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**Methods of Manufacturing Seedlac of  
Improved Quality. Part I—Use of  
Alkaline reagents**

BY

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# Methods of Manufacturing Seedlac of Improved Quality

## Part I—Use of Alkaline Reagents

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The colour of seedlac is an important factor in determining its price, a light-coloured product, i.e. one of low bleach index (B. I.) always fetching a relatively better return. Hence investigations have been carried out from time to time to modify the process of sticklac washing so that seedlac of lower bleach index than usual might be obtained without undue addition to the cost of production. Thus, Thakur and others reported that by washing sticklac to a size small enough to pass through a 20-mesh sieve and using triethanolamine (T.E. A.) as a washing reagent seedlacs of comparatively low Bleach Index could be prepared. His method, however, proved unacceptable to the trade on two grounds: (i) the smallness of the grain size and (ii) the relatively high price of T. E. A. In the present work, these two unsatisfactory features have been eliminated; in particular, care has been taken to ensure that the use of an alkali does not affect the yield adversely.

In the main, various cheap alkalis, e. g. washing soda, caustic soda etc. were used in place of T. E. A. The right grain size was secured by sieving the crushed sticklac simultaneously through two sieves of different mesh-size. Optimum working conditions have been worked out and are reported here.

The quality of the product from each experiment was checked by analysis, for which the following methods were used:

1. Determination of hot alcohol insolubles by Stillwell's method (2) as modified by Indian Lac Research Institute using 95% alcohol.
2. Determination of colour index was made by the method as adopted by Indian Lac Research Institute using No. 3 colour standard. (3).
3. Determination of Bleach Index was done by method as developed by Sankaranarayanan (4).
4. Determination of wax was done by McIlhiney's method (5).
5. Acid value was determined by the method as developed by Indian Lac Research Institute (6).

Data given in this paper are the average of at least three experiments with each sample of sticklac.

### GRAIN SIZE

Before washing, sticklac was crushed in a hand-driven triple roller and sieved through 10-mesh and 30-mesh sieves. The material remaining in between was taken for washing. The washing was done by the country method putting the prepared sticklac in a cup-shaped stone vat. In a small scale this method of washing was simulated in the laboratory by the use of mortar and pestle.

In a preliminary experiment, ordinary *Baisakhi* lac was washed with water only and with different quantities of washing soda. It was found that by washing with 8 chataks of soda per maund of lac, Bleach Index was reduced from 120 to 92 with a simultaneous reduction in yield by 4 seers.

### USE OF ALKALIS IN WASHING

Next, ordinary *Baisakhi phunki* sticklac was washed with varying quantities of soda. Yield and qualities of the products were compared with seedlac washed with water only from the same stock of sticklac. Results are given below :—

Quantity of soda used per maund of sticklac in Chataks.	0	2	8	16
Bleach Index	120	100	92	87
Yield %	62.5	62.0	52.5	50.0

The above data show that by increasing the quantity of soda beyond 8 chataks, the Bleach Index of the product is not much reduced whereas the yield is very adversely affected, making the process uneconomical.

Experiments were next performed to find out the comparative efficiency of different chemicals. Dry *Baisakhi (Ber) phunki* was used in these experiments. The results were as follows :—

Chemicals used in chataks per md. of lac.	With water only	Ammonia 2.5 chs	Soda 4 chs. & Bleaching powder 8 chs.	Sodium sulphite 4 chs.	Commercial caustic soda (NaOH 86%) 8 chs.
Yield %	64	53.3	56.8	57.0	57.7
Bleach Index	114	90	96	94	87
Remarks	—	Regains the colour after keeping for a few days.	The seedlac developed white spots and looked dull.	Seedlac was glossy	Surface gloss was less, but the grains were clean.

The above table shows sodium hydroxide to be the most efficient washing reagent. Subsequent experiments were done to find out the minimum quantity of the reagent needed to ensure best results particularly in regard to yield and Bleach Index of seedlac. Lac from the same stock as used in the previous experiments was used. Results are given below :—

Sodium Hydroxide used in gms. per 1 lb. (7.8 ch.) of crushed lac	0	1	2	3	4	5	6	7	8	9	10
Yield %	64	61	57.2	57	57	57	57	55	53	52	51
Bleach Index	114	98	94	93	91	87	85	78	75	73	70
Colour Index	11	9.5	7.5	7	6.7	5.8	4.4	4.4	4	3.8	3.7
Hot Alcohol Insolubles %	4.19	3.51	3.65	2.63	2.91	3.02	3.02	2.21	2.32	1.36	1.17

It appears that by increasing the quantity of sodium hydroxide above 7 gms. per pound of crushed lac, the Bleach Index of the product can be reduced still further, but in view of the fact that 80 is the Bleach Index of Grade IA seedlac, 7 gms. may conveniently be taken as optimum for the purpose. Further, hot alcohol insolubles content of the product was also below 3%. To confirm these results, two other varieties of lac viz., dry *Palas phunki* of Ranchi and dry *Ari* lac from Poona were washed using different quantities of caustic soda. Results were as follows :-

Quality of lac washed.	<i>Palas</i> lac of Ranchi				Poona lac.			
	0	6	7	8	0	6	7	8
Quantity of NaOH used in gm./lb. (7.8 chs.) of lac.								
Yield %	69.1	61.3	61.0	60	78	62.6	68.5	61.0
Bleach Index	121	80	78	78	120	80	75	75
Colour Index	12	4	4	3.5	16.5	8.8	7	7

So the above results confirm that 7 gms. of caustic soda per lb. of dry lac is sufficient to reduce the Bleach Index from 120 to 80.

Then the above experiment was repeated with fresh *Phunki Rangeeni* lac. This lac was not dry as it could be made into a lump by pressing in hand. It was found that the Bleach Index of the product was reduced from 95 to 68 by washing with 7 gms. of caustic soda per pound of crushed sticklac. But the yield was reduced from 75% to 64% which was considered to be too low. So, subsequently, this lac was washed with 3.5 gms. of caustic soda per lb. of lac: the Bleach Index of the product was 78 and the yield 70%. So, for fresh lac 3.5 gms. of caustic soda per lb. of prepared sticklac is sufficient to reduce the Bleach Index to 80.

Further work was conducted with fresh *Ari Ber* lac, with the idea that *Ari* lac might behave differently as the colouring matter in it is soft. After using 3.5 gms. of caustic soda per lb. of lac which corresponds to 5 chhataks per md., it was found that the Bleach Index was lowered from 100 to 63 and the yield from 77.5% to 57.5%. As so much lowering of Bleach Index is not required, especially at the cost of so much reduction in yield, the washing was repeated with less quantities of caustic soda, viz. 2 chhataks and 2.5 chhataks per maund. The resulting products had Bleach Indices 81 and 77 and yields 71% and 70% respectively. So *Ari* fresh *Rangeeni* could be washed to a product having Bleach Index lower than 80 by using 2.5 chhataks of caustic soda per maund of sticklac.

Washing of lac with caustic soda might be expected to remove some portion of the lac complex of high acid value (A. V.), and some wax from the surface of the lac grains; hence these were determined for a few samples of seedlac washed with different quantities of caustic soda. Results are given below :—

Washed with NaOH gm./lb (7.8 ch.)	A. V.	Wax %
0	71.91	3.36
3.5	71.18	2.98
7.0	70.58	2.94

Evidently the use of caustic soda does not appreciably change the above values.

To find the effect of age on the seedlac washed with caustic soda, the Bleach Indices of the above samples were determined after 9 months (April to December): these were found to remain unchanged.

As regards the appearance of the seedlac prepared by the above method, the grains looked somewhat dull and had less gloss. It was found however, that considerable improvement in appearance is brought about if the caustic soda is very thoroughly washed out and then the grains of lac are washed with a very dilute (0.1%) solution of sulphuric acid. After this treatment, the acid also should be very thoroughly washed out.

Lastly, to find the effect of washing with caustic soda on the shellac subsequently to be made from seedlac, shellac was made from the samples of seedlac washed without, and with respectively 3.5 gms. and 7 gms. of caustic soda per lb. of lac. The results are as follows :—

Quality of seedlac washed with NaOH gm./lb.	0	3.5	7
Yield of shellac %	80	83	85
Colour	9.5	6.0	5.0
Life in minutes	43	43	43
Flow in seconds	116	117	119

So no detrimental effect on shellac made from the seedlac washed with caustic soda is found. On the contrary, the yield is more which is due to there being less insoluble matters in the seedlac.

In conclusion, based on these experiments, the following method of washing is prescribed for preparation of seedlac of low Bleach Index from inferior quality lac.

First the scraped lac is crushed in a triple roller and sieved between 10- and 30-mesh wire gauze. The bigger particles remaining over 10-mesh, if they contain lac, should be crushed again. The lac remaining over 30 mesh is taken for washing to make seedlac whereas the finer particles that have passed through 30 mesh are washed for making *mol-amma*. The "prepared" lac is first washed twice in the usual way in a stone vat with water only. The caustic soda as required per maund of lac depending on the quality of lac ( chart given below ) is dissolved in 8 gallons of water. Seedlac made from one maund of prepared sticklac is soaked in the solution in a stone vat and stirred for ten minutes with a wooden rod. After this period, plenty of water is poured into the vat and the seedlac grains are washed thoroughly till free of caustic soda as tested by litmus paper. Approximately 190 gallons of water are required for 1 md. of prepared sticklac. For washing according to this method, the quantity of caustic soda required per maund of prepared sticklac is as follows :

Dry lac ( <i>Phunki</i> or <i>Ari</i> )	...	...	...	...	10 chhataks.
Fresh lac ( <i>Phunki</i> )	...	...	...	...	5 chhataks.
Fresh lac ( <i>Ari</i> )	...	...	...	...	2.5 chhataks.

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