

# Utilisation of polymerised bleached lac in French polishing

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A METHOD for complete dissolution of 100% polymerised and insoluble bleached lac has been developed. The method consists in refluxing the lac in common solvents in presence of mineral acid for 10 hours. The varnish thus prepared, when applied on wooden surfaces by French polishing technique produces smooth, hard, glossy and adherent films and compares well with the fresh bleached lac varnish.

THE familiar French polish is used extensively by furniture manufacturers almost everywhere and is made by dissolving 900-1800 gm of shellac in a gallon of alcohol. Sometimes venice turpentine, gum mastic, castor oil, or linseed oil are also added to improve the gloss, flow and elasticity of the film. Spirit shellac varnishes particularly in U.S.A., are made from bleached lac (white lac) and known as 'liquid' shellac. Most vigorous tests on wooden surfaces have established shellac's outstanding superiority over all other finishes as regards adhesion, retention of colour, lustre etc.

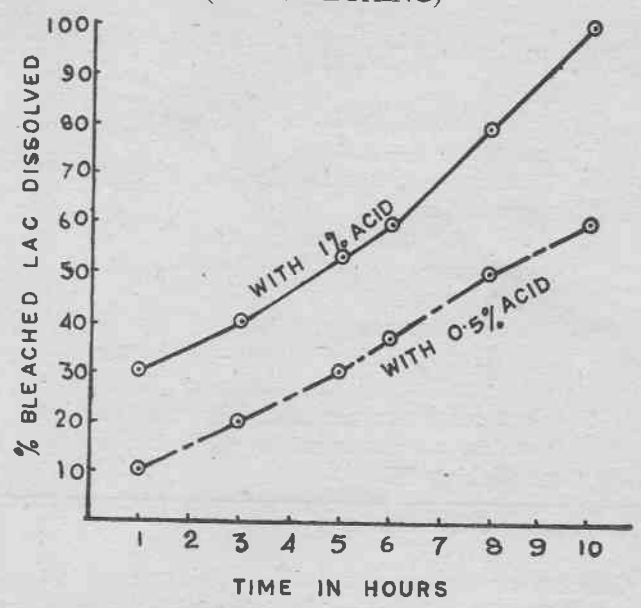
The basic procedure in the bleaching process consists in dissolving lac in aqueous sodium carbonate solution at 90-100°C, straining off the undissolved materials and treating the filtered extract usually when cold with sodium hypochlorite solution. The bleached lac is reclaimed from the solution by precipitation with mineral acid usually sulphuric acid.

Due to the entry of chlorine<sup>2</sup> in the molecule of lac during the process of bleaching, the keeping quality of bleached lac deteriorates and as a result, it does not stay long under normal conditions of storage in godowns. It becomes polymerised and insoluble comparatively earlier than shellac and dewaxed lac and becomes unfit for French polish. How to utilize the polymerised bleached lac — has been a problem for the industry.

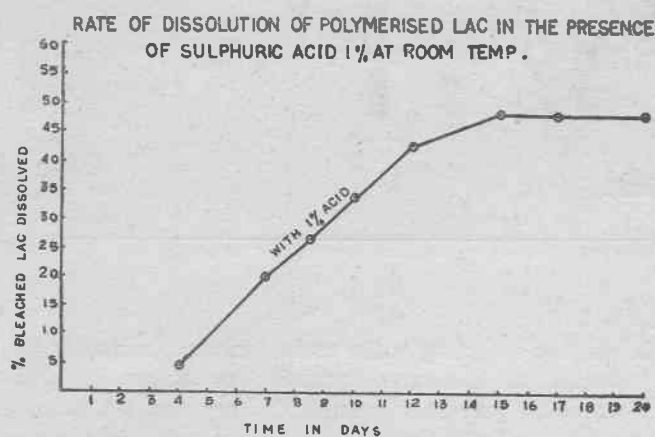
Bhatt and Kamath<sup>3</sup> reported that deteriorated lac can be reconditioned quickly with the help of mineral acids. He made his experiments with a sample of dewaxed lemon with about 58% cold alcohol insolubles. But the method did not succeed in the case of bleached lac probably due to special conditions of polymerisation in it. However, keeping the idea in view, attempts were made to dissolve the polymeris-

ed lac by refluxing with usual solvent mixtures in presence of minimum quantity of sulphuric acid. First of all sulphuric acid (0.5% on the wt. of lac) was tried. But only partial solution could be obtained in 10 hours (see graph I), on increasing the amount of acid from 0.5 to 1.0%, a complete solution of the 100% polymerised lac was accomplished in 10 hours (see graph I). Since it is not practicable for furniture manufacturers to reflux the varnish, experiments were made to dissolve the polymerised lac in the cold at room temperature. Polymerised lac was kept in the mixture of solvents containing 1% sulphuric acid with occasional shakings. It was observed that only 48% of the lac went into solution in 15 days (see graph II). However, the bleached lac containing about 50% cold alcohol<sup>4</sup> insolubles went completely into solution in 10 days. This method is quite practicable for small furniture manufacturers and they can use even 50% polymerised lac in their trade efficiently.

RATE OF DISSOLUTION OF POLYMERISED LAC IN THE PRESENCE OF SULPHURIC ACID (BY REFLUXING)



Graph I



Graph II

### Experimental

100 gm of 100% polymerised lac was treated with a mixture of solvents containing 225 gm spirit (95%), 30 gm. butanol and 45 gm. toluene. To this 1 gm. (0.55 cc.) concentrated sulphuric acid (sp. gr. 1.84) was added. This was then refluxed for 10 hours. Refluxed varnish was then mixed with BaCO<sub>3</sub> (Barium carbonate) (2 gm) in solid state to neutralise excess acid present in the varnish. After filtration, films on glass and tin panels were prepared by flowing and on wooden panels by French polishing technique. The films were then tested for their gloss, hardness, colour, water and heat resistance properties by standard methods as prescribed in I.S.S.<sup>5</sup> The properties are given in the following table:

### COMPARATIVE FILM PERFORMANCE OF BLEACHED LAC VARNISHES

	Varnish obtained from bleached lac	Polymerised bleached lac
<b>A. Properties of the varnish</b>		
1. Clarity	Clear and transparent	Clear and transparent
2. Colour index (By Lovibond Colour comparator) — units	1 1/7	2 1/2
3. Viscosity — (Seconds) (By No. 4 Ford cup)	16.6	17
<b>B. Film properties</b>		
1. Gloss (% standard black glass)	70*	72*
2. Appearance	Smooth and uniform	Smooth and uniform
3. Hardness-gms.	600	600
4. Water resistance		
(a) (Time of initial blush) — (minutes)	30	30
(b) Condition of the film after 24 hours	Blushed	Blushed
5. Heat resistance performed by standard heat test cup as prescribed by I.S.I. initial temp. of sticking °C	60	64

\* Average of five readings

### Conclusions

(1) Totally polymerised and insoluble bleached lac can be made soluble in solvents/solvent mixtures, if refluxed for 10 hours in presence of sulphuric acid (1% on the wt. of lac).

(2) Under similar conditions only 60% of the polymerised bleached lac goes into solution if the quantity of sulphuric acid is reduced from 1.00 to 0.5%.

(3) At room temperature, if the polymerised bleached lac is kept for 15 days with sulphuric acid (1% on the wt. of lac) only 48% of the lac goes into solution.

(4) At room temperature, if the bleached lac (50% cold alcohol insolubles) is kept for 10 days in presence of sulphuric acid, whole of the lac goes into solution.

(5) Varnish prepared from the polymerised bleached lac can be applied on wooden surfaces by French polishing technique. These varnishes produce films having excellent gloss, hardness, water and heat resistance and compare favourably with the films prepared from fresh bleached lac varnish.

(6) Cold method for the dissolution of polymerised bleached lac is more practicable for small furniture manufacturers as it does not involve any complicated process. This method will help them in utilising their old polymerised stock of bleached lac efficiently in French polish.

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