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Cold Setting Sealing Wax in Paste Form

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A cold setting sealing wax in the form of paste has been prepared from butyl ester of lac/hydrolysed lac and ethyl cellulose, using titanium dioxide as filler and methyl acetate-ethyl ether (40 : 60) mixture as solvent. The seals made from the wax paste after exposure for 1 min over a clear surface set within 5 min. Even after one year's storage in a collapsible tube, the sealing wax shows no deterioration in its performance characteristics.

Among the various uses of shellac, an important one is in making sealing wax. From time to time, several formulae have been reported, e.g. cold sealing wax[1], lightable sealing wax[2], non-inflammable sealing wax[3], sealing wax in the form of candle[4], etc. These are all covered by patents. Standard sealing waxes are prepared using shellac, rosin, pigment and dye (Bhowmik, T., personal communication). These are marketed in the form of sticks in different shades. The major limitations of the products are: (i) while applying over the surface, an open flame is required, which sometimes damages the surface due to burning of sticks, (ii) there is loss of the product, and (iii) the seals obtained are brittle. An attempt has been made to prepare a cold setting sealing wax in the form of paste which could be stored in a collapsible tube and used whenever required. The present communication reports the results of this study.

Experimental procedure

Ethyl cellulose (3 g) and dried TiO_2 (3 g) were taken in a cleaned dried mortar (porcelain) and mixed thoroughly. To this, 1 g shellac ester[5] (butyl) or hydrolysed[6] lac dissolved in 4 ml of a mixture of methyl acetate and ethyl ether (40 : 60) was poured and finally mixed using a pestle till a homogeneous paste was formed. Care was taken to spend minimum time in the preparation of the paste. The product was then immediately transferred to a collapsible tube.

Tests

Drying time—A small quantity of the sealing wax was taken out of the tube and spread over a clean surface with the help of a spatula. After exposure for 1 min, a seal was made with the standard die and the time for complete drying was noted. It generally took 5 min to set.

Adhesion—A few seals were applied over a piece of paper and kept at room temperature for 6 hr. The seals were then bent together with the surface on which they were applied over a cylinder of 60 mm diameter. They were taken to pass the test, as they remained attached to the paper on which they were applied.

Heat resistance test[7]—A few seals were applied over craft paper and allowed to dry at room temperature. The paper was then kept in an oven at 55° ± 0.5°C for 5 hr. The seals were taken to have passed the test, since the engraved letters on them remained unaffected.

Storage stability—The sealing wax prepared with the composition developed was kept in a

Table 1—Performance of Cold Setting Waxes of Different Compositions

Solvent	Butyl ester of lac/hydrolysed lac	Ethyl cellulose	Titanium dioxide	Performance Time for impression, min / Time for setting, min
	g	g	g	
Ethyl acetate (4 ml)	1.0	3.0	2.0	5/15
do	0.5	3.5	4.0	7/15
do	1.0	3.0	3.0	4/10
do	1.5	2.5	3.0	8/15
Butyl acetate (4 ml)	1.0	3.0	3.0	Impression is made after 9 min, but slowly disappears
Amyl acetate (4 ml)	1.0	3.0	3.0	do

Table 2—Effect of Solvent Composition on Drying Time of Wax

Solvent		Butyl ester of lac or hydrolysed lac	Ethyl cellulose	Titanium dioxide	Time for impression, min / Time for setting, min
Ethyl ether	Methyl acetate				
%	%	g	g	g	
20	80	1.0	3.0	3.0	3/8
30	70	1.0	3.0	3.0	3/8
40	60	1.0	3.0	3.0	2/7
50	50	1.0	3.0	3.0	2/6
60	40	1.0	3.0	3.0	1/5
70	30	1.0	3.0	3.0	1/5, but cannot be stored for long.

collapsible tube. At the end of one year, there was no deterioration.

Results and discussion

From the data presented in Table 1 it is evident that with ethyl acetate as the solvent and using different concentrations of ethyl cellulose, lac ester and filler, the composition containing 1 g hydrolysed lac/butyl ester of lac, 3 g ethyl cellulose and 3 g titanium dioxide gives excellent results. The same composition with butyl acetate and amyl acetate as solvents did not give satisfactory results. Hydrolysed lac and butyl ester of lac were found to be equally suitable for the purpose. The former being cheaper is recommended for commercial use. To minimize the time for putting the seal and to get a hard dry product in minimum time, ethyl ether - methyl acetate mixture was tried as solvent. Best results were obtained with methyl acetate - ethyl ether (40 : 60) mixture. Alteration in the ratio of ethyl ether and methyl acetate did not prove beneficial, as the storage behaviour of the material deteriorated.

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