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Utilization of Byproducts of Lac Industry: Part I—Manufacture of Bleached Lac from *Molamma*

A. K. GHOSH & S. C. SEN GUPTA
Indian Lac Research Institute, Ranchi

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A method of utilizing *molamma*, a byproduct of lac industry, for converting it to bleached lac of standard quality and of good storage stability, by a slight modification of the conventional bleaching technique adopted for seed lac, i.e. by carrying out the initial alkali extraction at a low temperature (50°C.) for a longer time (4 hr), is described. The bleached lac obtained is comparable in all aspects with that obtained from seedlac and of even better storage stability.

INDIA produces the major portion of the world's output of sticklac and almost the entire quantity is processed into seedlac in this country itself. During this processing, certain unavoidable byproducts are obtained such as *molamma*, *kunhi* to an extent of nearly 7 per cent. Of these *molamma* forms the major part. It is usually obtained in the form of fine grains and dust which contain mainly lac (70-75 per cent) along with impurities such as sand, woody matter, insect debris. On account of its fineness, it is unsuitable for use as such in the subsequent shellac manufacture by the hot filtration method. Though lac can be recovered from it by

solvent extraction, as far as is known, it is not being put to use that way in this country. As such, there is no market for this commodity in India except for a small quantity consumed in bangle making. Hence, this byproduct goes on accumulating and occasionally West Germany imports this at a very cheap price. Recovery and proper utilization of this lac will consequently add to the overall economy of the lac industry.

Recently, bleached lac is gaining popularity in this country and if the product could be made available at a cheap rate, the pace will be accelerated. It was, therefore, thought that if bleached lac of adequate quality can be prepared from *molamma*, there will be, to some extent, more economic utilization of the material. The results of the work undertaken, with this object in view, are presented.

The lac content of *molamma* varies from sample to sample but, in general, in well washed samples, it is between 70 and 75 per cent. Among the impurities, sand is 5-6 per cent, woody matter 2-3 per cent and insect debris the rest. Due to the presence of insect debris it has always been a difficult problem to extract lac from *molamma* by the conventional alkaline solutions.

When *molamma* is extracted with boiling aqueous sodium carbonate solution, a part of the insect debris goes into solution resulting in a thick and very dark coloured extract. Bleach index of this solution is also very high. It has already been established that use of excessive amounts of bleach liquor detracts from the quality of bleached lac produced[1]. Consequently, it has not been possible, so far, to prepare a standard bleached lac of good colour and keeping quality starting from *molamma*. The extraction procedure, therefore, required modification in order to reduce the dissolution of these undesirable materials during the alkali extraction. After various attempts, it has been found that complete extraction of lac from *molamma*, giving light coloured extracts with low bleach index, could be achieved under the following conditions.

Process

The material is screened through 30 mesh sieve and the portion that passes through forms the raw material for further processing. The residue consists mostly of woody and other extraneous material and is to be neglected.

The lac content (hot alcohol solubles) of the sample is first determined. Sodium carbonate, 10 per cent on the lac content of the sample, is then dissolved in a volume of water equal to the volume of the quantity to be bleached. The solution is raised to 55°C. and the raw material gradually added with constant stirring. The stirring is continued for a total period of 4 hr keeping the temperature at 50°C. by addition of a little hot water from time to time whenever necessary. Finally more water at 50°C. is added so as to make the solution contain 25 per cent lac. The solution is then strained through cloth. Further processing such as dewaxing (if necessary), bleaching, precipitation and washing, are carried out in the manner already standardized in this Institute[2,3]. The bleach liquor requirement for bleaching by this technique is worked out by determining the bleach index of the sample according to the standard method[4], except that the initial digestion with soda is carried out exactly under similar conditions of time, temperature and alkali concentration as described above. It has always been found that the bleach index, determined by this modification, is 20-40 units less than the results obtained by the standard method.

Bleaching of *molamma* by this technique has been repeated on a semi-pilot scale (10 kg.) a number of times and found reproducible. The yield of bleached lac is 80-83 per cent on the lac content.

Properties of bleached lac

The bleached lac thus obtained, on semi-pilot scale, is free flowing and its keeping quality is very good. It retained its solubility in alcohol even after one year's storage in the dry state at room temperature, whereas, the one obtained by the conventional method,

i.e. soda extraction at 85-90°C., started becoming insoluble within three to four months.

The comparative properties of bleached lacs thus prepared on semi-pilot scale from various types of *molamma* are brought out in Table 1.

It will be seen (from Table 1) that the yield and colour indices of bleached lac obtained by modified and conventional methods of extraction were almost similar but the acid values and the chlorine contents were lower in lacs obtained by the modified method. These lower values might be responsible for the better storage properties of the bleached lacs.

Wax and ash contents and life under heat

The wax contents of a few representative samples of regular and refined bleached lacs and ash and life under heat of a few regular bleached lacs have also been determined and the results are given in Table 2.

It will be seen (from Table 2) that though *molamma* contained a higher percentage of wax than seedlac, the wax contents in

Table 1 — Preparation of bleached lacs from *molamma* and seedlac under different conditions of extraction and their properties

Raw material used	Temp. of extraction °C.	Bleach index by extraction at		Yield of bleached lac on lac content %	Properties of the bleached lac produced		
		85-90°C.	50°C.		Colour index	Acid value	Chlorine content %
Molamma, ILRI	50	150	120	81	0·38	68	1·32
	50	152	120	82	0·38	69	1·33
	50	150	120	81·7	0·38	68	1·35
	85-90	152	—	82	0·38	78·6	1·62
Molamma, commercial	50	125	90	82	0·32	69	1·35
	50	125	92	82·4	0·34	70	1·40
Bhole Kunhi, commercial	50	160	122	80	0·36	73	1·40
	50	162	120	83	0·36	71	1·38
	50	160	120	82	0·35	72	1·38
	85-90	160	—	82	0·37	84·3	1·88
Seedlac, 30 mesh	50	120	100	84·7	0·36	69	1·27
	50	120	98	84·4	0·37	69·6	1·29
	50	120	100	84·4	0·36	69	1·26
	85-90	120	—	84·8	0·30	79	1·31
	85-90	120	—	84·6	0·31	78·5	1·33

Table 2 — Wax and ash contents and life under heat of some refined and regular bleached lac prepared by the modified method

Raw material	Wax content in			Ash in regular bleached lac %	Life under heat at 150°C. of regular bleached lac *min.*
	Crude material %	Bleached lac %			
		Regular	Refined		
Molamma	7·5	3·82	0·20	0·76	14
	7·5	3·78	0·23	0·75	—
	6·5	3·62	0·19	0·77	—
Seedlac	4·6	3·52	0·20	0·66	14

the bleached lac were of the same order. The ash content and life under heat also were similar.

The above findings show that bleached lac prepared from *molamma* by the modified technique are almost similar in all respects, if not better, to those prepared by the conventional method from seedlac except for their lower acid values.

This technique is also applicable for the production of bleached lac from seedlac. If seedlac is to be processed, it has to be crushed to pass through 30 mesh before extraction with soda. The requirement of bleach liquor is also less than what is necessary by the standard method (vide Table 1, sample 4) and the product obtained has a lower acid value and better storage stability.

In conclusion it may be emphasized that, since the raw material is cheap, and a standard quality of bleached lac having good colour and storage stability is obtained, the utilization of *molamma* for the manufacture of bleached lac will add to the economy of the industry and at the same time the price of bleached lac also will be cheaper ensuring, in future, a better and steady market for it.

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