EXPOSÉ THÉORIQUE SUR LE SAVON ET SA FABRICATION

Analyse succincte historique, chimique, cosmétique de différentes méthodes de saponification en se concentrant sur la qualité du corps gras utilisé.

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About this document

An essay by Stephane Andrieux (Dermolia), October 2018, revised in October 2026. This text aims to make the reader aware of how soap is made, from the tree that bears the fruit to the extraction of the oil, and then to saponification. It is the fruit of several years of practice, study and experiments, and makes no claim to absolute knowledge: it seeks an objective, reasoned view, without prejudice or chauvinism. You may share it freely for information purposes, with a link to dermolia.ch. Any commercial use or use in training requires my consent. Reasoned comments, corrections or additions are welcome: info@dermolia.ch.

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1. Stephane Andrieux

Hello, I am Stephane Andrieux. Among other activities, I am a soap maker. Under the Dermolia brand, I produce cold process soaps whose only fat is filtered organic extra virgin olive oil. Not just plain ‘olive oil’.

2. Why this text?

I wrote this text on my own initiative. It is an open reply to everyone who tries to tell fake Marseille soaps from real ones without ever asking whether a real Marseille soap is actually good. I want to show that even what are considered real Marseille soaps are not as good as people think.

3. The errors all too often stated shamelessly about Marseille soaps.

1. Most of the people who try to tell real Marseille soaps from fake ones have never gone as far as asking themselves whether a ‘real Marseille soap’ is any good.
2. The white colour of a soap does not mean that the soap is made with palm oil.
3. A soap made in Marseille or in Kuala Lumpur with the same method and the same ingredients will be of the same quality.
4. ‘Pure soap’ means nothing.
5. Marseille soap is far from being free of ecological problems! a) the oil used is always poor and the process of extracting these oils has already caused ecological problems before it reaches the soap factory! b) it is boiled for days for no reason, energy consumption) c) It is washed even when this serves no purpose, causing heavy pollution. 2 tonnes of highly polluted water discharged per tonne of soap produced.
6. Traditional process. This is not a traditional process, it is a primitive process.
7. The famous 72% means nothing if you do not know the dilution percentage of the soda. And everyone has their own. 72% means neither that there is 72% olive oil in the soap, nor that there is 72% olive oil in the total fats used. It was a Marseille soap maker who one day decided to stamp 72% on it. A marketing gimmick
8. Making Marseille soap, like making any type of soap, means bringing about a chemical reaction, as when you make mayonnaise. It is wrong to say that Marseille soap is not chemistry.
9. There are chemicals in Marseille soaps because, as with all soaps, the soap maker has to use an alkali to make it, and an alkali is a chemical. It is therefore wrong to boast that Marseille soap is made without chemicals.
10. Marseille soap can be used both for housework and for washing yourself. This is wrong, because a caustic or household soap is harsh on the skin and

a toilet soap enriched with oil will be too greasy to use for household purposes. It will leave greasy marks.

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4. The history of soap and documentation:

I recommend 2 books available free of charge online on gallica.fr, the digital library of the Bibliothèque nationale de France (French National Library).

4.1 A book from the time when soap was used for household purposes

The 'Rapport sur la fabrication des savons' (Report on the manufacture of soaps), written in 1794, describes soap recipes, discussing the ingredients and methods used at a time when people still lacked the chemical knowledge to describe the saponification process. This was a time when soap was used almost **exclusively for household purposes.**

4.2 A book from the time when toilet soaps were being made

The 'Guide pratique du fabriquant de savons' (Practical guide for the soap manufacturer), published in 1887, almost 100 years later, discusses ingredients and methods at a time when chemists were finally able to explain what saponification is, the very time when **toilet soap** was being made, that is to say soap made for cosmetic purposes.

4.3 Conclusions drawn from reading these two books:

1. Soap has been made all over the world for a very long time**. Not just in Marseille**.
2. All the methods used before the discovery of how to manufacture caustic soda, methods described as primitive (p. 14, §3) in the second book, **are almost identical**. This is hot process saponification. Fats and soda obtained from ashes or minerals are boiled for days, witch-style, and washed with salt water if one wishes to refine the soaps.
3. The discovery of how to manufacture artificial caustic soda by Nicolas Leblanc (see the book 'Nicolas Leblanc, sa vie, ses travaux, et l'histoire de la soude artificielle' (Nicolas Leblanc, his life, his work and the history of artificial soda)) around 1789 is the event that enabled the soap industry to develop considerably. By 1887, soda cost roughly **200 times less than at the time of its invention,** 100 years earlier (see Nicolas Leblanc p. 27 §1)**.** Hence the increased manufacture of toilet soaps in the 19th century.
4. The artificial manufacture of soda by human beings makes it possible to know the **exact quantities** needed for a fat to saponify. See book 1, p. 25 §B.

5. Soda made it possible to discover the **cold process** of saponification. That is to say, without the use of heat. See book 1, p. 25 §B. See also p. 7 of the same book, last paragraph.
6. As early as 1887 (see here p. 166) there was talk of a saponification process called ‘refonte’ (remelting), which makes it possible to make soap by remelting scraps of ordinary soap. Today we would call these soap scraps (bondillons).
7. The oils recommended for cold process saponification (as used in the preparation of medicinal soaps by pharmacists since the end of the 18th century) must be **clean, high-quality oils**, because the soaps will be neither boiled nor washed. See book 1, p. 25 §B
8. **Glycerine has a benefit for the skin**. It makes it supple. Book 2 p. 239 D

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5. What is soap?

So I will give the **civilised** definition of what soap is, by describing the principle of saponification as it has been known for 250 years.

I use the word ‘civilised’ in reference to the opening lines of the ‘Guide pratique du savonnier’ (Introduction, p. 13).

These lines say: ‘There are certain products indispensable to civilised man, the very use of which is a proof of civilisation.’

5.1 Definition of saponification:

Saponification is the exothermic, complete and natural reaction which, through the mixing of a fat and an alkali (using the known saponification value), produces soap + glycerine. This mixing takes place in the presence of water, which is used to dilute the soda.

5.2 Definition of the terms used:

5.2.1 What is an alkali?

An alkali (for example sodium hydroxide, otherwise known as caustic soda) is a basic substance (with an extremely high and known pH); these alkalis are manufactured by human beings. For example, caustic soda is made by the electrolysis of brine (salt water).

5.2.2 The saponification value:

A clean, homogeneous fat, as we hope it will be, has a known saponification value. This value is calculated in a laboratory and stated when the fat is sold.

The saponification value is the mass of alkali needed to saponify a fat completely. For example, an extra virgin olive oil has a saponification value of 0.135, which means that 0.135 g of soda is needed to saponify 1 g of extra virgin olive oil completely. This is no secret to anyone.

5.2.3 Exothermic reaction:

This means that the reaction itself produces heat

5.2.4 Complete reaction:

This means that after the reaction, no trace of the starting ingredients remains. No more fat, no more oil, only soap and glycerine.

5.3 Saponification in simple terms

(We are not giving here any recipe to be followed at home on your own without expert advice; handling caustic soda can prove very dangerous, even with irreversible consequences. Many precautions must be taken)

We mix 1 g of oil with 0.135 g of soda; at the end of the saponification process, only soap and glycerine remain.

This without the use of heat, as if we were making pancake batter.

Soap is the result of mixing 3 ingredients: a fat, an alkali and water. **Always 3 ingredients, at the very least.**

5.4 Surfactant and superfatting:

5.4.1 Surfactant

Soap is a natural surfactant obtained through the saponification process, whatever that process may be (see the article 'savon' (soap) in the Larousse encyclopaedia). The surfactant cleans, perhaps even too much, the skin that surrounds us. When it cleans us, soap, which, I repeat, is a natural surfactant, removes the natural layer (the hydrolipidic film) covering our skin. So does water, for that matter. The best way to protect your skin, without even mentioning our diet, is the moisturising we must give to the skin.

5.4.2 Definition of superfatting:

We have talked about saponification, describing the reaction as complete. No more oil or soda at the end of the soap making process. Well, the result obtained is a soap called **caustic or household soap**. It is good for cleaning laundry or floors. To the quantity of oil, it is possible to add an extra percentage which will not be saponified and will remain in the soap after saponification. This percentage of additional oil is the stated superfatting percentage. If you like algebra, you will understand that superfatting can be defined in 2 ways: an additional percentage of oil added during the saponification process, or a reduced percentage of caustic soda added. It depends on which way you look at it.

5.5 Conclusions on saponification:

We must distinguish between household soap and toilet soap. Household soap is soap with no added oil; toilet soap is soap with added oil, which will benefit skin hydration and help rebuild the skin's hydrolipidic film (see study 124.3, p. 1136 (in English) of the book 'Olives and Olive oil in health and disease prevention' by Victor R. Preedy and Ronald Ross Watson). This book is not available online but is well worth reading, being a work of over 1,500 pages bringing together the conclusions reached by pharmaceutical, medical and university studies on the benefits of olive oil, whether ingested or applied to the skin.
Household and toilet soaps can be made without the use of heat (cold process), and do not need to be washed if the oil used is clean.

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6. Oils

6.1 Olive oils

6.1.1 Edible oils and lampante oils:

'Olive oil' is a loose, everyday term used to designate 4 categories of oil (I am simplifying a little) which have nothing to do with one another. Some are virgin and edible, the others are lampante (not edible). My sources here are online on the website of the IOC, the International Olive Council. The IOC is a body that was set up in Madrid in 1959 under the auspices of the United Nations.

6.1.2 Classification of olive oils:

In descending order of quality, we find:

- **Extra virgin olive oil**
- **Virgin olive oil**
- **All the other oils are lampante oils before being refined**

For an overview, from the tree to the bottle, see my interactive map 'Olive oil, from A to Z'.

6.1.2.1 Extra virgin olive oil

Extra virgin olive oil is the best of the olive oils. It is an oil extracted, generally by centrifuge (presses belong to the past), directly from the olive using mechanical processes without the use of heat, i.e. roughly below 27 degrees. To obtain an extra virgin olive oil, clean work is needed from the grove to the mill. The olives do not touch the ground, nobody walks on them, they are processed immediately after harvesting, etc.

6.1.2.2 Virgin olive oil

Virgin olive oil. Like extra virgin olive oil, it is obtained solely by mechanical processes. It may show slight organoleptic defects (taste, smell), provided its fruitiness remains perceptible, and its acidity (expressed as oleic acid, nothing to do with a sour taste) may reach 2%, instead of 0.8% for extra virgin olive oil.

6.1.2.3 The other olive oils: lampante oils

All the other oils are lampante oils (fit for burning in oil lamps), considered not edible. These are the oils that have not been classified, by their chemical analysis and/or by the tasters of the tasting panel, as extra virgin or virgin olive oil.

6.1.3 Olive pomace: definition:

Olive pomace is the paste left over after the mechanical extraction of virgin olive oils. From this paste, roughly 2% oil is extracted after refining (see the website of Oriva, the Spanish olive-pomace oil interprofessional body).

6.1.3.1 Solvent extraction

Hold on tight, please! Pomace yields almost no more oil mechanically: the remaining oil is extracted from it using a solvent described as food-grade, hexane. Hexane is a

hydrocarbon obtained directly from petroleum (see the brief definition in the Larousse). It is also found in petrol, the fuel that runs our cars, among other things. So the pomace is mixed with hexane, then the mixture is distilled to recover the oil, of course with tolerated residues of hexane in it: this is crude olive-pomace oil, which is not edible. It must then be refined, like lampante oils.
To find out more about how olive-pomace oil is made, I recommend reading the 'Guide de gestion de la qualité de l'industrie d'extraction de l'huile de grignons d'olive' (Quality management guide for the olive-pomace oil extraction industry), published in 2006 by the International Olive Council (IOC).

6.1.3.2 Dangers in the production of olive-pomace oil

Regarding the dangers in the production of olive-pomace oil, you can read the toxicological data sheet on hexane published by the INRS (Institut national de recherche et de sécurité, the French National Research and Safety Institute). The dangers for workers are enormous, ranging from damage to the nervous system to explosions and burns.
We will not discuss the recycling of hexane after the extraction of pomace oil, nor the risks that it may pose in the residual doses left in a product that is going to be consumed by humans.

6.1.4 What is done with lampante oils and pomace?

Mankind tries to make them fit for consumption.

6.1.5 How do we make lampante oils and pomace fit for consumption?

6.1.5.1 Refining

Lampante oils, just like crude olive-pomace oil, are refined: neutralisation, bleaching and deodorisation, by physical and chemical processes, without solvents. A small dose of virgin oils (plain virgin or extra virgin) is then added to the refined oils to give them some taste. They are then sold for human consumption under the names 'olive oil' (refined olive oils and virgin olive oils) and 'olive-pomace oil' (refined olive-pomace oil and virgin olive oils) respectively.

6.2 Palm oils

6.2.1 Definition

- **Copra oil, which is a refined coconut oil,**
- **coconut oil or coconut butter,**
- **palm kernel oil, or palm seed oil,**
- **palm oil**

are ALL palm oils.

They all come from palm trees (of different species, admittedly – see the Larousse definition of the coconut palm), and over 80% of palm oil is produced in South-East Asia, in Indonesia and Malaysia (see the production figures of the United States Department of Agriculture, USDA). I do not wish to talk here about deforestation or orang-utans, but rather about the journey these oils make, oils developed for reasons of cost and already in use from the second half of the 19th century (see Guide pratique du fabricant de savons p. 15), back when European colonists were already running an international economy with profit in mind above all, rather than the care owed to people or the respect owed to nature.

6.2.2 Distance already travelled by a soap made in Europe and partly composed of one of the palm oils

The journey I am talking about, the one these oils make? More than 11,000 kilometres to the first European port, as the crow flies. 11,000 km, then, is the approximate distance already travelled by a soap made in Europe with palm oils when it leaves the laboratory. You can do the calculation yourself with any as-the-crow-flies distance calculator, for the Jakarta–Marseille journey.
If the oil were imported from Spain, Spain being the largest producer of olive oil in the world, with up to three times the production of Italy, the world's second-largest producer, the soap would have travelled less than 1,000 km, that is to say more than ten times less.

6.3 Refined seed oils (I lack some concrete data here).

Sunflower, rapeseed and linseed oils: whatever you may hear in praise of these oils, almost all of them are extracted with solvents such as hexane (a petroleum derivative), then refined. These are oils that have already polluted before they arrive at the soap maker's laboratory.
If anyone has good reference documents on the production of virgin seed oils (because they do exist), **I would be glad to have them.** They are hard to find.

6.4 Conclusion on oils

The best oil to use in Europe is an oil:

- That has not travelled far before reaching the laboratory,
- That has been produced by farming that respects nature
- That has been produced by respectful mechanical extraction
- That has not been extracted with solvents
- That has not been refined

The only oil that is fairly easy to find in Europe is either extra virgin olive oil or virgin olive oil. Of course it is possible to find other good-quality oils or fats, but they are very hard to recognise because, unlike olive oil, which has been largely regulated by an international council since 1959, the other oils do not have enough legislation to oblige their producers to follow good rules, nor to provide concrete parameters for telling good seed oils from bad ones. And yet even the world of olive oil is vast and rife with fraud. For example, never buy an unfiltered oil or an oil in a clear bottle.

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7. What about the Marseille soap manufacturing process?

7.1 Boiling for 10 days:

Marseille soap is produced by boiling in a cauldron for roughly 10 days (or for less time if the factory uses pressure-cooker-style vessels).

7.2 Ingredients that go into Marseille soap:

Only fats of plant origin are boiled (this is the rule of the specification of the Union des professionnels du savon de Marseille, filed with the INPI; no law defines Marseille soap, as the French ministry's answer to a question in the Senate, 2013 points out), for example palm and coconut (copra) oils, virgin or refined olive oil, or olive-pomace oil, with caustic soda diluted in water.

7.3 Washing the Marseille soap paste:

Marseille soap is washed with salt water, which removes, among other things, its glycerine. The soap is then dried (artificially or in the open air) and sold.

7.4 Why do Marseille soap makers persist in boiling their mixture to obtain their soap?

7.4.1 Industrial equipment / scientific knowledge

The industrial equipment of the Marseille soap factories has not changed as fast as scientific knowledge. These companies are often owned by people who have inherited the family's industrial plant and who cannot afford to change the methods or the production equipment of an industry that works.

7.4.2 Unnecessary energy consumption.

If they are honest, they admit that excessive energy consumption is unnecessary and make efforts to develop more respectful production equipment, such as through the use of what we call pressure cookers.

7.4.3 Quality of the oils

The oils used for Marseille soap are cheap oils (no pun intended) and not homogeneous. So, since they make soap in industrial quantities, they make sure that saponification has really taken place and that there is no risk of caustic soda remaining in the soap.

To give an idea of cost, an extra virgin olive oil (of unknown origin) can cost them up to 2 times as much as a common palm oil or refined pomace oil.

7.4.4 Ecological problems linked to washing Marseille soap

Washing Marseille soap means 2 tonnes of salty, oily water discharged into the environment for every tonne of soap made.

Some Marseille soap makers are trying to find solutions to avoid washing the soaps, because it is an extremely polluting process.

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8. The advantages/disadvantages of Marseille soap

8.1 The advantages of Marseille soap as given by a Marseille soap maker:

When you ask a Marseille soap maker, the only answer he can honestly give is that the finished soap contains at least 63% fatty acids and that the oils used are exclusively vegetable (see the specification of the Union des professionnels du savon de Marseille). The famous '72%' means something else: the share of fats in the recipe loaded into the cauldron at the start, not a content measured on the finished soap. Vegetable – what does that mean?

8.2 The advantage of Marseille soap, my personal opinion

The advantage I would grant Marseille soap is that it is cheap, because it is industrial and made with poor ingredients.
Another advantage I would grant Marseille soap, used as a **household** soap, is that it is useful for everything other than washing yourself, and cleans floors and laundry well without the need to buy forms of poison in plastic bottles.

8.3 The disadvantages of Marseille soap

Uses low-quality, polluting ingredients
Uses ingredients that have travelled more than 10,000 km (most of the time)
Uses an energy-intensive method
Uses an extremely polluting manufacturing method because of the washing.

9 The advantages/disadvantages of cold process saponification

9.1 The advantages:

The method used consumes little or no energy
The manufacturing method causes little or no pollution
It is the best method for noble oils in superfatted soap.

9.2 The disadvantages

If the ingredients used are of low quality or come from far away, the soap already has an ecological impact before it even reaches the laboratory

10 The advantages/disadvantages of using the remelting method

10.1 The advantages:

If we are talking about recycling offcuts of a good ordinary soap, it helps avoid producing too much waste.

10.2 The disadvantages.

If the soap scraps come from a manufacturing process guilty of pollution or from ingredients of poor quality, it is a technique that is hardly respectable.

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11 Additional ingredients in soap:

11.1 Colourings

They are useless, even if they are made with so-called natural ingredients. They are only there to please the eye.

11.2 Fragrances / scents

Be wary. Prefer essential oils whose origin is known. This must be stated on the label. The percentage must also be stated. The benefits of fragrance or essential oils are mainly olfactory. Do not expect them to perfume your skin or make you more beautiful overnight.

11.3 Honey

In high concentration, over 8%, we can assume that it acts on the skin. The concentration of honey must be stated, as must the origin of the honey.

11.4 Oil blends

To my mind, this is a bit of a con. If the soap maker has managed to find an excellent oil, there is no need for blends. Let us remember that to make a good tomato sauce, you need good tomatoes.

12 Keeping soap

12.1 Use-by date

There is no real use-by date for a soap. A superfatted toilet soap may start to smell bad after a few years. This is because the unsaponified oil may start to go rancid. But there is no danger to the skin.
Soap makers put a use-by date because they have to put one.

12.2 Avoid moisture

Soap must be kept away from moisture. Between uses, let it dry on a stainless-steel rack, so that all its sides can dry properly.

12.3 How soap reacts in the sun

Soap does not melt in the sun; on the contrary, it dries there. Soap only melts in water.

13 A toilet soap: how to get the most out of it? This holds true for any kind of body or hair cleanser.

13.1 Washing properly

Do not wash too much. Wash properly, like our grandparents or great-grandparents (they were clean even without taking a shower every day). Wash the parts where we really need to clean ourselves thoroughly:

- Under the arms
- The feet (thoroughly, with a hard brush; do not forget the nails)
- Between the legs and between the buttocks.
- The hands, very thoroughly, at least 2 times a day
- The face 1 to 2 times a day
- The navel, give it particular attention
- The hair roughly once or twice a week, if you get into the habit of brushing it properly (from the bottom upwards) and regularly.

13.2 How to spread the soap?

With your hands you can spread the soap perfectly over all areas of the body and hair; with a washcloth – but it must always be clean or perfectly dry – you probably save soap. Personally, I do it with my hands.

13.3 Rinse well

Always rinse well with cold or lukewarm water after washing with soap.

13.4 Dry yourself well

Dry your feet very thoroughly (at least 15 min with a clean towel if you have foot problems, or directly with a hairdryer on cold air).
Dry your hands, navel, armpits and between your legs well.

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14 My answer as to what makes a good soap and how to find one on the market would therefore be:

1. Trust in the soap maker
2. Only soaps made with extra virgin olive oil as their fat (or being able to fully justify any other fats). The producer must be able to name a) the place where the olives were harvested, b) the mill where the extraction was carried out, c) the month and year of the harvest, d) the variety of olive from which the oil was extracted (the variety does not matter, but the fact that an oil is single-variety is reassuring as to the olives not having travelled thousands of kilometres across Europe for no reason before their oil was drawn from them), e) whether the oil is filtered, and whether this is done before storage (that is to say, as it should be) or simply at the time of later bottling.
3. If the soap has only 3 ingredients, the minimum number of ingredients at the time of manufacture – extra virgin olive oil, water, soda – then it has a good chance of being very good. The INCI list, which describes the soap after it has been made, shows 4 ingredients, because saponification also produces glycerine: Sodium Olivate, Olea Europaea (Olive) Fruit Oil, Glycerin, Aqua.
4. As for the manufacturing method, assuming that what I have said above is respected, a cold process soap will be the best.
5. In general, a good cold-process soap made with the best extra virgin olive oil is, contrary to false rumours, white to pale cream, ivory in colour (this is the colour described by the MySwissLab laboratory in the safety report for my soaps).
6. Remember that ‘Natural’ labels etc. are often companies that get paid to award the labels; few of them care about problems related to the transport or refining of the ingredients. Most of them accept a non-natural percentage in a product they deem ‘Natural’.
7. Another essential element for a toilet soap is superfatting. A minimum of 7% is needed for daily use. A ‘Sunday best’ soap at 20% may be exceptional but is not necessary for daily care. To give you an idea, a soap with 7% superfat costs the soap maker roughly 1.8% more than a soap with no superfat. For a household soap, choose a soap with no superfat. That is to say, a caustic soap that will be used only for household purposes.

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15 Conclusion on finding a truly good soap:

They are almost impossible to find because soap makers, instead of concerning themselves professionally with the true quality of the ingredients they use, play on scents, blends and colours. A soap that looks beautiful or smells good does not clean better and brings no more benefits to the skin.

In soap there are no secrets; the recipe is public; the only secret lies in the method and the oil used.

16 Sources:

- See the many sources clearly indicated in the text
- Practice: More than 500 kg of soap made using different formulas.
- Olive oil sommelier course (50 h) at the European tasting school + olive oil mill master course
- Detailed conversation with a Marseille soap maker on 18 practical and chemical technical points crucial to saponification.

17 Bibliography

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Dictionary

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