try not to splash it about.

**Follow these points and you will reduce the risk of splashing and burns.**

- ✕ Use a damp towel around all vessels containing soap mixture and lye.
- ✕ Add lye to water when making the NaOH solution, rather than water to lye.
- ✕ Stir in one direction, stop and stir in another, to avoid splashing the caustic soap mixture out of the pot. This goes for the lye too.
- ✕ Wear protective goggles and gloves (rubber are adequate) when making soap.
- ✕ Keep some vinegar on hand to neutralize the caustic solution.

## Tools of the Trade

### *Basic equipment:*

Large stainless steel pot  
Accurate scales, measuring in grams and ounces, preferably digital  
Safety goggles  
Rubber gloves  
Heatproof glass container for lye solution  
Thermometer(s) 2 is better than one. One for the fats and one for the lye.  
Molds – custom made or milk cartons, plastic ware etc  
Stainless steel or wooden stirring equipment

### *Add-ons*

Hand blender  
Measuring cups/spoon  
Towels  
Insulating material - old blankets will suffice  
Sieve  
Wax paper  
Assortment of plastic containers for ingredients – yogurt pots etc.

### *Ingredients*

Lye – Red Devil from the local supermarket is fine – **NEVER use Drano, its not 100% lye**  
Fats and Oils  
Herbs  
Liquid – Water, milk, herbal infusion or a combination  
Colorants  
Herbs  
Abrasives – Oats, Pumice  
Essential oils

## Basic Soap Making Instructions

As soap making is a time sensitive operation it is best to have all your equipment and ingredients gathered before you start. This includes grinding Oats or other herbs if they are to be used, measuring out essential oils, prepping the area so its clear of clutter and lining the molds.

**Note:** *I have heard that mixing essential oils together before they go into the soap, and leaving them for a few hours will create the synergy that will become the true scent. I have also mixed essential oils and thought 'yuck, not using that!'. Perhaps I should heed my own advice.*

The aim is to add the lye to the fats when they are both at the desired temperature. This can be tricky. The fats are placed on the stovetop and heated, the NaOH added to water will generate its own heat – and a lot of it so be careful. This will then be cooling down. You want to make the two meet in the middle. I have heated a lye solution on the stovetop in a heat safe jug but I wouldn't recommend it as a regular practice.

So all the measured fats are placed in the pot, heated gently and a thermometer is used to establish the desired temperature. Lets say 110°F. The NaOH is added to the cold water and stirred gently. Another thermometer is used to gauge when its temperature also reaches 110°F.

**TIP: If your stovetop has an extractor fan then add the NaOH to the cold water under the hood, with the fan on, this will draw up the fumes from the resultant reaction, as they can be fairly noxious. If not, be sure to hold your breath for the initial release of vapour.**

When they are both 110°F or as near as, add the lye to fats - NOT the other way round – and begin stirring.

Stir and use the hand blender alternately until trace is reached. Then add all other ingredients including the superfatting component. Stir in and pour into the mold. Do not scrap down the pot as some of the mixture on the sides may not have reached trace.

Cover the mold and insulate for at least 24 hours.

Remove the insulation and leave for a further 24 hours in the mold.

Remove from the mold and leave for an additional 24 hours, the cut into bars and leave to cure. If you have difficulty removing the soap from the mold you can freeze it and then remove it.

#### **Miscellaneous things that sprang to mind:**

To test whether your cured soap still has any caustic quality, touch the tip of your tongue to it, if you feel a 'zinging' sensation, the bar is still caustic and requires further curing.

The only flower that retains its colour after saponification is Calendular, which stays yellow. Lavender goes a nasty shade of mucky brown.

Interestingly you can create your own colorants by using specific herbs, such as Comfrey root, which has a purple tinge to it and Licorice root, which turns a deep brown.

Spirulina (and I assume all other blue green algae) will give the soap a green colour, which stays after saponification is complete.

Hard fats (such as beeswax) need higher temperatures to melt, so its advisable to either melt them in the pot first and then add the other fats and oils or melt them separately. It's easier, to though not advisable, to heat the lye than mess around with ice and cool the fats, it's also annoying to find yourself juggling temperatures.

## Beeswax

### Properties in the final soap:

Beeswax gives emollient, soothing and softening qualities to the bar.

Antibacterial, antiseptic and wound healing action.

Beeswax will not become rancid.

As for the quality of the bar, it is included as a harder, this adds durability.

### Points to consider:

Beeswax contains about 50% **unsaponifiables**.

The substances in beeswax that do not react with the lye are known as **unsaponifiables**, they are considered impurities but it may be these substances that help decrease the trace time in recipes using beeswax.

(Some unsaponifiables; carotenoids, tocopherols and sterols, have qualities that add life to the soap, for example lengthening the time to rancidity with their antioxidant properties.)

Beeswax has a melting temperature of around 140 degrees so it is more advisable to add it to the mixture of fats and oils rather than using it as a superfatting ingredient. There is a risk that the melted beeswax can solidify into small beads within the soap mixture if added at trace.

Beeswax will give a hard quality, but the total amount in any recipe should be around 1.5% as too much will make the bar sticky and gummy and inhibits a good lather.

The temperature range for making soap with beeswax is higher than usual.

## Honey and Propolis

Add Honey at trace only as this may help it retain some of its beneficial properties and use it only in recipes calling for processing temperatures of 100 degrees or below.

Honey, as a humectant, lays down a protective film on the skin that hydrates and soothes it. If used in a recipe at trace and at the lower end of the temperature range it is more likely to retain its antibacterial qualities.

To avoid overloading the recipe and having honey seep out after the bar has solidified, keep the amounts down to about 2 teaspoons for every pound of fats and oils.

Propolis can be added to soap at trace in a ground form. It adds flecks of colour and an exfoliant quality. Whether it retains its antiseptic qualities I don't know.

How did bees ever become equated with sex? They do not live a riotous sex life themselves.  
A hive suggests cloister more than bordello.

~ *The Queen Must Die: And Other Affairs of Bees and Men*  
William Longgood

## SAP Values

Almond Oil , Cosmetic Grade USP	.137
Almond Oil, Sweet Expeller Pressed	.137
Animal/Vegetable Shortening/Tallow	.136
Apricot Kernel Oil Expeller Pressed	.135
Avocado Oil Cosmetic, USP	.133
Avocado Oil, Expeller Pressed	.133
Babassu Oil, Expeller Pressed	.178
Beeswax Pastilles, White	.067
Beeswax Pastilles, Yellow	.067
Borage Seed Oil, Expeller Pressed	.134
Brazil Nut Oil, Refined, Expeller Pressed	.136
Canola Oil	.132
Castor Oil, USP	.128
Cherry Kernel Oil, Expeller Pressed	.138
Cocoa Butter, Fully Deodorized, Expeller Pressed	.137
Cocoa Butter, Prime Pressed	.137
Coconut Oil, 76 Degree White	.178
Coconut Oil , 92 Degree White	.181
Coconut Oil, Extra Virgin, Organic	.182
Coconut Oil, Fractionated	.237
Corn Oil	.136
Cottonseed Oil, Winterized	.137
Evening Primrose Oil (10%GLA) Expeller Pressed	.133
Flaxseed Oil, Expeller Pressed	.134
Grapeseed Oil	.133
Hazelnut Oil, Expeller Pressed	.136
Hempseed Oil, Unrefined, Expeller Pressed	.137
Jojoba Oil	.068
Lard	.141
Macadamia Nut Oil, Expeller Pressed	.138
Mango Butter, Refined, Expeller Pressed	.135
Olive Oil, Extra Virgin	.135
Olive Oil, Pomace	.133
Olive Oil , Refined A	.135
Palm Kernel Oil	.178
Palm Oil, ORGANIC	.144
Palm Oil Refined Bleached Deodorized	.144
Peach Kernel Oil, Expeller Pressed	.136
Perilla Oil, Expeller Pressed	.137
Poppyseed Oil, Expeller Pressed	.137
Pumpkin Seed Oil, Expeller Pressed	.132

Rice Bran Oil, Expeller Pressed	.131
Safflower Oil , High Oleic, Expeller Pressed	.135
Sesame Oil , Refined, Expeller Pressed	.136
Shea Butter , Refined	.131
Shea Butter , Unrefined	.128
Soybean Oil ,Liquid	.136
Stearic Acid , Vegetable , Triple Pressed	.148
Sunflower Oil ,High Oleic	.136
Walnut Oil, Refined, Expeller Pressed	.136
Wheat Germ Oil ( Cold Processed)	.132

## NOTES

The pedigree of honey  
Does not concern the bee;  
A clover, any time, to him  
Is aristocracy.



## INFORMATION AND PURCHASING RESOURCES

### Soap Calculators (online):

You can google "SAP Calculator" for more!

- <http://www.fromnaturewithlove.com/resources/creator.asp>
- [http://www.rainbowmeadow.com/infocenter/calc\\_soap/rainbow\\_soapcalc.php](http://www.rainbowmeadow.com/infocenter/calc_soap/rainbow_soapcalc.php)
- [http://www.brambleberry.com/lye\\_calc\\_1.php](http://www.brambleberry.com/lye_calc_1.php)

### Web Sites:

These change frequently, but here are some I use often:

### Ingredients:

#### Online:

- [www.chemistrystore.com](http://www.chemistrystore.com)
- [www.betterbee.com](http://www.betterbee.com)
- [www.glorybeefoods.com](http://www.glorybeefoods.com)
- [www.brambleberry.com](http://www.brambleberry.com)
- [www.rainbowmeadow.com](http://www.rainbowmeadow.com)
- [www.fromnaturewithlove.com](http://www.fromnaturewithlove.com)
- [www.sunsoap.com](http://www.sunsoap.com)

#### Local:

- Yes! Natural Foods
- Whole Foods
- Costco (bulk olive oil and others)
- International groceries

### Books:

- The Soapmaker's Companion ~A Comprehensive Guide With Recipes, Techniques And Know-How by Susan Miller Cavitch
- The Natural Soap Book ~ Making Herbal And Vegetable Based Soaps by Susan Miller Cavitch
- The Soap Book by Sandy Maine
- Soap ~ Making it Enjoying it by Ann Bramson
- The Complete Soapmaker by Norma Coney
- The Art of Soapmaking by Marilyn Mohr