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METHOD OF MANUFACTURING SEEDLAC OF IMPROVED QUALITY

Part II—Use of Oxidising Reagents

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In the first part[1] the results of washing lac with alkalis have been reported. In this part it was thought worthwhile to extend the study of washing lac to a few alkaline oxidising reagents e.g. sodium perborate, and some acidic oxidising reagents. The use of the acidic agents was thought desirable as they were expected to reduce the loss because of the acidic nature of both the lac resin and lac dye.

It was noted by the previous workers[2] that sodium perborate reduces the colour of lac grains. Sodium perborate is also used as a bleaching agent in other industries e.g. in cotton textiles[3]. In a qualitative experiment, it was found that the bleach index of lac was reduced from 120 to 99 by washing with perborate. So the work on the use of perborate as a washing reagent was continued with a view to determining the details.

Table 1. Results of Washing Crushed Lac (*Palas*) 1000 gm. with Varying Quantities of Sodium Perborate.

Quantity of Sodium perborate (in gm.) used.	*Yield %*	*Bleach index.*
0	67.9	118
2	67.0	104
4	66.5	97
6	65.0	87
10	64.5	87

So it is found that the minimum quantity of perborate for efficient washing is 6 gm. per 1000 gm. of crushed lac, which equates to four *chattaks* per *maund* of crushed lac. This is, however, considered too much as the price of this chemical is high. Hence further experiments were undertaken to see if the requirement of this chemical could be reduced. To start with, 5 gm. of perborate in conjuction

with 1 gm. of caustic soda were used for each 1000 gm. of crushed lac. As a result, the bleach index was reduced from 119 to 93, and the yield was less by 3 percent. Oviously the reduction in bleach index is not much and the yield also is somewhat adversly affected. Efforts were therefore continued to see if a still better reagent were available. Hence instead of alkaline oxidising agents some acidic oxidising agents were tried. In all these experiments *ber* lac was used.

Table II. Results of Washing *Ber* Lac with Acidic Oxidising Agents

Chemicals Used	*Yield %*	*Bleach index.*	*Remarks*
Nil	55	111	.....
Sodium hypochlorite	55	105	Grains are not clean.
Nitric acid	55	105	,,
Acidic $KMnO_4$	55	100	Grains become blackish.
Acidic $K_2Cr_2O_7$	55	105	Grains become yellow.
Hydrogen peroxide	55	103	Grains are not clean.

From the above acidic potassium permanganate appears to be the most efficient agent. Hence its possible use was investigated further. Towards this end, a series of experiments, using 100 gm. of crushed *ber* lac in each lot, and varying amounts of $KMnO_4$, was done. The yields of seedlac were the same in each case but not the bleach indices. Results are given below in Table III.

Table III. Results of Washing Crushed Lac (1000 gm.) Using Varying Amounts of $KMnO_4$. (Acidic)

(*N*) *$KMnO_4$ Solution.*	*Bleach index.*	*Remarks.*
0 cc.	98	.....
5 cc.	89	Grains become blackish.
10 cc.	81	,,
I0 cc. Neutral.	85	,,

The development of a blackish colour on the lac grains was presumably due to deposition of manganese oxide produced by the reduction of potassium permanganate. To remove it, the grains were afterwards washed with dilute sodium bisulphite solution, but the colour did not improve. A further washing with a very dilute sodium hydroxide solution also had the same effect. So further experiments with potassium permanganate as well as with other oxidising agents were abandoned.

Experiments were done to replace perborate, which had given some promising results. Necessary clue was provided by the reaction between sodium perborate and water, which is as follows ;

$$4\ NaBO_3 + 5\ H_2O = 4\ H_2O_2 + Na_2B_4O_7 + 2\ NaOH$$

It may be seen that hydrogen peroxide, borax and caustic soda are formed in the reaction. Now it has been already found that hydrogen peroxide does not

work satisfactorily towards reducing the bleach index of lac. So the other products of the reaction should be taken into consideration. As reported already (*vide* 1st part) both sodium hydroxide and sodium carbon ate reduce the bleach index of lac individually, so a comparative study has been done in washing lac with mixtures of caustic soda and borax on the one hand and sodium carbonate and borax on the other. In each of these experiments 10 seers of *palas phunki* crushed lac were taken. The results are as follows :

Table IV. Results of Washing Crushed Lac (10 srs. *Palas* Phunki) with Borax and Other Chemicals.

Reagent used	*Yield %*	*Bleach Index.*	*Colour*	*Hot alcohol Insolubles %*
Nil	76·25	119	8·5	3·89
Borax 50 gm. & Washing soda 10 gm.	72·5	90	7·0	2·59
Borax 50 gm. and Caustic soda 10 gm.	73·75	86	6·0	2·23

So from the above results the use of a mixture of borax and caustic soda was considered advantageous. In subsequent experiments, minimum quantities of the chemicals required were determined.

In each of these experiments 1000 gm. of crushed lac of same quality were used. Results are given below

Table V. Results of Washing 1000 gm. of Crushed Lac with Various Chemicals.

(a) Washing with borax only						
Quantity of borax in gm.	0	5	6	10	15	20
Yield %	77·0	74·5	73·5	72·7	72·0	71·4
Bleach index.	110	108	107	98	82	74
Colour	10	8·5	8·5	7·5	7	7
(b) Washing with caustic soda only						
Quantity of caustic soda used in gm.	0	1	2	3	4	5
Yield %	77·0	74·0	73·6	72·4	71·4	70·6
Bleach index.	108	100	95	91	84	76
Colour	9·5	9	9	8	7·5	7
(c) Washing with 1 gm. of caustic soda and varying quantities of borax						
Quantity of borax in gm.	0	3	4	5	6	7
Yield %	77·0	74·0	72·5	71·5	71·0	70·5
Bleach Index	108	98	92	78	75	74
Colour	9·5	9	8	8	7·5	7

(*d*) *Washing with 5 gm. of borax and varying quantities of caustic soda*				
Quantity of caustic soda in gm.	0	1	2	3
Yield %	77·0	71.5	70·0	69·8
Bleach index	108	78	70	68
Colour	9·5	8	7	6

From (a), it is found that increasing the quantity of borax does not help much to reduce the bleach index, though it does not affect the yield adversely.

From (b), it is found that though an increase in the quantity of caustic soda helps to reduce the bleach index, it affects the yield adversely.

From (c), it can be seen that while increasing the quantity of borax beyond 5 gm. does not help much to reduce the bleach index, the yield is adversely affected. This was confirmed from (d).

So the optimum proportion of the mixture of borax to caustic soda may be taken as 5 : 1. Furthermore, for 1000 gm. of crushed lac, 6 gm. of the mixture appear to be essential. It has also been observed that the natural gloss of the lac grains is not lost by this washing.

A few more experiments using different qualities of sticklac were done with the above determined quantities of the mixture. In each experiment 10 seers of crushed lac were washed.

Table VI. Results of Washing (10 seers of) Various Sticklac with a Mixture of Borax 50 gm. and Caustic Soda 10 gm.

Quality of lac	*Chemical used*	*Yield of seed lac %*	*Bleach index.*	*Colour index.*
Fresh *Ari Rangeeni* from Ranchi	Nil	60·00	110	9·5
,,	Borax and caustic soda	57·50	80	6·0
Baisakhi Phunki dry, from Ranchi	Nil	76·25	111	9·5
,,	Borax and caustic soda	73·75	82	7·0
Rangeeni Phunki from Ranchi	Nil	77·5	95	9·0
,,	Borax and caustic soda	74·37	77	7·0

From the above results it may be concluded that a mixture of borax and caustic soda in the proportion of 5 : 1 is quite satisfactory for all types of lac, but that the quantity of the mixture itself may have to be varied depending upon the quality of the sticklac.

On the basis of the above results, the following working method for washing lac is proposed : First, the scraped lac is crushed in a triple roller and seived between 10 and 30-mesh wire gauezes. One *maund* of crushed lac (*Beuli*) is washed twice with water in the ordinary way in a stone vat. Then 3½ *chhataks* of borax and 3½ *tolas* of caustic soda are dissolved in 4 gallons of water. This mixture is added to the lac grains, previously washed twice, as stated before, and rubbed as usual for 10 minues. This rubbing can be done by feet as it does not corrode the human skin. The resulting mass is then washed twice with ordinary water to remove the reagents. Washed seedlac is then dried as usual.

Shellac was made by the country process from the seedlac prepared according to the above method and the properties of the same were compared with shellac made from seedlac washed with water. Yield of shellac from the first one is 1¼ % more than the yield from the latter.

Table VII. Analysis of the shellac made from both types of seedlac.

	Shellac from seedlac washed with water only.	*Shellac from seedlac washed with a mixture of borax and caustic soda.*
Acid value	78.02	76.63
Colour index	8.5	7.0
Life in mins.	58	58
flow in secs./5″	85	85

So by this method loss in washing lac has been reduced keeping the gloss and other properties intact.

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