Carriage House PAPER
Supplies for the Hand Papermaker
245 Kent Ave. Brooklyn, New York 11249, USA
Tel/fax: 718-599-PULP (7857)
www.carriagehousepaper.com

DIRECTIONS FOR COOKING BARK FIBERS OR OTHER PLANT MATERIALS IN SODA ASH, LIME, AND LYE

Common inner bark fibers:

Kozo - Broussonetia papyrifera
Mitsumata - Edgeworthia papyrifera
Gampi - Wikstroemia diplomorpha
Kenaf - Hibiscus cannabinus
Hemp - Cannabis sativa
Flax - Linum usitatissimum

1. Weigh dry fiber 1 lb. = 450 gm.

2. Soak fiber overnight in water. If some strands of fiber are wider than others, pull apart the fiber transversely, so that the strands are fairly uniform in width. It makes cooking easier.

3. Select an alkaline substance for cooking, such as soda ash, lye or lime. Recommended for kozo, mitsumata & gampi : soda ash, also called sodium carbonate or Na2CO3. Recommended for kenaf, hemp & flax: lye, also called sodium hydroxide or NaOH. Lye is a very strong alkali, and should be used with great caution.

4. Weigh out soda ash or lye Use 20% of the dry weight of fiber - 20% of 450 gm equals 90 gm.(3 oz.) Dissolve the 90 gm. of soda ash or lye in 1 cup of hot water. Always add the alkali to the water, not vice versa. In the case of lye, do this outdoors, using a glass (Pyrex® type) or stainless receptacle. A great deal of heat and fumes will be generated - BE CAREFUL! Wear rubber gloves!

5. Fill cooking pot (stainless steel or enamel) with about 7 liters (quarts) of water. When water is almost boiling, stir in the alkali, and add soaked fiber. Loosely cover and simmer about two to three hours, stirring fiber every 30 minutes.

6. When fully cooked, the kozo, mitsumata & gampi should part easily with and against the grain. The other three fibers should also be fully cooked, but this will not be as obvious. Strain and rinse fiber with water until the rinse water is clear.

7. Chiri-tori - If necessary, clean fiber by hand, by removing the endless specks of black barkor other debris.

8. Kozo, mitsumata & gampi can be easily beaten into a pulp by hand (approx. 30-45 minutes per lb.) After beating, place a pinch of pulp in a jar of water and shake well. If there are no clumps and the individual fibers are suspended, then pulp is ready to be made into sheets of paper. The other three fibers are considerably more difficult to hand beat, and we recommend beating them in a Hollander beater.

For a complete description of the use of bark fibers in papermaking, we recommend the book, Japanese Papermaking: Tradition, Tools and Techniques, by Timothy Barrett.

These general directions can be used with any plant material, but probably will have to be adapted for specific plants. You should experiment to see whether soda ash will do the job, or if a stronger alkali is needed, e.g., lye. Cooking time may vary greatly. Ease of beating, and hand beating vs. Hollander beating would have to be determined by trial.

Use of lime: Lime, also known as calcium hydroxide or Ca(OH)2, is a traditional alkali still commonly used in Asia, particularly in China and in southeast Asia. It is the alkali of choice there in preparing bamboo fiber and the various straw fibers, like rice straw and wheat straw. However, lime can certainly be used with all the other bark fibers that are listed on page 1. For these bark fibers, use the lime according to the preceding directions, except that you should use 25% lime to fiber by weight, and cook for about 5 hours. The advantage to the use of lime is that it is a calcium product, and the calcium adds an alkaline reserve to the paper, which may increase the longevity of the paper. In contrast, the other alkali, namely soda ash and lye, contain sodium, and the fiber should be washed very well to remove the sodium. One good method is to use a lime water bath for the fiber that has been cooked in soda ash or lye, right after the cook. Use the proportion of a 1/4 teaspoon of lime to 1 quart of water. Then after rinsing, give the fiber a final washing with lime, using the proportion previously mentioned.

Lime can also be used as a pre-cook method of breaking down tough fibers. This amounts to a retting action. Bamboo and straw are processed in China and Burma in the following way:
1. Soak the fiber overnight.
2. Coat the fiber with a paste of lime with water, cover with mud, and let it sit for several months. Or, using a large pot, place a layer of fiber inside, cover with a layer of lime; place another layer of fiber down, then cover with lime; continue this until the pot is full; then fill with water and cover. Leave this for a few months, checking occasionally to be sure that the water has not evaporated.
3. If you have opted for coating the fiber with lime, shake off the lime (after the several month period), which has now dried on the fiber. In the other case, where the fiber has been retting in a pot, simply rinse the fiber.
4. Cook the fiber for several hours. It is not necessary to add more alkali to the cook.
5. Rinse the fiber.
6. Beat by hand, stamper, or in a Hollander beater.

For a complete description of the preparation of bark fibers in papermaking, we recommend the book, Japanese Papermaking: Tradition, Tools and Techniques, by Timothy Barrett. For a description of the use of lime with bamboo and straw fibers, we recommend The Goldbeaters of Mandalay, by Elaine Koretsky and Donna Koretsky.