How to make soap at home

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Brief sketch of the history of soap

Although the ingredients used to make soap have changed over the years, the chemical process which creates soap has not. Basically oils and fats are combined with an alkali to create a reaction (saponification) which produces soap and glycerin. The quality of the ingredients you use has a significant effect on the final product.

A theory exists that prehistoric cavemen may have been aware of a crude form of soap. Cavemen typically roasted their meat over open wood fires. The fat from the meat would drip into the fire, mix with the ash (an alkali) and after a good rain, voila--you have foaming bubbles coming out of your campfire. Whether or not they realized the usefulness of this reaction is not known, but it is an interesting theory.

The first records of soap indicate that the Babylonians were making it around 2800 B.C. However these first soaps were thought to be used for cleaning textiles and fabric rather than the body. Soap for bathing the body seems to be credited to both the Romans and the Celtics who may have both independently discovered the benefits of hygiene around the beginning of the second century.

Soapmaking dramatically progressed around the 8th century in Italy, Spain and the southern parts of France when soapmakers began making soap from olive oil. These soaps were clearly superior for bathing and washing compared to those made elsewhere, and the result was a lively trade with Northern Europe

The cold method

The cold method is the most simple and straightforward to prepare the soap.

this technique takes advantage of the natural heat produced by the reaction between the caustic soda and the fat / oil, to complete the saponification.

This heat must be checked and maintained as long as possible so that it can do its job.

To obtain a good soap it is necessary to:

1. weigh with absolute precision the ingredients;
2. mix fats and caustic solution/LYE at the optimum temperature;
3. isolate the molds in the first 24 hours so that the heat of the chemical reaction is not lost.

- **Basic ingredients**:

- 1 Kg olive oil
- 128 g Lye/caustic soda (NaOH),
- 300 g water

- If you have 1 litre of olive oil which has a density of about 0,917 g/cm^3 e and so it weighs about 0,917 Kg, you will need:
- 117,4 g lye/caustic soda (NaOH)
- 275,2 g water

optional ingredients:

- 10 ml essential oils of lavender or other vegetable species
- 1 spoon of rice flour
- 1 spoon of di crushed dried flowers

To make natural soap also other vegetable oils can be used:

Peanut oil, coconut oil, seed oil, sunflower seed oil, corn

Margarine is not good because if you do not know exactly which oils compose it and in what percentage they are present, it becomes difficult to determine the coefficients of saponification, and then calculate the amount of alkali required to transform it into soap.

Nome olio	Coefficiente (NaOH)
Olio di arachidi	0.136
Olio di cocco	0.190
Olio di colza	0.124
Olio di fegato di merluzzo	0.132
Olio di girasole	0.134
Olio di jojoba	0.059
Olio di mais	0.136
Olio di mandorle dolci	0.136
Olio di nocciole	0.136
Olio di noci	0.135
Olio di oliva	0.134
Olio di palma	0.141
Olio di ricino	0.128
Olio di riso	0.128
Olio di semi di cotone	0.138
Olio di semi di lino	0.136
Olio di sesamo	0.133
Olio di soja	0.135

Quantity of lye (NaOH)
To be multiplied by 1000 to get the g / kg
Of oil to be used in saponification

Minimum equipment:

1 electronic scale accurate to the gram;

1 meat thermometer or the like which goes from about -10 ° C to +110 ° C to measure the temperature of the caustic solution and the oil;

1 stainless steel pot to heat the oil and make soap;

1 jug or container glass (Pyrex) or ceramic resistant to high temperature to dissolve the soda in the water;

tablespoons of stainless steel for the determination;

wooden spoons to be replaced with some frequency;

1 hand blender (mixer);

Tetrapak container open at the top and well cleaned inside;

rags or pieces of wool / fleece or foam to wrap the molds and keep them warm.

NB Do not wash in dishwasher soap but dirty equipment by hand with patience.

For your own safety

gloves, mask or even professional swimming goggles, mask vapor. Safety equipment must be worn whenever you weigh soda, is preparing the solution of liquid and soda, pour the soda in the oil and mixes the soap, the soap is poured into the mold. Gloves should be worn for handling the soap cool a few days

Tetrapack containers used as molds

Lye / caustic soda (NaOH)

The precision thermometer with external probe

Materials to be avoided:

Copper, Aluminum, Iron, Non-Stick

Step 1:

prepare the work area.
The perfect place to make soap is the kitchen,
because there is everything you need at your fingertips .

Clear the work surface, cover with old newspapers or rags.

Wear gloves and keep at hand
mask and goggles.

step 2:

prepare the caustic solution / Lye.
Wear gloves, mask and goggles,
in a large cup weigh the caustic soda with absolute precision

In a Pyrex jug weigh the water, put the jug on the bottom of the sink.

Gradually pour the soda water,

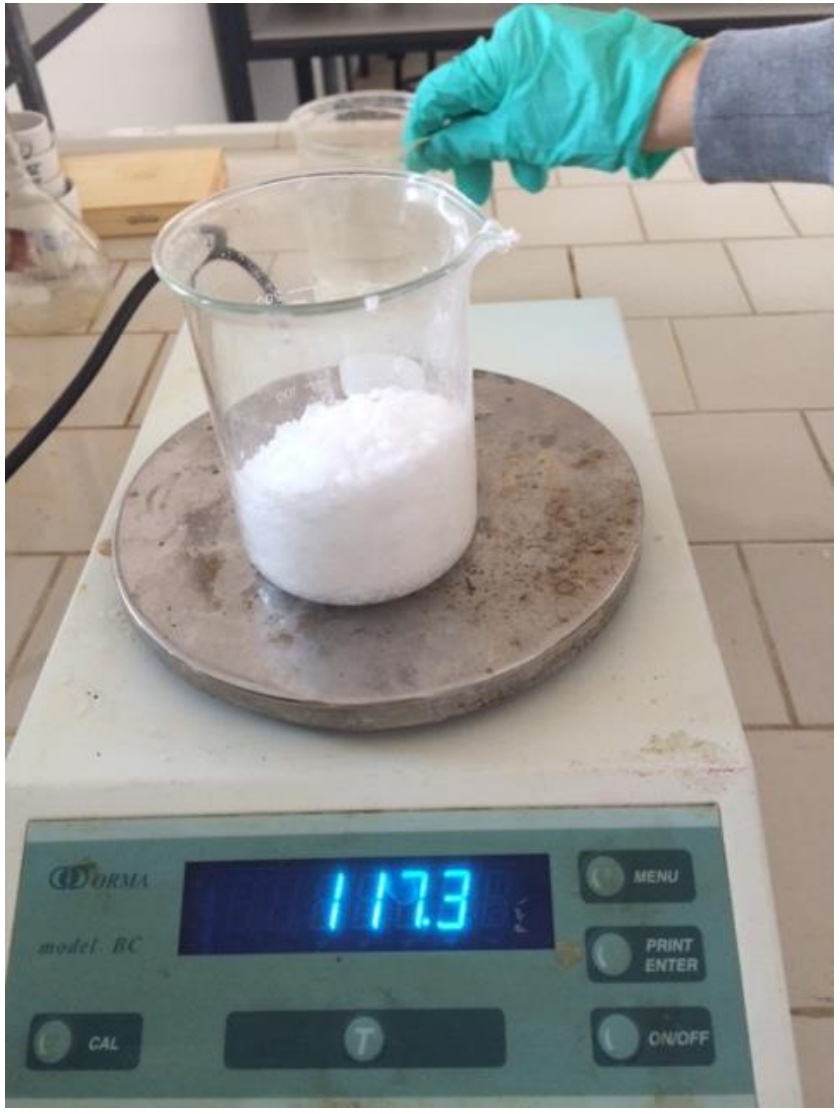
NB DO NOT DO THE CONTRARY AND AS IT COULD BE VERY DANGEROUS,

stirring so it melts well.

Attention because the temperature of the caustic solution will rise rapidly to 70-80 ° C.

Put the container in a safe place to cool

$NaOH \rightarrow Na^{+} + OH^{-}$



The soda is weighed accurately,
then it will be dissolved in a little time being very careful not to splash it because it is highly caustic

Step 3:

prepare fat.

Put the steel pot on the scale and,

with absolute precision, weigh the oil.

Put the pot on the stove.

Heat over low heat, stirring occasionally.

The oil should not heat up too much, check with the thermometer occasionally

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step 4:

prepare optional ingredients.
While the caustic solution is cooled and the oil heats up,

measure the essential oil of lavender.

In a small cup mix the essential oil with rice flour.

Finely chop the dried lavender flowers.

You can also just add the essential oil without flour or dried flowers.

step 5:

pour the caustic solution into the oil.
Wear gloves, mask and goggles, with the thermometer often controll the oil temperature and the caustic solution.

When both are at 45 ° C, gently pour the caustic solution into the oil, stirring well with a wooden spoon.

Now it's time to move on to the blender.

Remember that this operation should not be done on the stove turned on!

The fire of the pot with the oil has to be turned off
just when it has reached the desired temperature.

Lye Is poured cautiously
in olive oil after both have reached the temperature of 45 ° C

step 6:

The tape

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This is a crucial point for all soap makers

While blending, the soap will change color and texture,
becoming more creamy.

Suddenly, removing the blender and by pouring a bit of mixture in the pot, you will see that something will remain on the surface for a few seconds before sinking: this is called "the tape".

Now you can add any optional ingredients you have planned: leave the blender, take a spoon and stir smootly paid while the essential oil is poured in the soap and then add the chopped flowers

the mixture of soda and oil with is processed in the blender for a few minutes being careful not to splash out because it is very caustic.

You have to stop blending when the mixture puts on a very dense look

step 7:

the gel.

After quickly adding the optional ingredients,
pour the fresh soap into the mold to cool.

Well insulate with blankets to keep it warm.

During the following hours the soap will turn into "gel".

This means that the temperature will rise
and saponification of the oil will be completed.

The mixture is inserted with a spoon into the Tetrapak mold taking care to compact it well to avoid the formation of air bubbles.

Once the tetrapack is almost full, it must be closed with adhesive tape and put to rest well covered to keep the heat as long as possible.

step 8:

seasoning

Let the soap covered in the mold for 48 hours.

So take it out from the mold and let ripen in the air
in a dry and cool room.

The saponification is completed immediately
but the optimum seasoning
of a olive oil soap is 6-8 weeks.
The soap just taken out of the mould should be handled with gloves because
it may be a little irritating, especially for very sensitive skins.

After the seasoning the soap can be cut and used

The soap, after 48 hours, is extracted from the tetrapack. It has a solid consistency and is greasy to the touch.

It should be placed on paper towels.
It has a remarkable ability to irritate the skin, the eyes and the mucous membranes so it cannot be used immediately: in fact it will have to mature for about 2 months before being ready for use.

Important:

- The soap even after seasoning if it ends in the eyes can irritate them so be careful

- when using the soap let it be dry as much as possible to prevent it from liquefying and becoming stringy, and then difficult to use.

Chemical composition of olive oil

In olive oil have mostly triglycerides (98-99%), in particular:
-Triolein (1 + 3 to glycerin. Oleic) 70-85%
Tripalmitin (1 + 3 to glycerin. Palmitic) 10-18%
Trilinoein (1 + 3 to glycerin. Linoleic) 7-12%
Tristearin (1 + 3 to glycerin. Stearic acid) 1-3%
Other triglycerides 2%
Water 0.5%
Unsaponifiable 0.6-1.5%

$CH_3-(CH_2)_7-CH=CH-(CH_2)_7-COOH$ **oleic acid**

It 's a monounsaturated fatty acid that is with only one double bond.

$CH_3-(CH_2)_{14}-COOH$ **palmitic acid** It's a **saturated fatty acid** with only simple bonds.

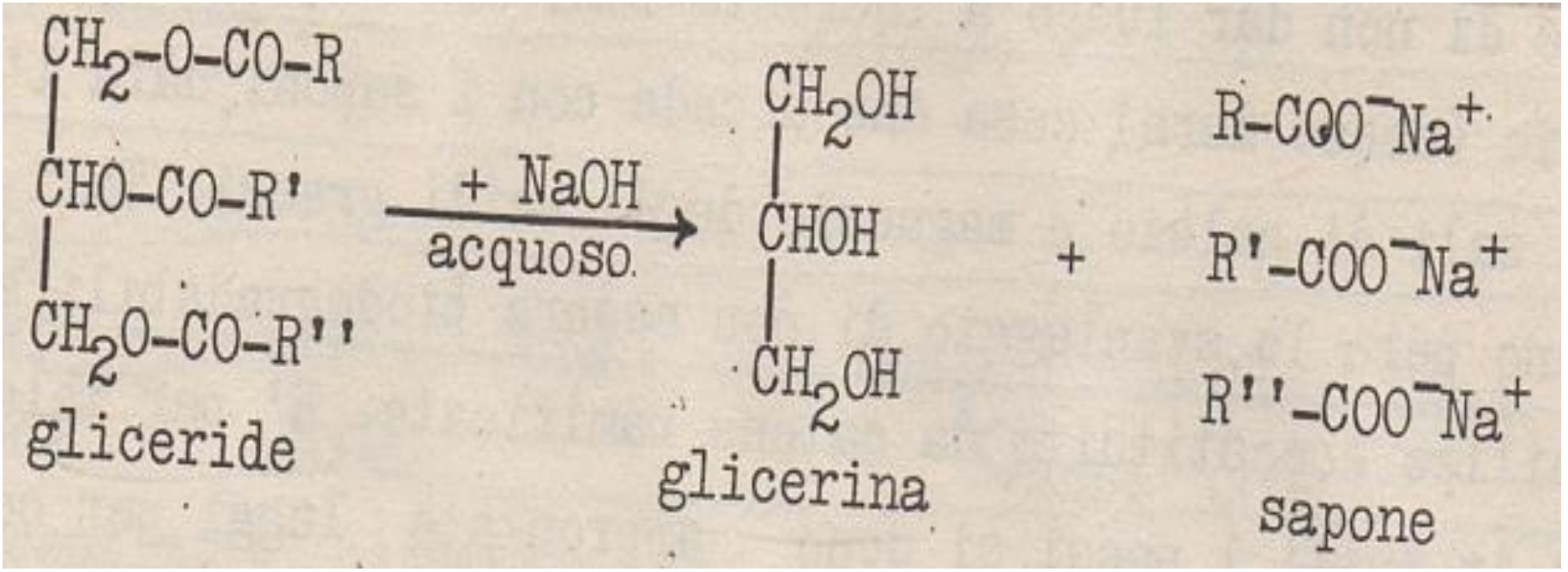
$CH_3-(CH_2)_4-CH=CH-CH_2-CH=CH-(CH_2)_7-COOH$ **linoleic acid**

It 's a polyunsaturated fatty acid that is to say with more than one double bond.

the saponification

Glycerides are esters of glycerol with fatty acids and can be hydrolyzed into their components and with acid catalysis, that alkaline.
The reaction of acid hydrolysis is of equilibrium,
it is always preferred to alkaline hydrolysis, which leads to the formation of the fatty acid, but not of its alkali salt (sodium or potassium) said "soap".

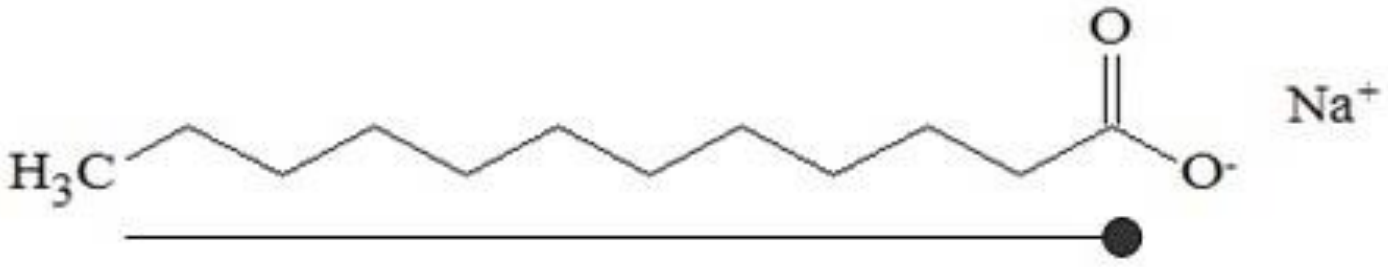
This is why the process of hydrolysis of glycerides is also called saponification.


CH2-O-CO-R
CHO-CO-R'
CH2O-CO-R''
gliceride
+ NaOH
acquoso
CH2OH
CHOH
CH2OH
glicerina
+
R-COO⁻Na⁺
R'-COO⁻Na⁺
R''-COO⁻Na⁺
sapone

why soaps cleanse

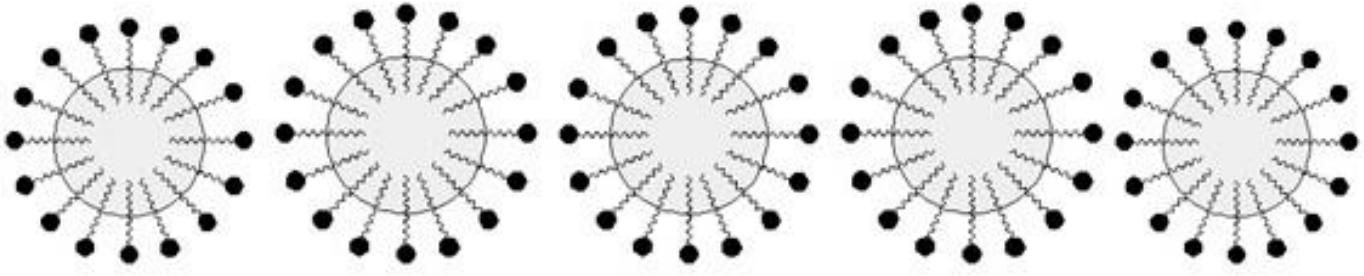
The soaps formed, until a short time ago, the main transformation product of glycerides for their cleansing properties.

Their molecule is formed from a long non-polar chain (R, R ', R' ') and a polar end (-COO-).



Why soaps cleanse

The non-polar chain is hydrophobic (insoluble in H2O) and the Polar end is hydrophilic (soluble in H2O): when the soap comes in contact, in water, with grease residues present on a surface to be washed, the non-polar chains dissolve in fat and leave the polar ends protrude in the surrounding watery solution



The micelles (individual particles of fat) are not able to approach, rather it reject, as a result of electrostatic repulsion of the polar ends.

Why soaps cleanse

Every particle of fat is then surrounded by a negative charge which prevents it to join the other particles of fat.

It thus forms a stable emulsion and the fat may be removed together with the water.

Nowadays synthetic detergents, have in common with the soaps the characteristic of having a non-polar fat-soluble hydrocarbon chain and a water soluble polar end.

Ingredients for our solid soap

Olive oil

Lye (NaOH)

water

Essential oils

What is to be found in our solid soap

Glycerin

Sodium salts of fatty acids of olive oil (mainly oleate, palmitate and linoleate)

Unsaponifiable substances: squalene, tocopherols and carotenoids, with soothing and softening properties.

Ingredients of a common industrial soap

Sodium Tallowate
Aqua
Glycerin
Sodium Cocoate
Parfum
Sodium Chloride
Sodium Citrate
Tetrasodium Etidronate
Tetrasodium EDTA
CI 77891

Sodium Tallowate = sodium salt of tallow, animal, emulsifier, surfactant

Tallow or tallow fat is mostly of animal origin, which is obtained from residues of the slaughter of animals, especially cattle and pigs.

There is also the tree of tallow, a small plant of the Euphorbiaceae family (Sapium sebiferum), native to China and Japan, also cultivated in Italy: has rhomboid leaves, flowers in terminal spikes, seeds surrounded by a layer of fat is used for candles and handmade soaps.

The animal tallow has a market value much lower compared to vegetable oils: this means more raw material with less expense.

The multinational cosmetics are in fact replacing the vegetable fat with those animals for the production of soaps.

The drug residues, pesticides, antibiotics used in factory farms tend to accumulate in animal fat, which in part is used just to produce soaps.

Sodium Cocoate = sodium salt of coconut fatty acids, emulsifier, surfactant, detergent

Sodium Chloride = sodium chloride, sea salt or rock salt, viscosity regulating agent, a filler

Sodium Citrate = sodium citrate, sodium carbonate and citric acid, regulator and chelating

Tetrasodium Etidronate = is derived from diphosphonic acid, chelating agent and emulsion stabilizing.

Tetrasodium EDTA = sodic salt EDTA (ethylenediaminetetraacetic acid), produced by ethylenediamine, sodium cyanide, water and formaldehyde, derived from petroleum, chelating agent, is able to inactivate the metal cations, preventing that they can bind with other ingredients of the soap and undermine its stability. and 'little biodegradable, it is suspected that the EDTA in the water can absorb heavy metals from sediments and can mobilize them making them bioavailable to the food chain. It is used to clean up the waters of the aqueducts by lead, arsenic, cadmium, etc. and also to detoxify who poisonings from these substances.

CI 77891 = titanium dioxide, dye, is in the form of white powder which is insoluble both in water and in oil, used in cosmetics as a decorative covering base.