Soapmaking from Coconut Oil
by Cold Process
SOAPMAKING FROM COCONUT OIL
BY COLD PROCESS

Technonet Asia
U.P. Institute for Small-Scale Industries
I. WHAT IS SOAP?

Common hard soap is the sodium salt of a fatty acid which results from the chemical reaction of fats and alkali. Fats and oil are primarily triglycerides. This means that a molecule of glycerol has linked up with three molecules of fatty acids. During saponification with alkali, the triglyceride is broken down to glycerol and fatty acids with the latter combining with the sodium in the alkali to form soap molecules.

Coconut oil soap is a well-known commercially established product. Coconut oil is known to be an ideal raw material for soapmaking due to its hardness, ready stability and free lathering properties of the sodium soaps made with it. Furthermore, because this oil is easily saponified even at room temperature, soapmaking is applicable. This saponification of coconut oil at room temperature is popularly known as soapmaking by cold process. This simple process is adaptable in the farm or in rural coconut communities.

The cold process of soapmaking involves the reaction of the oil with a quantity of strong caustic alkali solution almost equivalent to that theoretically required for complete saponification. This process needs very simple equipment.

II. MATERIALS/INGREDIENTS REQUIRED

Basis: 5 kg soap*

The following materials are used in making soap by cold process:

1. Fat — coconut oil prepared by wet processing or other conventional methods. This is readily available at Philippine Refining Company and other oil millers.

2. Lye — caustic soda solution (35° Be**). To get 35° Be, weigh 399 grams of sodium hydroxide flakes or pellets and then dissolve this in one liter of tap water. Check the density by means of a hydrometer.

3. Builder — sodium silicate. This chemical is available at the Chemical Philippine Mfg. Corp.

4. Perfume — essential oils such as citronella oil, ilang-ilang, etc.

III. EQUIPMENTTOOLS

In the course of making soap by cold process, simple equipment/tools are used. These tools are:

1. soap mixer
2. moulder
3. cutter (guitar string)
4. weighing scale
5. pail
6. percolator
7. oil storage tank
8. hydrometer
9. graduated cylinders
10. beakers and other measuring equipment

The equipment listed above are those used by the ICRDP-NIST group in developing the soapmaking technology. A contraption, however, of any of these equipment may be done as long as the formulation is made constant.

IV. FORMULATION

Basis: 5 kg soap

Oil - 3.57 kg (3.88 liters)
Lye or caustic soda solution (35° Be) - (sodium hydroxide) 1.77 liters
Sodium silicate - 0.14 liter
Essential oil - 0.04 liter

*Based on Industrial Chemical Research and Development Program (ICRDP) - National Institute of Science & Technology experiment.

**Baume — A calibration scale for liquids that is reducible to specific gravity by the following formulas: for liquids heavier than water, specific gravity = 145 - 145 - 7(at 60°F); for liquids lighter than water — specific gravity = 140 - 130 + 7(at 60°F); 7 is the reading on the Baume Scale in degrees Baume. Baume is abbreviated Be.
V. PREPARATION OF THE SOAP BY COLD PROCESS

1. Measure or weigh carefully the required quantity of coconut oil, then transfer to container of the soap mixer equipment.

2. Measure the lye required and add this slowly to the oil while stirring using the manually-operated (pedal type) soap mixer equipment as shown in Figures 1 and 2. This step, based on the ICRDP-NIST experiment, should be done at the range of 15-20 minutes of continuous stirring to get the ideal result.

3. Add measured amount of sodium silicate (builder) and essential oil (perfume). Stir continuously for 5-10 minutes.

   The ideal time required for steps 2 and 3 to be completed should be 30-35 minutes. Less than this time would not be an ideal preparation for the saponification process while more than this time would harden the mixture, thereby making the molding process difficult to accomplish.

4. Pour the homogenous viscous soap mixture into the moulder. Allow to stand at room temperature for 72 hours (three days) to enable complete saponification.

5. Cut the soap into bars of suitable sizes with a string or wire.

VI. PROCESS FLOW CHART

VII. ADVANTAGES/LIMITATIONS

Advantages
1. Low production cost
2. Adaptable to rural areas
3. No skill required
4. Simple process involved
5. Minimal maintenance required

Limitations/Disadvantages
1. Lesser foaming ability than other commercially available soap. Commercially produced soaps contain chemicals to increase their foaming ability. This product produced by cold process is not mixed with other chemicals.
2. Glycerine which can be sold to confectioners cannot be extracted, thereby lessening the probable profit of the project.
VIII. PRODUCTION COST OF SOAPMAKING BY COLD PROCESS

Basis: 100 bars of soap*

<table>
<thead>
<tr>
<th>Raw Materials</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Oil (copra: 32.46 kg)</td>
<td>P111.99</td>
</tr>
<tr>
<td>2. Sodium Hydroxide: 6.3 kg</td>
<td>P37.80</td>
</tr>
<tr>
<td>3. Sodium hydroxide: 0.94 kg</td>
<td>P4.03</td>
</tr>
<tr>
<td>4. Essential oil: 0.117 kg</td>
<td>P14.60</td>
</tr>
</tbody>
</table>

Direct Labor @ 2 workers at P18/day

Utilities
Water: nil

Total production cost P204.42

Unit cost: P2.04

Mark-up price of 30% P2.65

Commercial price of one soap bar P4.00

IX. SOURCE

For further inquiries about soapmaking by cold process, contact Mrs. Antonia Gonzales of ICRDP-NIST, NSTA Compound, Bicutan, Tagig, Metro Manila.

*Prices as of April 1983