



COLLECTION
PRO-AGRO

Improved technique for hand-crafted

soaps and detergents production

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General

information

The soap and detergent market is experiencing rapid growth related to greater demand caused by demographic changes. In Africa, the quality of hand-crafted soaps found in markets is doubtful and education programmes do not include the teaching of improved production techniques. Local consumption is therefore focused on imported products.

This document presents a simple demonstration of improved techniques for production of soaps and detergents, enabling the creation of jobs within some urban, though mostly rural, populations, while compensating for the lack of practical know-how on the subject.

This guide describes different types of domestic production processes, operating procedures and raw materials and includes a list of equipment suitable for all environments. Particular emphasis is placed on safety rules needed to avoid risks and accidents during production operations. The formulations are harmless to the skin and human health.

This work tool for learning and practical improvement is useful to professionals, actors in the field of functional literacy, adult education and champions of development and self-education. Above all, it can be used as a starting point for anyone wanting to start an income-generating project in the area of soap and detergent production.

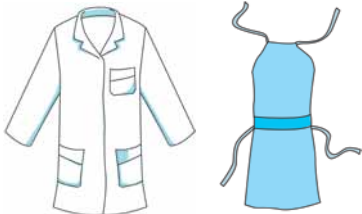

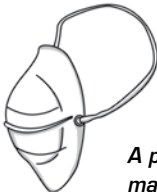
1

SAFETY RULES

Production of soaps and detergents requires the use of chemical products that are potentially dangerous for the human organism. A number of safety rules must therefore be observed.

1.1 Safety gear

Each operator must have the following safety equipment:

 <p><i>A jacket or apron made of hard material</i></p>	<p>A jacket, an apron or a long-sleeved shirt made of a hard material (denim, velvet, etc.) must be worn.</p>
 <p><i>A pair of plastic or rubber gloves</i></p>	<p>During the preparation of caustic soda solutions, it is necessary to wear well-fitting plastic or rubber gloves.</p>
 <p><i>A protective mask or scarf</i></p>	<p>To avoid the inhalation of toxic vapours from the dissolving soda, a protective mask or material soaked in water must be worn, covering the entire nose and mouth area.</p>



A pair of rubber boots or covered shoes

A pair of **rubber boots** or closed-toe shoes must be worn during preparation of the caustic soda solution.



A pair of protective goggles

A pair of protective **goggles** must be worn during the soap or detergent production process.



← **Safety gear**

1.2 Safety instructions



Rinse with water

- It is essential to work near a **water source**.
- If the caustic soda solution comes into contact with the skin, rinse off thoroughly with water to alleviate the effects of the soda.
- If the soda solution is swallowed, drink copious amounts of water.
- **Always pour the soda into the water,** and not the other way round, to avoid experiencing a violent reaction that could damage your skin or your eyes.
















- Drinking, eating and smoking are prohibited during soap production operations.
- Avoid any distractions during soap production operations.
- Chemical products used for the maturing or drying stages of soap production must be kept out of the reach of children and domestic animals.
- Soap-making equipment must not be used for cooking.




All operators are required to comply with these safety rules.

2

COMPARATIVE TABLE OF THE NECESSARY EQUIPMENT

The equipment must be made from plastic or stainless steel. The following table shows equipment required for production of each type of soap or detergent.

Household or toilet soap by cold process	Laundry soap by semi-boiled process	Powdered detergents	Liquid detergent	Shampoo
 <p><i>Two graduated plastic buckets (3 litres)</i></p>	 <p><i>A 50-litre metal tub or any other suitable container made from stainless steel</i></p>	 <p><i>A graduated plastic bucket (15 litres)</i></p>	 <p><i>A graduated plastic bucket (15 litres)</i></p>	 <p><i>A graduated plastic bucket (10 to 15 litres)</i></p>
 <p><i>A graduated plastic bucket (10 litres)</i></p>	 <p><i>Two sealable plastic buckets (with lids) (10 and 20 litres)</i></p>	 <p><i>A graduated plastic bucket (5 litres)</i></p>	 <p><i>A graduated plastic bucket (10 litres)</i></p>	 <p><i>A graduated plastic bucket (10 litres)</i></p>
 <p><i>A wooden or plastic spatula</i></p>	 <p><i>A wooden stick (1.5 m minimum)</i></p>	 <p><i>A wooden, plastic, or stainless steel spatula</i></p>	 <p><i>A wooden stick (1.5 m minimum)</i></p>	 <p><i>A wooden or plastic spatula</i></p>

Household or toilet soap by cold process	Laundry soap by semi-boiled process	Powdered detergents	Liquid detergent	Shampoo
 <p data-bbox="126 443 252 491">A large plastic bowl</p>	 <p data-bbox="311 443 436 491">A large plastic bowl</p>	 <p data-bbox="493 443 624 517">Plastic film (minimum two square metres)</p>		
 <p data-bbox="105 770 269 866">A plastic measuring jug with a pouring spout (1 litre)</p>	 <p data-bbox="295 770 460 866">A plastic measuring jug with a pouring spout (1 litre)</p>	 <p data-bbox="482 770 647 866">A plastic measuring jug with a pouring spout (1 litre)</p>	 <p data-bbox="665 770 829 866">A plastic measuring jug with a pouring spout (1 litre)</p>	 <p data-bbox="855 770 1020 866">A plastic measuring jug with a pouring spout (1 litre)</p>
 <p data-bbox="105 1094 269 1168">A plastic measuring jug with a pouring spout (500 ml)</p>	 <p data-bbox="295 1094 460 1168">A plastic measuring jug with a pouring spout (500 ml)</p>	 <p data-bbox="482 1094 647 1168">A plastic measuring jug with a pouring spout (500 ml)</p>	 <p data-bbox="665 1094 829 1168">A plastic measuring jug with a pouring spout (500 ml)</p>	 <p data-bbox="855 1094 1020 1168">A plastic measuring jug with a pouring spout (500 ml)</p>
 <p data-bbox="146 1369 213 1393">Moulds</p>	 <p data-bbox="341 1369 408 1393">Moulds</p>	 <p data-bbox="474 1369 647 1442">A metal sieve similar to that used for sand</p>		

Household or toilet soap by cold process	Laundry soap by semi-boiled process	Powdered detergents	Liquid detergent	Shampoo
 <p data-bbox="115 467 255 515"><i>Scales weighing from 0 to 20 kg</i></p>	 <p data-bbox="305 467 445 515"><i>Scales weighing from 0 to 20 kg</i></p>	 <p data-bbox="490 467 630 515"><i>Scales weighing from 0 to 20 kg</i></p>	 <p data-bbox="664 467 826 539"><i>Electronic scales for measurements under 5 kg</i></p>	 <p data-bbox="848 467 1011 539"><i>Electronic scales for measurements under 5 kg</i></p>
 <p data-bbox="104 802 266 874"><i>An industrial thermometer from 0 to 110/300 °C</i></p>	 <p data-bbox="300 802 462 874"><i>An industrial thermometer from 0 to 110/300 °C</i></p>	 <p data-bbox="484 802 647 874"><i>An industrial thermometer from 0 to 110/300 °C</i></p>		
 <p data-bbox="107 1121 266 1169"><i>A gas stove or other heat source</i></p>	 <p data-bbox="297 1121 456 1169"><i>A gas stove or other heat source</i></p>	 <p data-bbox="484 1121 644 1169"><i>A gas stove or other heat source</i></p>		
 <p data-bbox="107 1433 272 1457"><i>Baumé hydrometer</i></p>	 <p data-bbox="292 1433 462 1457"><i>Baumé hydrometer</i></p>	 <p data-bbox="477 1433 647 1457"><i>Baumé hydrometer</i></p>		

3

TOILET SOAP

The skin is the protective envelope of the human body. Because of its high sensitivity, it is subject to the effects of weather, diet, harmful and aggressive skin products and insect bites. It therefore needs to be cared for by toilet soaps meeting the following criteria: good solubility, durability, solidity and foaming rate. The domestic production of toilet soap relies on the cold process.



3.1 The cold process

The cold process does not use a heat source, rather a system that maintains the temperature in a cold environment. This process consists of gradually adding a caustic soda solution to fat and constantly stirring until the solution has been completely used up. This is done in a system composed of a tub of ice or salt water allowing the temperature to be maintained at between 0 and 40 °C for mixtures less than 15 kg. For those greater than 15 kg, the fat and caustic soda solution mixture must be maintained at the ambient temperature (between 24 and 30 °C). Once the soap paste has been obtained, chemical or natural substances are added to increase the antibacterial, softening, lightening, antioxidant or purifying properties of the toilet soap.

Choice of toilet soap

Choosing which type of toilet soap to make depends on skin problems, the availability of ingredients and the age of users.

- For **fragile or dry skin**, superfatted soap enriched with honey is recommended, as honey has antiseptic, softening, regenerating, nourishing and antiwrinkle qualities.
- For **skin damaged by sun, cold or pollution**, superfatted soap enriched with shea butter or cocoa butter is recommended, as these are softening, anti-drying, moisturising, regenerative and protective for the skin.
- For **oily and acne-prone skin**, superfatted soap enriched with shea butter and green clay is recommended. The use of shea butter combined with green clay provides the toilet soap with anti-acne, moisturising, softening, exfoliating, anti-drying and protective properties.
- For **oily and shiny skin**, superfatted soap enriched with Moabi butter, aloe vera and white clay is recommended. The use of Moabi butter combined with white clay and aloe vera provides the soap with healing, moisturising, softening, anti-drying and protective properties.
- Olive oil soap is suitable for **all types of skin and for infants**. It is softening, hydrating, healing and antioxidant.

Raw materials required for different types of soap

The following products should be used to obtain 5 kg of toilet soap:

<i>Types of soap</i>	<i>Raw materials required</i>
Superfatted soap enriched with honey	<ul style="list-style-type: none">• 2.5 litres of refined palm oil• 1 litre of refined palm kernel oil or coconut oil• 500 g of caustic soda• 2 litres of spring water, rainwater or demineralised water• 100 ml of sweet almond oil, olive oil or refined palm oil• 1 kg of cooking salt + 2 litres water/1 kg ice + 2 litres of water [see 3.2 for the cooling system assembly]• 175 ml of honey. The honey must be in liquid form and of good quality. It is better if collected fresh. It can also be enriched with royal jelly• Between 35 and 50 ml of sweet orange or lavender essential oil or natural extract.

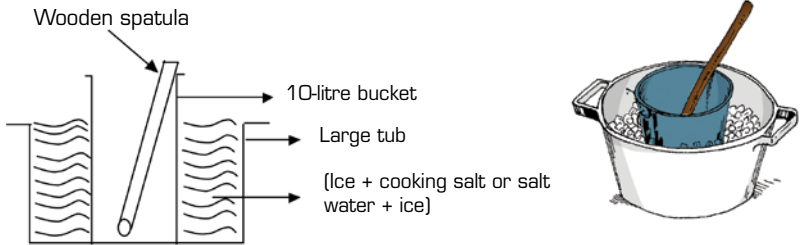
<i>Types of soap</i>	<i>Raw materials required</i>
Superfatted soap enriched with shea butter or cocoa butter	<ul style="list-style-type: none"> • 2.5 litres of refined palm oil • 1 litre of palm kernel oil or coconut oil • 500 g of caustic soda • 2 litres of spring water or rainwater • 1 kg of cooking salt + 2 litres water/1 kg ice + 2 litres of water for the cooling solution • 350 ml of melted shea butter or 350 ml of melted and cooled cocoa butter • Between 35 and 50 ml of citronella or lavender essential oil or natural extract.
Superfatted soap enriched with shea butter and green clay	<ul style="list-style-type: none"> • 2.5 litres of refined palm oil • 1 litre of palm kernel oil • 500 g of caustic soda • 2 litres of spring water or rainwater • 175 g of green clay powder • 1 kg of cooking salt + 2 litres water/1 kg ice + 2 litres of water for the cooling solution • 350 ml of melted shea butter • Between 35 and 50 ml of essential oil or natural lemon extract.
Superfatted soap enriched with Moabi butter, aloe vera and white clay	<ul style="list-style-type: none"> • 2.5 litres of refined palm oil • 1 litre of palm kernel oil or coconut oil • 500 g of caustic soda • 2 litres of spring water or rainwater • 175 g of powdered white (or grey) clay • 1 kg of cooking salt + 2 litres water/1 kg of ice + 2 litres of water for the cooling solution • 250 ml of melted and cooled Moabi butter • 100 ml aloe vera gel • Between 35 and 50 ml of essential oil or natural lemon extract.
Olive oil soap	<ul style="list-style-type: none"> • 3.5 litres of olive oil • 450 g of caustic soda • 2 litres of spring water or rainwater • 1 kg of cooking salt + 2 litres water/1 kg of ice + 2 litres of water for the cooling solution • 350 ml additional olive oil.

Where can I find the ingredients?

You can find fat, cooking salt, green clay, white clay, honey and fragrances in shops and general trading outlets. Chemical products can be found in hardware stores or businesses specialising in the sale of chemical products and laboratory equipment.

3.2 Cooling system for different types of toilet soap using the cold process

For fat mixtures less than 15 kg, follow the following procedure.



Production procedure for types of soap

3.3 Preparation of soda solutions by dilution of a stock solution

50 % solution (Base solution)

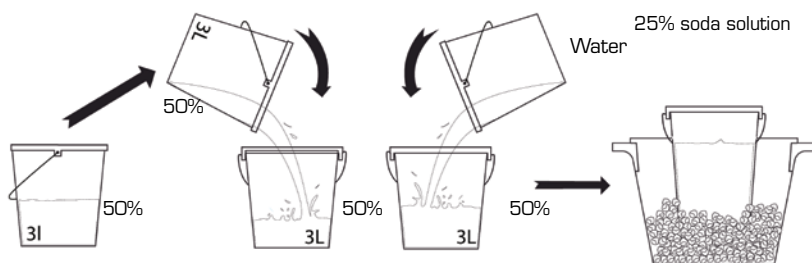
- Pour 1/2 litre of water into a 3-litre plastic bucket.
- Gently add the 1/2 kg of soda, dissolve with the aid of a plastic spatula.
- When the soda has completely dissolved, add another 1/2 litre of water, stir and let the solution stand for 15 minutes.



Preparation of the Base solution

25 % solution (working solution)

- Remove half of the 50 % solution and pour it into another 3-litre plastic bucket.
- Add twice its volume of spring water, rainwater or well water.
- Leave both solutions to stand in hermetically sealed containers for at least 3 hours.
- It is possible to cool the soda solutions in 30 minutes using ice.



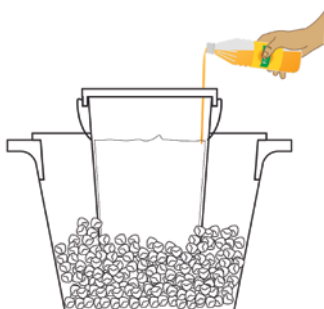
SPECIFIC CASE OF 100 % OLIVE OIL SOAP

- To prepare the 50 % soda solution in a one-litre container, dissolve 250 g of 99 % caustic soda in 500 ml of water, **making sure to put the soda in the water and not the other way round** in order to avoid a violent chemical reaction that could damage eyes and skin. Then **let it stand for at least three hours.**
- To prepare the 25 % soda solution in a one-litre container, dissolve 200 g of 99 % caustic soda in 800 ml of water, **making sure to put the soda in the water and not the other way round** in order to avoid a violent chemical reaction that could damage eyes and skin. Then **let it stand for at least three hours.**

Saponification

This saponification process can take 45 minutes to 1 hour.

- When the soda solution has settled, gradually add to a container placed in the cooling system: 2.5 litres of bleached or denaturised palm oil cooled to ambient temperature or refined palm oil and 1 litre of palm kernel oil or cocoa oil. For superfatted soap enriched with Moabi butter, aloe vera and white clay, or for superfatted soap enriched with shea butter and green clay, the white and green clays must be added to the mixture of oils before adding the soda solutions.
- For 100 % olive oil soap, pour 3.5 litres of olive oil into the cooling system.



← Saponification system

- Add the soda solutions gradually while stirring at a constant rate, always in the same direction.
- After adding the soda solution, continue to stir until a fairly heavy homogenous paste is formed.

Addition of additives

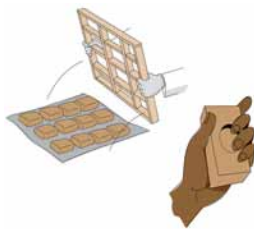
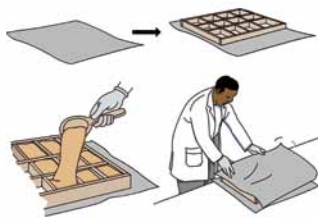
Once the soap paste is ready (a fairly thick paste, known as the “trace” stage, which means that when you remove some of the paste and pour it back into the mix, it stays on the surface and leaves a trail or “trace”), add the following, depending on the type of soap, while continuing to stir:

- For **superfatted soap enriched with honey**: an additional 100 ml of sweet almond oil or refined palm oil, 125 ml of natural honey, a minimum of 35 ml and maximum 50 ml of lavender or sweet orange essential oil or natural extract.
- For **superfatted soap enriched with shea butter**: 350 ml of melted shea butter, a minimum of 35 ml and maximum 50 ml of citronella essential oil or natural extract.

- For **superfatted soap enriched with cocoa butter**: 350 ml cocoa butter, a minimum of 35 ml and a maximum 50 ml of citronella or lavender essential oil or natural extract.
- For **superfatted soap enriched with shea butter and green clay**: 350 ml of melted shea butter, a minimum of 35 ml and maximum 50 ml of your chosen fragrance (lemon extract or essential oil).
- **Superfatted soap enriched with Moabi butter, aloe vera and white clay**: 250 ml of melted and cooled Moabi butter, 100 ml of aloe vera gel, a minimum of 35 ml and maximum 50 ml of natural lemon extract or essential oil.
- For **olive oil soap**: 350 ml of olive oil.

Moulding, drying and removing from the mould

After adding the additives, continue stirring for approximately two minutes until the paste is homogenous. Pour the resulting paste into plastic or wooden moulds (covered with a plastic film) in the desired forms. Then dry in the shade in the open air for two to four weeks, depending on the type of soap desired.



↑ Moulding the soap, drying it and removing it from the mould

When using palm kernel oil combined with palm oil, a hard soap can be obtained after one week whereas, when using cocoa oil combined with palm oil, the soap will not be hard.

The moulds must be covered with a plastic film to avoid losing the fragrance and to allow the saponification process to be completed during the three days of moulding prior to air drying.
 Soap dishes, plastic bottles and plastic utensils can be used as moulds.

3.4 Financial information

The production cost for 5 kg of toilet soap (superfatted soap enriched with honey) using the cold process is, on average, FCFA 29,085, corresponding to € 44.30. Production of the soap can be made cheaper if the essential oil is replaced by a synthetic fragrance.

<i>Description</i>	<i>Coût (FCFA)</i>	<i>Coût (€)</i>
Refined or table palm oil (2.5 litres)	2,755	4,20
Palm kernel oil (1 litre)	600	0,91
Caustic soda (0.5 kg)	400	0,61
Honey (175 ml)	440	0,70
Water, ice and cooking salt	410	0,60
Additional refined palm oil (100 ml)	115	0,20
Essential oil (citronella) (35 ml)	23,420	35,70
Labour (3 hours)	945	1,40
TOTAL	29,085	44,30

The production cost for 125 g of superfatted soap enriched with honey is approximately FCFA 727, i.e. € 1.10. This soap is sold on the market at between € 1.82 and € 2.00. The profit on each 125 g piece of superfatted soap enriched with honey that is sold amounts to FCFA 466 to 584 (€ 0.70 to 0.90). The table below covers the average production cost and sale price of the different types of toilet soap produced by the cold process.

<i>Types of soap</i>	<i>Production costs for 5 kg of toilet soap</i>	<i>Production cost of one 125 g bar of soap</i>	<i>Sale price of one 125 g bar of soap</i>
Superfatted soap enriched with honey	€ 44,30	€ 1,11	€ 1,82 - 2
Superfatted soap enriched with shea butter	€ 45,10	€ 1,13	€ 1,75 - 2
Superfatted soap enriched with cocoa butter	€ 63,58	€ 1,59	€ 3,44
Superfatted soap enriched with shea butter and green clay	€ 50,97	€ 1,27	€ 3,20
Superfatted soap enriched with Moabi butter, aloe vera and white clay	€ 49,92	€ 1,25	€ 1, 83

4

HOUSEHOLD OR LAUNDRY SOAP

Household or laundry soap is the best known domestic hygiene product. Production of good quality soap helps reduce family expenses. Hand-crafted production of household and laundry soap is based on two main processes: the semi-boiled process and the cold process.



4.1 Household soap using the cold process

The cold process does not use a heat source, rather a system that maintains the temperature in a cold environment. This process consists of gradually adding a caustic soda solution to fat and constantly stirring until the solution has been completely used up. This is done in a system composed of a tub of ice or salt water allowing the temperature to be maintained at between 0 and 40 °C for mixtures less than 15 kg. For those greater than 15 kg, the fat and caustic soda solution mixture must be maintained at the ambient temperature (between 24 and 30 °C).

Raw materials for 5 kg of household soap

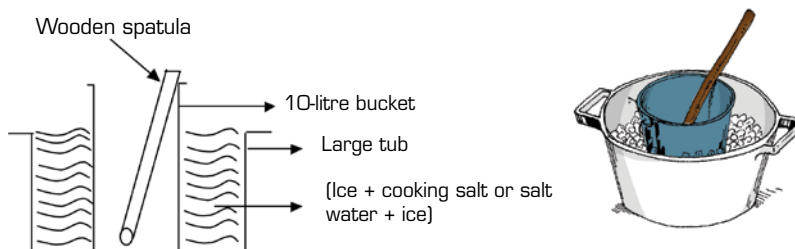
- **500 g of caustic soda (99 % soda)** in bags. The caustic soda enables the oils to be processed into soap.
- **2.5 litres of palm oil** bleached in advance to the point where a piece of white paper shows no colouring. The bleaching time depends on the quality and quantity of the oil.
- **1 litre of industrial palm kernel oil.** The palm kernel oil must be whitish and not black. Crude palm kernel oil (black) must be pre-treated by boiling a volume of palm kernel oil in double its volume of water for a maximum of 20 minutes.
- **75 ml of sodium silicate.** The sodium silicate softens the water to help the soap harden, become translucent and produce foam.
- **2 litres of rainwater, spring water or distilled water** for the preparation of the soda solutions.

If possible, 10 ml of EDTA (Ethylenediaminetetraacetic acid). The EDTA enhances the foaming properties by breaking down the structures.

Production process

Assembly for the production of soap solutions

For fat mixtures less than 15 kg, follow the following procedure.



⬆ Production procedure for types of soap

Preparation of two soda solutions

50 % solution (Base solution)

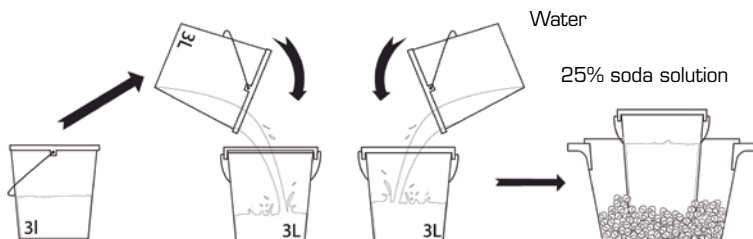
- Pour 1/2 litre of water into a 3-litre plastic bucket.
- Gently add the 1/2 kg of soda, dissolve with the aid of a plastic spatula.
- When the soda has completely dissolved, add another 1/2 litre of water, stir and let the solution stand for 15 minutes.



⬆️ Preparation of the Base solution

25 % solution (Base solution)

- Remove half of the 50 % solution and pour it into another 3-litre plastic bucket.
- Add twice its volume of spring water, rainwater or well water.
- Let both solutions stand in hermetically sealed containers for at least 3 hours.



⬆️ Preparation of the working solution

Saponification

- When the soda solution has settled, transfer it gradually to a container placed in the cooling system: 2.5 litres of palm oil denatured or bleached in advance and cooled to ambient temperature, and 1 litre of palm kernel oil.
- Add the soda solutions gradually while stirring regularly, always in the same direction. Begin with the 25% solution and finish with the 50% solution.
- After adding the soda solutions, continue to stir until a fairly thick homogenous paste is formed. This saponification process can take 45 minutes to 1 hour.

Addition of additives

When the soap paste is ready and while continuing to stir, gradually add 75 ml of sodium silicate and fragrance if necessary.



⬆️ **Adding the silicate**



⬆️ **Adding the fragrance**

Finishing

After adding the additives, continue to stir until the paste is homogenous. Then pour the resulting paste into plastic or wooden moulds in the desired forms and dry in the shade in the open air for at least 3 days.



⬆️ **Moulding the soap, drying it and removing it from the mould**

The colour of the soap depends on the oil or mixture of oils used. When using palm kernel oil, the soap is white. With palm oil, it is pale yellow or cream. The mixture of palm oil and palm kernel oil produces a light brown soap.

4.2 Laundry soap using the semi-boiled process

The semi-boiled process is the oldest. It consists of gently heating the fat by gradually adding, while stirring, volumes of soda solution until all the solution has been used up and a clear homogenous paste has been obtained, to which chemical substances are added, as required, to provide the soap with aromatic, stain-removing and emulsifying properties. The temperature of the reaction must be maintained between 55 and 70 °C.

Raw materials for 29 kg of soap (145 x 200 g bars of soap)

- 16 kg of palm oil
- 4 kg of palm kernel oil
- 3 kg of caustic soda
- 20 litres of spring water, rainwater, distilled or demineralised water for preparation of the soda solutions
- 200 ml of sodium silicate.

Production process

Pre-treatment of the palm oil: heat-bleaching

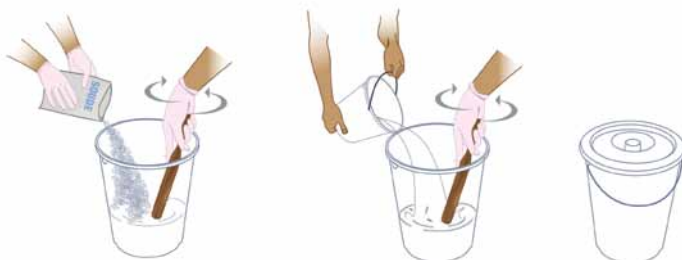
In an open container, heat the palm oil to a temperature of **200 to 250 °C**, while stirring occasionally, for **2 to 5 hours**. The time depends on the volume and quality of the palm oil.



Preparation of two soda solutions

15°Bé or 10.06 % soda solution (low concentration solution)

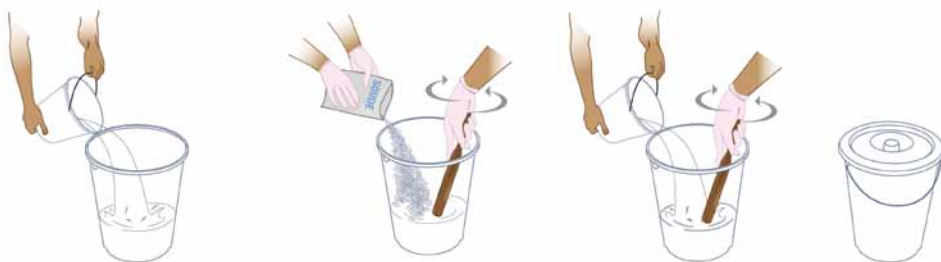
Pour 10 litres of spring water, rainwater or distilled water into a 20-litre bucket with a lid, then add 1.50 kg of caustic soda. Stir with a wooden stick or plastic spatula and add 5 litres of the same type of water. Homogenise and let stand sheltered from the air in a hermetically sealed container.



°Bé is the soda content, obtained by measuring the density of the liquid with a Baumé hydrometer.


40°Bé or 35 % soda solution (high concentration solution)

Pour 10 litres of spring water, rainwater or distilled water into a 20-litre bucket with a lid, then add 1.50 kg of caustic soda. Stir with a wooden stick or plastic spatula and add 3 litres of the same type of water. Homogenise and let stand sheltered from the air in a hermetically sealed container.



Both solutions must be kept in an airtight container in the shade for at least 3 hours.

Operating method for the saponification process

	<ul style="list-style-type: none">• Weigh the quantities of raw materials (bleached palm oil and palm kernel oil pre-melted and cooled to ambient temperature).
	<ul style="list-style-type: none">• Place them in a water heater or metal drum and heat to approximately 55-60° C.
	<ul style="list-style-type: none">• Stop heating.• Add small quantities while stirring the soda solution. Begin with the 15°Bé solution, then, when the solution has emulsified, add the 40°Bé soda solution.
	<ul style="list-style-type: none">• The temperature of the reaction mixture must rise to 70-90° C. Adding the soda solutions to the mixture of oils causes the temperature to rise.• Stir continuously and continue to heat gently for 2 to 3 hours.• Next, test the quality of the soap with a trowel. If the paste slides off in a block without leaving a trace, the saponification is completed. If, on the other hand, the paste leaves traces on the trowel, the saponification is incomplete.



- Add the sodium silicate.

- Continue to stir for a maximum of **5 minutes**.
- Place the plastic sheet into the mould along the inner sides.
- Pour the saponified paste and cover it with the plastic sheet.
- Leave it to stand and dry for at least **72 hours**.
- Remove the soap from the mould, cut it into pieces, mark or stamp as necessary.



↑ Moulding the soap, drying it and removing it from the mould.

- If the fat is of poor quality, results will be poor. Always make sure that you have good quality materials before beginning the soap-making process.
- To obtain harder soaps, palm oil can be replaced by palm stearin in the same proportions.
- If you want to add colorant to the soap, it must be dissolved in the oil (for oil colorants) and in the weak soda solution (for water colorants).
- Palm kernel oil can be replaced by coconut oil, as they have the same properties.

4.3 Financial information

Household soap

The following table shows the expenditure required to produce 5 kg of household soap.

<i>Description</i>	<i>Cost (FCFA)</i>	<i>Cost (€)</i>
Palm oil (2.5 litres)	1,380	2.1
Palm kernel oil (1 litre)	600	0.9
Caustic soda (0.5 kg)	400	0.6
Liquid sodium silicate (75 ml)	75	0.1
Water, ice and cooking salt	435	0.7
Labour (3 hours)	940	1.4
TOTAL	3,830	5.8

Cost of producing 5 kg of soap using the cold process

The production of 5 kg of household soap using the cold process costs FCFA 3,830 (€ 5.80). The production cost for a 200 g bar of soap is approximately FCFA 153 (€ 0.23). Sold on the market at FCFA 200 (€ 0.30), the profit margin on a 200 g bar of soap will be FCFA 46.8 (€ 0.07).

<i>Weight and quantity of soap</i>	<i>Cost of producing 10 kg of household soap</i>	<i>Cost of producing one bar of soap</i>	<i>Selling price of one bar of soap</i>	<i>Profit margin for one bar of soap</i>	<i>Profit margin for 10 kg of soap</i>
Household soap (50 x 200 g bars)	7,660 FCFA	153.2 FCFA	200 FCFA	46.8 FCFA	2,340 FCFA
Household soap (25 x 400 g bars)	7,660 FCFA	306.4 FCFA	350 FCFA	43.6 FCFA	1,090 FCFA

Estimate of costs and sale of 10 kg of household soap (in FCFA)

When marketing the soap in bars of 400 g, the production cost for one bar is FCFA 306 (€ 0.46). Sold on the market at FCFA 350 (€ 0.53), the profit margin for one 400 g bar will be FCFA 43.6 (€ 0.066).

The profit margin achieved by marketing 10 kg of laundry soap in 400 g bars is FCFA 1,090, compared to that achieved by marketing 10 kg of laundry soap in 200 g bars, which is FCFA 2,340.

Laundry soaps

The following table shows the expenditure required to obtain 29 kg of laundry soap.

<i>Description</i>	<i>Cost (FCFA)</i>	<i>Cost (€)</i>
Palm oil (16 litres)	8,805	13.42
Palm kernel oil (4 litres)	2,400	3.66
Caustic soda (3 kg)	2,400	3.66
Liquid sodium silicate (75 ml)	200	0.30
Energy, water, ice and cooking salt	2,800	4.27
Labour (3 hours)	920	1.40
TOTAL	17,525	26.72

Average production costs for 29 kg of laundry soap using the semi-boiled process

The production of 29 kg of soap using the semi-boiled process costs FCFA 17,525 (€ 26.68), which is € 0.19 for one 200 g bar of soap selling on the market for € 0.30. The profit margin is therefore € 0.11.

The higher the production capacity, the lower the production costs.

5

DETERGENT POWDER

Detergents are synthetic products that facilitate the formation of foam, the emulsification of one liquid in another or the wetting down of a solid surface by a liquid. They have replaced bars of laundry soap and now represent 90 % of worldwide consumption of hygiene products.



5.1 Raw materials

The following products are required to obtain 8.5 kg of detergent powder:

- 6 litres of palm kernel oil or coconut oil
- 1 kg of caustic soda
- 3 litres of spring water, rainwater or demineralised water
- 100 g of soda ash (sodium carbonate) to avoid the redeposit ion of marks or stains on the material
- 500 g of sodium tripolyphosphate to increase the detergent's cleaning power
- 120 ml of sulfonic acid to increase the detergent's foaming power
- 10 g of sodium perborate to increase the detergent's bleaching power
- 100 g of carboxymethylcellulose (CMC) to fight bacteria and increase the brilliance of the washing

- 250 ml of oxygenated water to increase cleaning power through the action of the active oxygen and facilitate the granulation of the detergent
- 70 ml at least of synthetic fragrance to improve the aromatic properties of the detergent.

5.2 Production process for hand-crafted soap powder

Preparation of the soda solution

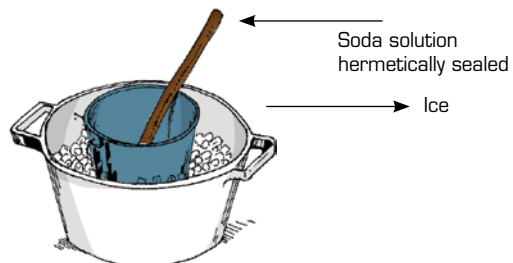
Follow the following procedure to prepare the soda solution:

1. Pour 1.5 litres of water into a 5-litre plastic bucket
2. Slowly add 1 kg of soda and help it dissolve using a plastic spatula
3. When the soda has completely dissolved, add another 1.5 litres of water, stir and leave the solution to stand in a hermetically sealed bucket for at least 3 hours.



⬆️ Preparation of the soda solution

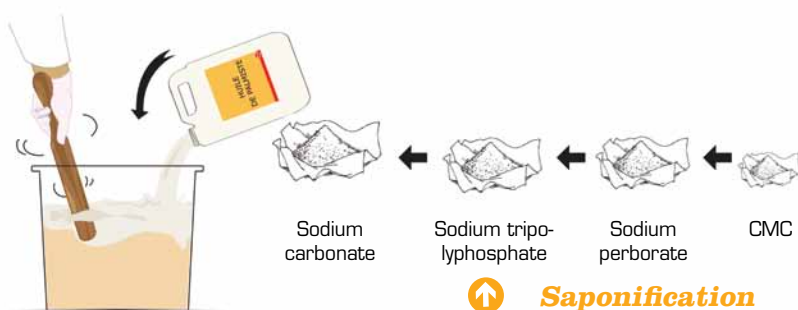
It is possible to cool the soda solution in 30 minutes by using ice.



⬆️ Cooking of the soda solution

Saponification

When the soda solution has cooled for at least 3 hours, gradually add the following to the 15-litre plastic bucket: palm kernel oil, soda ash, sodium tripolyphosphate, sodium perborate and carboxymethylcellulose (CMC), while stirring continuously. Add the soda solution very gradually while stirring regularly, always in the same direction. When all of the soda solution has been added, continue to stir until a fairly heavy homogenous paste is formed (and the trace becomes evident). Always stir the paste in the same direction and keeping up the same rhythm. This operation can take between 45 minutes and 1 hour.



Addition of additives

When the paste is ready and while continuing to stir, add 120 ml of sulfonic acid and as much synthetic fragrance as you require in that order. Ten minutes later, add the oxygenated water. When you add the water, the paste whitens and inflates – do not worry, this is quite normal.

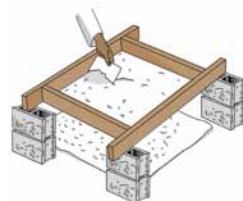


Finishing

After adding the additives, continue to stir for two minutes to make the paste homogenous. Pour it onto the plastic film (across the entire surface) and dry it in the shade in the open air for 72 hours. Granulate the paste using a sieve with metal fibres or using a mill grinder, then package it.



Drying



↑ Pouring onto the film, drying and granulation

5.3 Financial information

Description	Cost (FCFA)	Cost (€)
Palm kernel oil (6 litres)	3,600	5.49
Caustic soda (1 kg)	800	1.22
Sulfonic acid (120 ml)	360	0.55
Oxygenated water (250 ml)	500	0.76
Water (5 litres)	10	0.01
Soda ash (100 g)	35	0.05
Sodium perborate (10 g)	150	0.23
Sodium tripolyphosphate (0.5 kg)	1,750	2.67
Labour (3 hours)	950	1.43
TOTAL	8,155	12.41

Cost of producing 8.5 kg of detergent powder using the cold process

The cost of producing 8.5 kg of detergent powder using the cold process is FCFA 8,155, which amounts to € 12.40. On the market, a 30 g jar sells for FCFA 50, or € 0.076. The profit margin obtained from selling 8.5 kg of detergent powder in 30 g jars is therefore FCFA 6,010, or € 9.17.

6

LIQUID DETERGENT

A liquid detergent is a synthetic chemical product with cleaning properties that are more advanced than those of laundry soap.





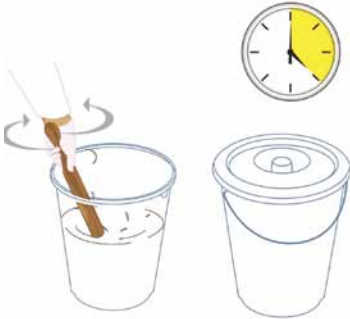
6.1 Raw materials

The following products are required to obtain 10 litres of liquid detergent:

- 1 kg of Texapon, Genapol or Alcopol, a cleansing agent or synthetic soap that is ready for use simply by diluting with water
- 1 kg of cooking salt, softening agent to help the dilution of the Texapon in water
- 9 litres of spring water or rainwater to dilute the Texapon or cooking salt (sodium chloride) to obtain liquid detergent
- 30 g, i.e. approx. 2 soup spoons of sodium benzoate, which acts as a stabiliser in the mixture
- 100 ml of the synthetic fragrance of your choice to improve the aromatic properties of the liquid detergent
- Optional - 50 g of colorant solution in 500 ml of water. Add 20 ml of this solution to the 9 litres of water required for the preparation of the liquid detergent.

6.2 Operating mode

In the bucket, mix the Texapon, Ginapol or Alcopol (in gel form) with the cooking salt, then stir vigorously for 15 to 20 minutes until homogenised.

 An illustration showing a hand pouring water from a bottle into a bucket. A clock icon above the bucket indicates a 15-minute period. In the second part of the illustration, a hand is stirring the contents of the bucket with a wooden stick, with circular arrows indicating the stirring motion.	<p>Next add 5 litres of water and continue stirring.</p>
 An illustration showing a hand pouring water from a bucket into a larger bucket. In the second part of the illustration, a hand is stirring the contents of the larger bucket with a wooden stick, with circular arrows indicating the stirring motion.	<p>Finally, add the rest of the water solution (the remaining 4 litres) and continue to stir until a viscous and sufficiently thick liquid has been obtained.</p>
 An illustration showing a hand stirring the contents of a bucket with a wooden stick, with circular arrows indicating the stirring motion. A clock icon above the bucket indicates a 15-minute period. To the right of the bucket is a smaller bucket with a lid.	<p>You can then add the synthetic fragrance of your choice, the sodium benzoate, the EDTA (if you are using tap water) and the colorant (if required).</p>



Stir the mixture a final time before sealing the bucket hermetically. Let it stand for at least 5 hours. Finally, pack in plastic containers.

6.3 Financial information

<i>Description</i>	<i>Cost (FCFA)</i>	<i>Cost (€)</i>
Texapon (1 kg)	3,000	4.57
Cooking salt (1 kg)	300	0.46
Sodium benzoate (30 g)	75	0.11
Water (10 litres)	20	0.03
1-litre plastic container (10 bottles)	1,500	2.29
Synthetic fragrance (100 ml)	1,000	1.52
Labour (2 hours)	635	0.97
TOTAL	6,530	9.95

Cost of producing 10 litres of liquid detergent

The production of 10 litres of liquid detergent without colorant packed in 1-litre plastic bottles costs FCFA 6,530 or € 9.93. One bottle of liquid detergent costs FCFA 653 to produce, or € 0.99. This bottle sells for FCFA 800 on the market, or € 1.22, so the profit margin per bottle is FCFA 147, i.e. € 0.23.

7

ANTI-DANDRUFF SHAMPOO WITH ESSENTIAL OILS

A synthetic detergent designed for washing hair, the anti-dandruff shampoo with essential oils, is particularly suitable for damaged and greasy hair, as it not only eliminates dandruff, but also cleans and strengthens the scalp. It can also help to reduce hair loss caused by scalp tension.





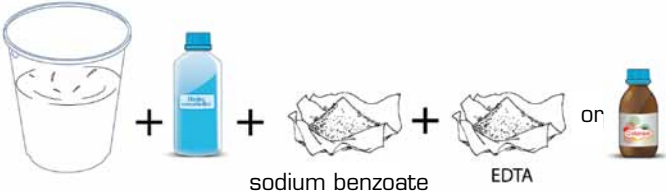
7.1 Raw materials

The following products are required to produce 7.5 litres of shampoo:

- **500 g of Ginapol (sodium lauryl ether sulfate or triethanolamine).**
- **500 g of cooking salt.** The cooking salt enables the Ginapol to dissolve in the water and increases the viscosity of the shampoo.
- **6.5 litres of demineralised water, spring water or rainwater.** The demineralised water enables the cleansing agent to dissolve and serves as a complement to the formula.
- **150 g of sodium benzoate.** Sodium benzoate is a preservative at 0.1 – 0.2 %. It helps to avoid contamination of the shampoo.
- **25 ml of ylang ylang essential oil.** With the scientific name *Cananga odorata*, ylang ylang essential oil has a relaxing effect and provides a sense of equilibrium.
- **12.5 ml of cedar essential oil.** With the scientific name *Cedrus atlantica*, this essential oil has a fortifying, relaxing and harmonising effect.
- **50 ml of lavender essential oil.** With the scientific name *Lavandula angustifolia*, lavender has anti-bacterial, psychologically balancing, antifungal, antiseptic, analgesic, antiviral and refreshing properties.

- **75 g of ethylenediaminetetraacetic acid (EDTA).** This enhances the action of the preservatives and the development of foam.
- **If necessary, 75 g of colorant for water diluted in one litre of water.** The colorants and fragrances are optional. Soluble in water, they provide the shampoo with its scented and glistening characteristics.

7.2 Operating mode

	<ul style="list-style-type: none"> • Mix the Ginapol (in gel form) in water with the cooking salt, then stir vigorously for 10 to 15 minutes.
	<ul style="list-style-type: none"> • Add half of the water and continue to stir.
<ul style="list-style-type: none"> • Finally, add the rest of the water and continue to stir until the liquid is viscous and thick enough. • Add the essential oils, the sodium benzoate, the EDTA and, if required, the colorant. 	
 <p style="text-align: center;"> + + + + or </p> <p style="text-align: center;"> sodium benzoate EDTA </p>	

- Give the mixture a final stir for a maximum of 5 minutes before hermetically sealing the bucket.
- Leave to stand for one week, then pack in plastic or dark glass bottles.



When washing hair, shampoo should be applied twice: the first application eliminates the dirt and dandruff by massaging the scalp, followed by rinsing; the second is the actual treatment, which consists of applying the shampoo and leaving it to work on the hair and scalp for 5 to 10 minutes. Finally, rinse thoroughly.

7.3 Financial information

Description	Cost (FCFA)	Cost in €
Ginapol (500 g)	1,500	2.29
Cooking salt (500 g)	150	0.229
Demineralised water (6.5 litres)	10	0.015
Ylang ylang essential oil (25 ml)	28,700	43.75
Cedar essential oil (12,5 ml)	10,005	15.25
Lavender essential oil (50 ml)	53,035	80.85
EDTA (75 g)	190	0.29
Labour (3 hours)	940	1.43
TOTAL	94,530	144.11

Average cost of producing 7.5 litres of anti-dandruff shampoo with essential oils

The production of 7.5 litres of shampoo costs FCFA 94.530 (€ 144.11), which amounts to FCFA 12,604 (€ 19.21) for the production of one litre of shampoo. Selling for FCFA 16,400 (€ 25), the profit margin for one litre of anti-dandruff shampoo with essential oils is FCFA 3,796 (€ 5.79).

8

ADDITIONAL INFORMATION

8.1 Conclusion

Soap has always been a key product in the daily quest for the well-being of all humans, enabling them to avoid microbial contamination and hygiene-related diseases. This guide encourages the development of plant-derived materials in the soap-making sector. It is to be hoped that we can integrate the use of less well-known and non-traditional oils and butters in the production of hand-crafted soaps.



8.2 Useful contacts

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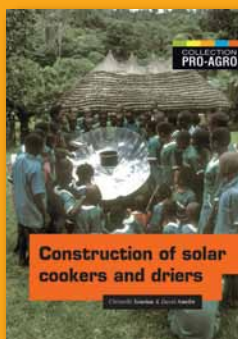
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Improved technique for hand-crafted soaps and detergents production

Pro-Agro is a collection of practical, illustrated guides that are jointly published by CTA and ISF Cameroun. They are an ideal source of information for farmers, rural communities and extension workers in tropical and subtropical regions.

Using simple and effective methods, this guide describes the hand-crafted production of toilet soap, household soap, shampoo, and liquid and powdered detergent. It sets out the different processes, operating methods, raw materials and lists of equipment that can be adapted for local use. This learning and development tool will be the perfect starting point for anyone wanting to start an income-generating project in the area of soap and detergent production.

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