SNo. 192

Reprinted from *Research and Industry*, Vol. 18, No. 2, June 1973, pp. 42-43

Recent Advances in the Technology of Lac Processing & Utilization of Byproducts of Lac Industry

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Manuscript received 5 February 1973

The techniques developed at the Indian Lac Research Institute, Ranchi in recent years for the processing of lac and utilization of the byproducts of lac industry are reviewed. Among the processes discussed are those for (1) refining of lac; (2) production of shellac directly from sticklac; (3) reclamation of lac dye from lac factory effluents; and (4) manufacture of bleached lac.

THE conventional methods of seedlac and shellac manufacture[1] are time-consuming and expensive. Several new techniques for processing lac and utilizing the byproducts of lac industry have been evolved at this institute. A few of these are reviewed in this communication.

Techniques for lac processing

In the first stage of refining of lac, crushed lac is washed with water to remove the water-soluble impurities. As the price of washed lac (seedlac) depends upon its bleach index, low bleach index product fetching a higher return, many attempts have been made to produce light coloured seedlac. A mixture of caustic soda and borax in the ratio 1:5 has been found to be a very effective washing aid for this purpose[2]. Further, by using potassium permanganate, higher yield of seedlac is obtained[3].

The separation of sand from seedlac has been a long standing problem. The usual methods of removal of sand from seedlac are tedious and time-consuming and add substantially to the cost of production. The Institute has designed a machine[4] for this purpose which separates sand particles to the extent of almost 100%.

Regarding shellac manufacture, a major improvement is the development of an autoclave method[5] employing direct steam, which can be adopted by both small and large scale manufacturers. The method is economical and rapid and has the additional advantage that lac, which has been stored for long periods, can also be processed. Also, through a simple modification[6] in the furnace of the conventional "Bhatta" process of seedlac melting, the costly wood charcoal has been replaced by soft coke, thereby effecting substantial economy in shellac production.

A major breakthrough in the field of processing of lac is a process for the manufacture of shellac directly from sticklac[7]. During the processing of sticklac to seedlac and then to shellac by the conventional methods, there is 20% loss of lac resin. The new technique enables almost 100% recovery of the resin, thereby eliminating the byproducts. Another advantage is that the shellac obtained has superior properties compared to the products obtained by the conventional methods.

Utilization of byproducts

Lac factory effluents contain a good amount of lac resin, wax and almost the entire water-soluble lac dye. These are valuable products and their economic reclamation adds to the economy of the lac industry. The normal practice is to allow the effluents to drain out into the adjoining fields, creating unhygienic conditions in the surroundings due to the putrefaction of insect bodies. A very simple process has been developed for hygienic disposal of these effluents and obtaining lac, wax and dye as a slurry. Methods[8-9] have been standardized for the reclamation of these products from the slurry and dye from the mother liquor.

To recover the wax from the slurry, a wax extraction pilot plant has been assembled. The wax thus obtained or that obtained from refuse lacs is very dark in colour and finds limited use. A method[10] has been developed recently for the manufacture of light coloured wax from the crude wax, having higher melting point, better solvent retention power and low penetration value. This wax can replace the costly imported carnauba wax.

The lac dye has many uses and some outside countries have shown interest in it. The residue from the slurry contains sufficient nitrogen due to the presence of insect bodies and is a good manure.

The byproducts of lac industry, such as *molamma, kunhi, kiri,* etc. contain a good amount of lac. These are exported at a very low price. Methods[11,12] have been developed for the manufacture of shellac, bleached lac and total hydrolyzed lac from these byproducts.

Bleached lac

Nearly 50% of lac consumed in the world today is in the form of bleached lac, popularly known as white shellac. Large quantities of bleached lac are manufactured in foreign countries, viz. United States, United Kingdom and Germany. India, however, had no bleached lac industry. The production of bleached lac of satisfactory keeping quality is a tricky process requiring strict control at every step, A process[13] for the manufacture of bleached lac of regular (with full complement of wax) and refined[14] (without wax) varieties of satisfactory keeping quality which does not discolour or block on storage has been developed. The process has been successfully tried up to pilot plant scale[15]. The knowledge thus gained has enabled its manufacture to be undertaken on an industrial scale not only to meet the internal demand but also to export it to potential markets in the South and Middle East countries.

Acknowledgement

The authors are thankful to Dr S. C. Sengupta, Head, Division of Chemistry and Dr J. N. Chatterjea, Director of the Institute for their help in preparing the paper.

References

1. *Lac—A monograph,* edited by B. Mukhopadhyay & M. S. Muthana (Indian Lac Research Institute, Ranchi), 1962, 156.
2. Ghosh, A. K. & Bhowmik, T., *Method of manufacturing seedlac of improved quality,* Indian Lac Research Institute, Ranchi, Bulletin No. 90, 1957.
3. Ghosh, A. K. & Sen Gupta, S. C., *Res. & Ind., New Delhi,* **9** (1964), 224.
4. Ghosh, A. K. & Bhowmik, T., *Res. & Ind., New Delhi,* **2** (1957), 87.
5. Bhowmik, T., *Res. & Ind., New Delhi,* **2** (1957), 309.
6. Ghosh, A. K. & Sengupta, S. C., *Res. & Ind., New Delhi,* **10** (1965), 299.
7. *Annual Report, Indian Lac Research Institute, Ranchi,* 1968, 39.
8. Ghosh, A. K., Mukherjee, M. & Sen Gupta, S. C., *Res. & Ind., New Delhi,* **9** (1964), 129.
9. Ghosh, A. K. & Sen Gupta, S. C., *Res. & Ind., New Delhi,* **12** (1967), 168.
10. *Annual Report, Indian Lac Research Institute, Ranchi,* 1969, 70.
11. Ghosh, A. K. & Sen Gupta, S. C., *Res. & Ind., New Delhi,* **12** (1967), 171.
12. Ghosh, A. K. & Sen Gupta, S. C., *Res. & Ind., New Delhi,* **14** (1969), 14.
13. Khanna, B. B., *Paintindia,* **13** (1963), 28.
14. Khanna, B. B. & Sankaranarayanan, Y., *Res. & Ind., New Delhi,* **7** (1962), 373.
15. Khanna, B. B. & Sankaranarayanan, Y., *Res. & Ind., New Delhi,* **10** (1965), 1.