Introduction to Soap Making (VITA Technical Bulletin No. 3)

by Marietta Ellis

Published by:

VITA (Volunteers in Technical Assistance)
3706 Rhode Island Avenue
Mt. Rainier, Maryland 20822
USA

Available from:

same as above

51003-BK

INTRODUCTION TO SOAP MAKING

by Marietta Ellis

This booklet presents techniques for making soap for home or village use. Soap can be made very economically. When cooking greases and fireplace or stove ashes are saved routinely, the basic ingredients are available at almost no cost.

The recipes offered here have been tested and will produce good soap. However, variations among local ingredients and conditions may make it necessary to try different soap-making recipes to see which combinations work best. Directions for larger commercial production of soap are not included in this Bulletin, since different equipment and techniques are required.

Author Marietta Ellis, of Bedford, Massachusetts, has been active in VITA activities for more than ten years. Her expertise in making soap derives from a background in medical technology, chemistry, and Colonial American crafts.

Please send testing results, comments, suggestions, and requests for further information to:

Technical Bulletins
VITA Publications Service
1815 North Lynn Street, Suite 200
Arlington, Virginia 22209-2079 USA

Revised 7/81
ISBN 0-86619-081-3

INTRODUCTION TO SOAP MAKING

BACKGROUND

Soap is formed by the chemical reaction of a fatty acid and an alkali. Although this reaction itself involves complex chemical substances, soap can be made very simply, with readily available equipment and common ingredients. The essential materials for making soap are fats, oils, and an alkali. Optional additions are perfumes, dyes, abrasives, sudsing agents, etc.

Fats and Oils

Fats and oils used to make soap must come from animal or vegetable sources. Oil derived from another source, such as mineral oil, cannot be used. Soap can be made by using only one kind of fat or oil, or by mixing animal and vegetable oil. Animal fats are hard fats. Soap that uses only animal fat is hard, tends to be grainy, and lathers poorly. Soap made only from vegetable oils lathers well but does not harden properly. A mixture of the two types of fats brings out the best qualities of both.

Other oils that can be used are olive, cottonseed, maize, soybean, groundnut, safflower, sesame, linseed, etc. Coconut and palm oils are very good for soap making.

The animal or hard fats that are generally used to make soap are tallow and lard. Tallow is the fat from beef or lamb. Lard is the fat from hogs. Butterfat is acceptable. However, chicken fat is not a hard fat, and is regarded as an oil.

Alkali

Alkalis are basic (low pH) substances that cause the desired chemical reaction. Common alkalis used are caustic soda (sodium

hydroxide) and potash (potassium hydroxide). The alkalis used to make soap can be from two sources: (1) lye, caustic soda, or potash, purchased at the market; or (2) lye obtained by leaching or washing water through the ashes of plants.

If possible, use commercially available lye because it is easy to use and gives consistent results. However, there are situations where this is impossible. This booklet therefore includes a section that gives the techniques for leaching lye from plant ashes.

Other Ingredients

Borax, soda, ammonia, kerosene, naptha, and rosin are sometimes added to increase the quantity of suds and improve the appearance of the soap. They are not necessary. Likewise, sand and pumice increase the soap's cleaning power.

Perfumes are added to make soap smell more pleasant. Either essential oils or artificial perfumes can be used. Some essential oils commonly used are lavender, geranium, wintergreen, citronella, clove, lemon, rose, almond, caraway, and banana. The oil or perfume is stirred into the soap just before the soap is poured into molds. The quantity of perfume used depends on the size of the batch of soap being produced, the intensity of the perfuming agent, and the strength of the desired final scent. The amount used can vary from a few drops to 15 grams (approximately 1/2 oz) or more.

Coloring matter can also be added. For example, vegetable or aniline dyes can be used to make soap. They are stirred evenly into the soap mixture before pouring it into molds. The color obtained from aniline dyes has a tendency to fade slightly when soap is exposed to bright light.[1]

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[1]Francioni, J. B. and Collings, M. L. "Soap Making." Louisiana State Extension Circular.

There are six major steps to make soap:

- Preparing the fat
- Preparing the lye (alkali)
- Mixing the fat and lye to form soap
- Adding extra ingredients, such as perfume and dye
- Molding
- Curing

GENERAL METHODS FOR SOAPMAKING
USING CANNED CAUSTIC SODA (Sodium Hydroxide)

This recipe will make 4.1 kilograms (9 pounds) of good quality soap. The amount produced can be changed as long as the general techniques and proportions are followed.

Equipment

- Bowls, buckets, pots, or tubs. These should be made from enamel, iron, or clay. Enamel containers should be chip-free, if possible. Never use aluminum; lye destroys aluminum.

- Measuring cups of glass or enamel.

- Spoons, paddles, or smooth sticks for stirring. These should be made from wood or enamel.

- Containers for molding soap. These can be wooden, cardboard, or waxed cartons. The molds can be any size, but those that are 5 or 6.5cm (2 or 3 inches) deep are the best. Gourds or coconut shells can be used for molds.

- Cotton cloth, waxed paper, or other material for lining molds. Cut the cloth or paper into two strips, one a little wider than the mold and the other a little longer than the mold. This lining will ease the removal of the soap from the molds.

- A thermometer with the range of 0 to 65°C (0 to 150°F). This is helpful but not necessary.

Temperature

A thermometer is not a necessary piece of equipment for making soap by the method given here. You can estimate the temperature of the mixture by comparing it with your body temperature. If a thermometer is available, the following information may be useful for judging the correct temperature at which to mix the fat and the lye together.

Type of Fat	Temperature of Fat	Temperature of Lye
Tallow	54°C or 120°F	32°C or 90°F
Lard or soft fat	38°C or 100°F	21°C or 70°F
Tallow & lard mixture	46°C or 115°F	26°C or 80°F
Vegetable oils	57°C or 135°F	26°C or 80°F

When a combination of equal amounts of different fats and oils is used, the temperature used for mixing is the mean of those used by each alone. In other words, add the temperatures together and divide by the number of temperatures. For example, the temperature for a mixture of tallow and vegetable oils would be:

$$\begin{array}{rr} 54^\circ C & \text{or } 120^\circ F \\ \underline{57^\circ C} & \text{or } \underline{135^\circ F} \\ 111^\circ C & \text{or } 255^\circ F \end{array} \qquad 2 \overline{)\ 55.5^\circ C} \quad \text{or} \quad 2 \overline{)\ 127.5^\circ F}$$

When the weather is hot, the temperatures for making soap should be about 5°C (10°F) less for the fats and 1° to 2°C (2° to 4°F) less for the lye. Rancid fat will require about 5°C (10°F) more heat than sweet fat.

Information for the following recipe was compiled from: Make Your Own Soap, Federal Extension Service; VITA Technical Inquiry Service, IR-25097; and "Home Soap Making," Village Technology Handbook, VITA. The recipe has been tested successfully in home conditions.

A BASIC RECIPE FOR SOAP (Yield: 9 pounds)

Ingredients

- 13 cups of clean, hard fat or oil
- 1/4 cup of borax (optional)
- One 13-ounce can of lye (sodium hydroxide crystals)
- 5 cups of water
- Perfume (optional). Use one of the following:

  - 4 tsp sassafras
  - 2 tsp oil of wintergreen
  - 2 tsp oil of citronella
  - 2 tsp oil of lavendar
  - 1 tsp oil of cloves
  - 1 tsp oil of lemon

Basic Procedure for Making Soap

Step One: Prepare (clarify) the fat.

- Place fat and an equal amount of water in a kettle.
- Add a sliced, unpared potato.
- Bring this mixture to a boil.
- Remove the kettle from the fire and strain the mixture through a sieve or a piece of loosely woven cloth.
- Add 1 quart of cold water for each gallon of hot liquid.
- Let the mixture stand without stirring until it is cool. The fat will harden on top.
- Remove the clean fat from the top.
- Measure the amount of fat required by the recipe and melt it down in the kettle.

Step Two: Prepare the lye.

CAUTION--LYE BURNS!! LYE IS POISON!!
KEEP IT AWAY FROM CHILDREN!!

Do not allow lye to come in contact with your skin or clothes. If contact does occur, wash thoroughly with a large amount of water any area that the lye may have touched. If possible, add lemon juice or vinegar to the water. If lye is swallowed, it should be followed by as much vinegar, lemon juice, rhubarb, or plain water as possible.

Contact a physician immediately.

- Measure the amount of water required.

- Measure the amount of lye required.

- Add the measured lye to the water very carefully. **Always add the lye to the water.** The resulting solution will become very hot.

- Allow the lye mixture to cool down to body temperature. To test the temperature, place your hand under the vessel that holds the solution. There should be no noticeable difference between the temperature of your hand and the vessel. **NEVER TEST THE LYE SOLUTION ITSELF WITH YOUR FINGERS.**

Step Three: Combine the fat and lye.

- Let the melted fat cool to body temperature.

- Add the lye mixture to the melted fat, pouring it very slowly and evenly in a small stream. As this is being done, stir the mixture slowly and evenly **in one direction.**

- Continue stirring the mixture after all the lye has been added until the spoon makes a track. This will take a long time--usually 30 minutes.

Step Four: Add extra ingredients.

- If you use extra ingredients (perfume, etc.), add them now.

- Allow the mixture to stand. Stir once or twice every 15 or 20 minutes for a period of several hours.

Step Five: Pour into molds.

- When the mixture is very thick and honeylike in consistency, it is ready to be poured into the molds. Line the molds with the cloth, waxed paper, or similar material that has been cut into two strips.

thick and syrupy, and drops in a sheet from a spoon. Pour again into the molds and let stand again for 48 hours.

. **Separating soap.** This may be the result of mixing the lye and fat together at the wrong temperatures, or of stirring either too much or not enough.

. **Curdled soap.** Check for rancid or salty fat.

SPECIALIZED SOAP RECIPES

In various parts of the United States, soap making uses products available locally (such as cracklings--crisp roasted pork rinds) and various forms of lime. The processes used are generally the same as those outlined in the General Method of Making Soap (page 4), which call for canned lye. A few of the following recipes, however, direct the soapmaker to add the grease to the alkali mixture, rather than to add the lye to the fats. Unless an individual recipe indicates otherwise, follow the process of adding the lye to the fats.

Crackling Soap Recipe

(From Inglenook Cookbook, Brethern Publishing House. Donated to the cookbook by Mrs. Frank K. Allen, Big Lake, Minnesota.)

- Place 4-1/2 pounds of cracklings in a kettle. Dissolve one 13 oz. can of lye in 1 gallon of water. Add the lye mixture to the cracklings in the kettle. Cook until well dissolved, about 1/2 hour.

- Add 1-1/2 gallons of water. Bring to a boil, and boil for two hours.

- Pour into cardboard or wooden boxes lined with waxed paper or cloth. Allow to cool, then cut with a sharp knife.

- Store for two to four weeks in a place where air can circulate between the bars at room temperature.

The following recipes, which use either unslaked lime or quicklime and soda as the alkali, all follow the same general procedure. To restate: mix dry alkali with water, allow to stand until clear, and then drain the liquid. This mixture is the lye solution to which the fats or oils are added. Boil the mixture until soap is formed. Pour the soap into molds, allow to harden, and cut into bars.

The following recipes were compiled from an old domestic economics book, The Housekeeper's Reference Book. They have been changed slightly for easier understanding.

Soda and Lime Soap Recipes

Recipe #1 (using lard; e.g. pork, fat)

- 6 pounds of sal soda (washing soda)
- 3 pounds of stone lime
- 4 gallons of soft water
- 6 pounds of melted lard

- Dissolve the soda and lime in the water. Boil the mixture.
- Allow the mixture to settle, then pour off the clear liquid.
- Add this liquid to the 6 pounds of melted lard and boil until it becomes soap.
- Pour into pans. Cut into bars when cool. Harden for a week.

Recipe #2 (using tallow, the white, harder fat of cattle or sheep)

- 2 pounds of sal soda (washing soda)
- 2 pounds of lime
- 2 pounds of tallow
- 1 gallon of soft water

- Dissolve the sal soda in the one gallon of boiling water.
- Add the lime and let stand for a few hours, stirring occasionally.
- Let settle and pour off the clear liquid. Add this liquid to the tallow.
- Boil the tallow mixture until the soap is formed. Pour into pans and allow to cool. Cut into bars.

Recipe #3 Boiled Soap

- 6 pounds of sal soda (washing soda)
- 3 pounds of unslaked lime (calcium oxide)
- 6 gallons of water
- 6 pounds of clean, melted fat
- 1/2 pound of table salt

- Pour 4 gallons of boiling water over the washing soda and the unslaked lime. Let it stand until it is clear.

- Drain off the liquid, saving the solid material. Add this liquid to the melted fat.

- Boil the mixture for about two hours, or until it begins to harden. Stir often.

- Pour the remaining 2 gallons of water over the saved lime-soda material. Let it stand until it is clear and cool.

- Pour this liquid carefully into the boiling soap to thin the mixture and keep it from boiling over.

- Stir in the salt just before removing the soap mixture from the fire. Pour the soap into a pan, let it stand until it is hard, and then cut into bars.

Recipe #4 Unslaked Lime and Soda Soap

- 3 pounds of soda ash
- 1-1/2 pounds of unslaked lime
- 7 pounds of fat
- 7 gallons of water

- Add the lime and soda ash to the water. Bring it to a boil and boil for 15 minutes. Pour off the lye.

- Add the fat to the lye and boil it for two hours.

- Pour this into cooling frames. Let it harden, and then cut into bars.

COCONUT OIL SOAP RECIPES

The recipes employing coconut oil as their source of fat were provided by the M. H. Baker Company of Minneapolis, Minnesota.

Recipe #1 (using tallow)

- 100 pounds coconut oil
- 50 pounds tallow, cleared
- 27 pounds caustic soda (sodium hydroxide)
- 50 pounds water
- 2 ounces perfume, optional*

- Dissolve the caustic soda completely in the water.

- Thoroughly mix the coconut oil and the tallow.

- Add the soda liquid to the mixture of coconut oil and melted tallow. It should be at body temperature.

- Stir until the mixture is smooth and homogeneous. The temperature should be about 63°C to 68°C (145°F to 154°F).

- The soap may be made in a steel or iron container. When smooth, it can be poured into a wooden container or fiber drum for cutting.

- Cover the container with burlap or any loose cover. Keep it in a warm place for five to seven days. Cut into bars. Allow the bars to age, as desired.

If no tallow is available, use the following recipe.

Recipe #2 (without tallow)

- 150 pounds coconut oil
- 27 pounds caustic soda (sodium hydroxide)

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*Perfume is optional--but very desirable--if the tallow is rancid.

- 48 pounds water
- 2 ounces perfume, optional

- Dissolve the caustic soda completely in the water.

- Add the soda liquid to the coconut oil. It should be at body temperature.

- Stir until the mixture is smooth and homogeneous. The temperature should be about 63°C to 68°C (145°F to 154°F).

- The soap may be made in a steel or iron container. When smooth, it can be poured into a wooden container or fiber drum for cutting.

- Cover the container with burlap or any loose cover. Keep in a warm place for five to seven days.

- Cut into bars. Allow the bars to age, as desired.

VARIOUS TYPES OF SOAP

Many forms of soap available commercially can be prepared at home. Others require equipment and processes that are impractical on a small scale.

Soap flakes, chips, or powder are made from soap that is about three days old. A soap chipper, slaw cutter, vegetable shredder, or a can lid in which chisel cuts have been made can be used. Size of the cutting teeth will determine the consistency of the soap chips. Stir the flakes occasionally as they dry.

To make soap jelly, cut 1 pound of hard soap into fine shavings and add 1 gallon of water. Boil slowly for 10 minutes, then cool. Cover to prevent drying.

Here are some special-duty soaps that can also be made at the home level:

Toilet Soap

To make a fine, smooth toilet soap, use the basic soap recipe on page 5 and allow the soap to cure for at least 48 hours.

. Shave the soap or cut it into fine pieces. Boil the soap pieces, using 1 cup of water for every 2 cups of fat or oil used in making the primary soap.

. Boil the mixture and stir until the soap falls off the spoon in a sheet. This takes about 10 minutes.

. Pour into the molds and again let cure for 48 hours.

. Cut into bars and store in a warm, dry place for four weeks.

Soft Soap

. 1 pound can of pure potash
. 5 pounds of fat, strained and cleared
. 8-3/4 gallons of water

. To one quart of water in a large kettle, add the one pound of potash. Boil for 15 minutes.

. Add the 5 pounds of fat and boil slowly for an hour longer, stirring frequently with a wooden spoon or a stick.

. Pour the boiling mixture into a large tub. (The tub can be enamel or wooden. It should not be aluminum because the excess potash will corrode aluminum.)

. Stir 2 gallons of hot water into the mixture.

. In about 15 minutes, add 2 gallons more of hot water. Stir well.

. Add 4-1/2 gallons of water, either hot or cold. Stir well.

. Stir the soap three or four times during the next hour. The mixture will be thin and white when it cools.

Abrasive Soap Paste

- Cut or shave 1 pound of homemade or neutral soap into small pieces.
- Melt the soap pieces in one pint of hot water.
- Add 2 ounces of mineral oil and mix well.
- When cool enough to handle, combine with pumice stone.
- Store the paste in tightly-sealed containers to prevent it from drying out.

Glycerine Soap

Use the canned caustic soda (sodium hydroxide) process. In addition:

- After the lye has been combined with the melted fat, add 4-6 ounces of glycerine for about every 6 pounds of fat.

Using the colonial method:

- Before the boiled fat-lye mixture sets, add 4-6 ounces of glycerine for every 6 pounds of fat.

Mechanic's Cleaning Compound

- 5-1/2 pounds of lard
- 8 ounces of light mineral oil
- 12 pounds of pumice stone or tripoli powder
- 7 pints of water

- Heat lard to 32°C (90°F).
- Mix in 2-1/2 pints of 32°C (90°F) water and allow to stand for 24 hours.
- Add 7 pints of water.

- Dissolve mineral oil with heat. Combine it with the lard mixture.

- Cool to a thick consistency and work in the ground pumice stone or tripoli powder.

- Store the mixture in a tightly sealed container to prevent it from drying out.

HOW TO MAKE LYE

Lye can be made by using water to leach or soak potassium carbonate out of the ashes of plant materials. Basic equipment for making lye includes a bottomless, 5-gallon bucket or barrel; a pot of clay, stone, glass, or iron; and a flat stone large enough to hold the bucket. A run-off lip and a circular groove somewhat larger than the diameter of the bucket are chiseled into the stone. See Figure 1.

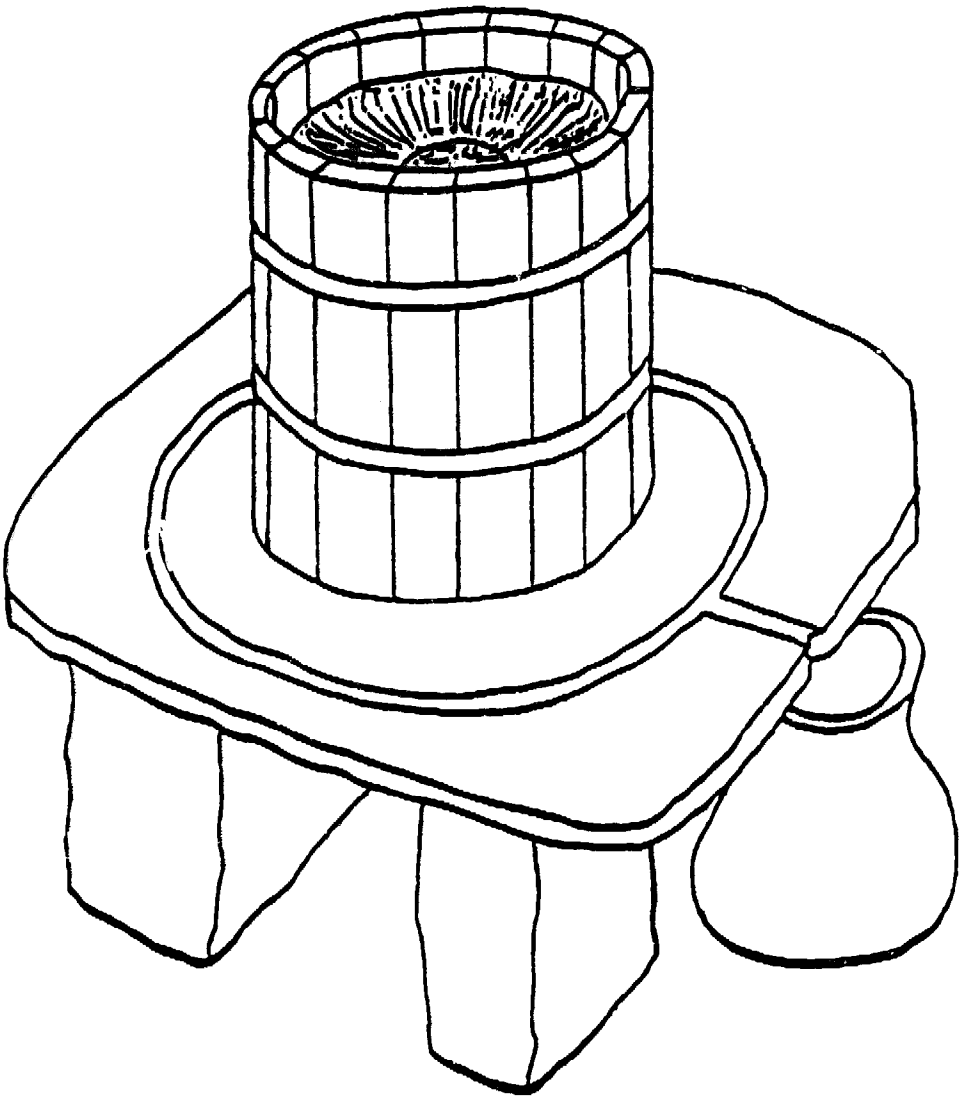

Figure 1. Lye-Leaching Apparatus

To make the lye, place the flat stone on a pile of rocks, stones, bricks, etc. Place the bottomless wooden bucket on the stone, within the circular groove. Position the clay, stone, or iron pot beneath the chiseled lip. Make a filter by placing two criss-crossed layers of twigs in the bucket. Top the twigs with a layer of straw. See Figure 2.

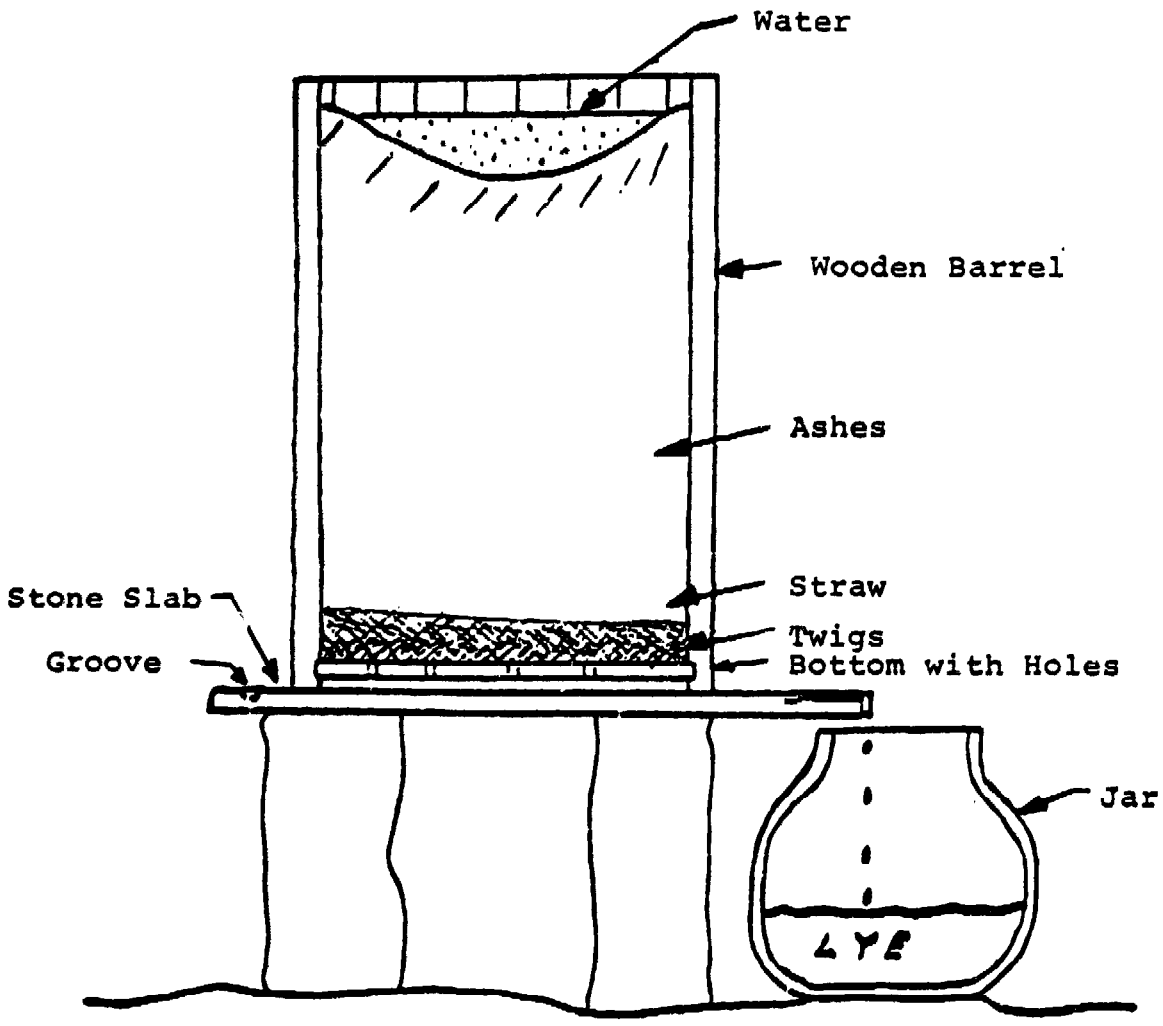

Figure 2. Lye-Leaching Apparatus--Cross Section

Fill the bucket with dry ashes. Ashes from all types of woods and plants may be used, but hardwood ashes yield the best lye. Mounding the ashes up around the sides and leaving a depression in the center will ensure that the water drains properly. Slowly pour warm water into the bucket, allowing the ashes to absorb as much water as possible before adding more.

Stop adding water when a brown liquid begins to flow from the bottom of the bucket across the stone and into the jar placed at the lip of the stone. The brown liquid is the lye. It takes about one hour to collect it. This process yields about 2-1/2 quarts of lye. **Remember: lye is a caustic, dangerous substance. Do not touch it.**

Lye leached in this way may vary in strength. These variations will affect the proportions of lye in the recipes. The strength of the lye solution can be determined precisely by using a Baume hydrometer, which is a special instrument to measure the specific gravity of a solution. The lye solution is poured into a cylinder and the Baume hydrometer is carefully placed in the solution. The reading on the hydrometer is the strength of the lye solution in degrees Baume (Be). This method is employed by commercial soapmakers.

If no hydrometer is available, several methods can be used that give reasonably accurate results. Three methods are as follows:

Method One

- Simply float an egg in the lye solution. If the egg floats with its top visible, the solution is strong enough. See Figure 3.

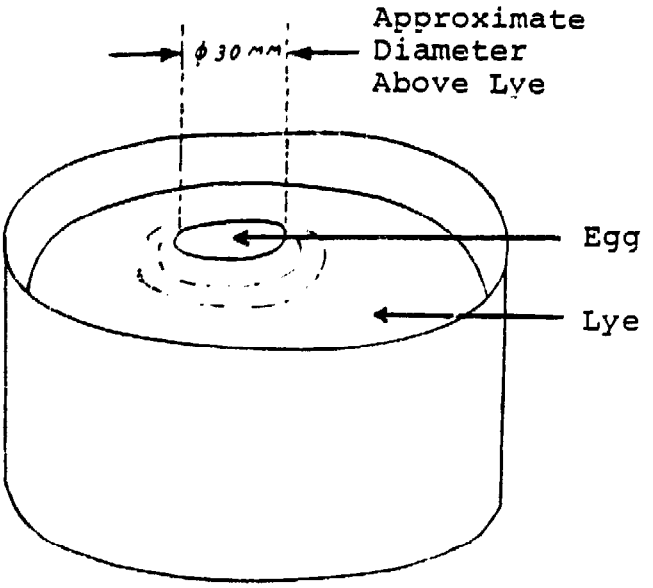

Figure 3. Egg Floatation Test

Method Two

- Dip a chicken feather in the solution. A solution of the correct strength will cling to the feather. If the solution is too strong, it will dissolve the feather.

Method Three

- Prepare a saturated salt (sodium chloride) solution by adding salt to approximately 1 liter of warm water. Stir until dissolved. Continue adding salt until no more will dissolve in the water. The solution is then saturated, which means the water has absorbed all the salt that it can hold.

- Tie a weight (a rock or scrap of iron) to the end of the stick of wood. Float the weighted stick in the salt solution. The stick should stand up straight. A small part of it should stick out from the liquid. Mark the stick where it emerges from the liquid surface. The marked stick is the measure for the lye concentration.

- Place the weighted stick in 1 liter of the lye solution, in the same size container used for the salt solution. If the lye is the proper strength, the stick will stand up straight, and its top will emerge at the marked point. The stick can be used again and again. It should be checked occasionally since its weight may change because of drying out or absorbing moisture. The salt solution can also be used again if it remains saturated.

Lye that is too strong can be thinned by adding water. Lye that is too weak can be strengthened by pouring it over a bucket of new ashes, or by boiling it down to its more concentrated strength.

Remember: Lye is dangerous. When handling it, do not allow it to splash on your skin. Do not allow it to boil so fast that it splashes.

SOAP SUBSTITUTES

Certain plants contain saponin, a substance that lathers in water. Ground or bruised parts of such plants can be used as soap substitutes. In some locations, such plants may be easier to obtain than the ingredients required to make soap.

Aloe--Jamaican vegetable soap is made from large succulent leaves of the aloe plant. The leaves are pressed between rollers or pounded in a mortar to produce juice. The juice is collected and strained through coarse cloth or a strainer. The strained juice is boiled or placed in the sun and reduced to a thick consistency. It is then combined with ashes and formed into balls so it will not stick to the fingers. This product will keep for years. It will form a lather in saltwater or fresh water.

One gallon of juice extracted from the aloe plant will yield one pound of the soap. The soap must not be mixed with tallow or any other fat, as this will destroy its cleaning properties.

Fern--Ferns burned until blue, rolled into balls, and dissolved in wash water have been reputed to clean clothes. (Family Recipe Book, 1819.)

Sarsaparilla.

Senega root (Polygaea senega).

Soap bark--The inner bark of Quillaja saponaria, a small tree of the rose family (Rosaceae), which grows in Chile. This inner bark is reduced to a powder and used as a soap substitute.

Soapberry plants--Plants of the genus Sapindus of the Sapindaceae family. These plants are either trees or shrubs that bear pinnate leaves with numerous small greenish or white flowers. They are found in tropical countries.

S. Marginatus.

S. Saponaria--Native to tropical America.

Soapwort--An herb, Saponaria efficinalis, whose leaves are used for cleaning.

Saponaria officinalis.

Saponaria vaccaria (cowherb).

Plants of the tropical zones whose leaf ashes yield lye for soapmaking:

Scientific name	Common name	Prominent location
Arthrocnemum indicum	Mangrove	Indian coast
Atriplex repens	Salt bush	Indian coast
Avicennia nitida	Mangrove	Philippine swamps
Cocos nucifers	Coconut palm	Coast of most tropical regions
Halocharis violocea		Indian coast
Haloxylon recurm	Camel food	Indian coast
Haloxylon multiflorum		Indian coast
Haloxylon salicornicum		Indian coast
Kochia indica		Indian coast
Salicornia brachiata		Indian coast
Salsola foetida	Aden balsam	Indian coast
Suaeda fruticosa		Indian coast
Suaeda monoica		Indian coast
Suaeda maritima		Indian coast
Suaeda nudiflora		Indian coast

Note: The plants of the Indian coast were provided by VITA Volunteer Dr. S. K.Barat, formerly of the Central Leather Research Institute, Adyar, Madras, India.

POTASSIUM CARBONATE (K_2CO_3)

Baume (Be)	Specific Gravity	Percent Potassium Carbonate
1.0	1.0072	1
2.3	1.0163	2
4.8	1.0345	4
7.3	1.0529	6
9.7	1.0715	8
12.0	1.0904	10
14.3	1.1096	12
16.6	1.1291	14
18.8	1.1490	16
21.0	1.1692	18
23.1	1.1898	20
25.2	1.2107	22
27.3	1.2320	24
29.3	1.2536	26
31.3	1.2756	28
33.3	1.2979	30
38.0	1.3548	35
42.5	1.4141	40
46.8	1.4759	45
50.9	1.5404	50

MEASUREMENTS AND CONVERSION RELATIONSHIPS

(Useful in making soap.)

Liquid

1 gallon equals 4 quarts, equals 3.8 liters
1 liquid quart equals 2 pints, equals 0.95 liters
1 pint equals 2 cups, equals 0.48 liters
1 cup equals 8 ounces, equals 0.23 liters
1 ounce equals 0.03 liters

Weight

1 ounce equals 28.35 grams
1 pound equals 16 ounces, equals 0.45 kilograms
1 pound of fats equals 2 cups of fat, equals 0.48 liters
0.48 liters of fat equals 0.45 kilograms of fat

The following is a formula for converting Fahrenheit degrees to Celsius degrees:

$$(F^\circ - 32) \times 5/9 = C^\circ$$

DICTIONARY OF TERMS

Alkali--Any of various bases that neutralize acids and turn litmus paper blue; any of various other compounds such as the carbonates of sodium and potassium.

Baume--The measurement used on a hydrometer to determine the specific gravity of an alkali or other liquid or solution.

Caustic alkalies--Hydroxides of the alkali group of metals; sodium hydroxide (NaOH) is called caustic soda and is used to produce hard soap. Potassium hydroxide (KOH) is called caustic potash and is used to produce soft soap.

Fat--Any of several white or yellowish, greasy substances composed of carbon, hydrogen, and oxygen, that form the chief part of adipose tissue of animals and also occur in plants. Used to make soap.

Glycerides--Ester of glycerol, i.e. fats.

Hydrometer--An instrument for determining the specific gravity of a liquid.

Leach--To percolate water through ashes to produce lye.

Lime, slaked--Calcium hydroxide [$Ca(OH)_2$].

Lime, unslaked or quick lime--Calcium oxide (CaO).

Limestone--Calcium carbonate ($CaCO_3$).

Lye--A highly concentrated alkali solution resulting from leaching, e.g., caustic potash, washing soda.

Potassium hydroxide (KOH)--A white, deliquescent solid, KOH; caustic potash used to produce soft soap.

Pumice stone--Porous volcanic rock, used as an abrasive.

Sal soda--Sodium carbonate crystals.

Saponification--The splitting of the fat molecule with an alkali into glycerol and soap.

Saponification number--The number of milligrams of 100% potassium hydroxide that will saponify 1 gram of a particular fat.

Soap--The sodium or potassium salt of fatty acids, used for washing and cleansing.

Soap, hard--A soap formed by the reaction between a sodium alkali and fats and oils that contain a high percentage of saturated fatty acids.

Soap, soft--A soap formed by the reaction between a potassium alkali and fats and oils that contain unsaturated fatty acids.

Soda--Sodium carbonate (Na_2CO_3).

Soda, washing--Sodium carbonate (Na_2CO_3).

Tallow--The harder fat of cattle or sheep, used in soap making and candle making.

Tripoli--Any of several substances containing or resembling silica, e.g., ground, weathered limestone, used as an abrasive in soap.

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