

that any rosin or colophony, which can be separated in a state of reasonable purity from the sample of shellac, was originally added to the shellac, as an adulterant.

The process here described allows the analyst to separate in a form convenient for exhibition either as evidence in court or as an ocular demonstration for his client, any rosin which may have been added as an adulterant to shellac.

Shellac varnishes may contain beside true shellac not only rosin, but other gums and resins soluble in alcohol. It becomes, therefore, a matter of interest to ascertain how some of these other resins behave when treated by this process. Two samples of manilla, when treated, using absolute alcohol as the first solvent, gave respectively, 41.2 and 43.3 per cent. of matter soluble in petroleum ether. The acidity of these two lots of matter soluble in petroleum ether was in the case of the first sample such that 1 cc. of normal alkali neutralized 411.7 milligrams and in the case of the second 470.7 milligrams. Two samples of Kauri gave, respectively, 37.9 and 27.0 per cent. Upon titrating with standard alkali these portions soluble in petroleum ether, it appeared that 1 cc. of normal alkali was capable of neutralizing 903.6 mg. and 742.5 mg., respectively. Of Sandarac, two samples, when similarly analyzed, gave 34.96 and 36.19 per cent., having such an acidity that of the first 541.2 mg. would neutralize 1 cc. normal alkali, and of the second, 552.5 mg. would neutralize 1 cc. Of Dammar, 89.9 per cent. proved to be soluble, while the resin of *Shorca roburta*, a sample of which was kindly sent by Mr. W. Risdon Criper, of Calcutta, gave 69.5 per cent. of soluble matter.

A number of attempts were made to effect a satisfactory separation of the wax before separating the rosin from the shellac. It was found, however, that on account of the solubility of wax in alcohol and in glacial acetic acid, this separation could not well be made by filtering out the wax before the addition of petroleum ether. Neither were attempts which were made to separate the wax by a preliminary solution of the shellac in aqueous alkali successful in furnishing a method that at all approached in feasibility to the method already described.

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THE VOLATILE OIL OF *PINUS SEROTINA*.

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Scattered among the forests of Long Leaf pine along the Atlantic seaboard, there are found, usually in mixed stands, patches of Pond pine (*Pinus serotina*) and Loblolly pine (*Pinus taeda*). These pines are seldom subjected to turpentineing, as the yield of oleoresin is not so plenti-

ful as from the predominating types *Pinus palustris* and *Pinus heterophylla*. Nor are the two species usually distinguished locally, the name "black pine" being applied to each. The striking odor of the wood of *Pinus serotina* when freshly cut made desirable an investigation of its volatile oil, and in collaboration with the U. S. Forest Service, the oil has been studied in this laboratory during the past year. Well identified trees were selected in Florida. The trees were regularly chipped throughout one season of eight months. The product from each tree was collected every eight weeks. The oleoresin closely resembles that from Cuban pine (*P. heterophylla*) being quite liquid and containing relatively about the same proportion of crystalline acids. To this low percentage of crystalline matter is to be assigned doubtless, as in the case of *P. heterophylla*, the absence of "scrape" formation on the scarified surface of the tree, a formation so typical of *P. palustris*.

The volatile oil was distilled from the oleoresin by steam in the apparatus described on page 865 above. The oleoresin evidently contains a greater proportion of mucilaginous substances than that from the more common pines, for it was much more difficult to distil. On heating to 140°, the usual temperature of distillation, and introducing steam, the easily molten mass froths badly. This could be avoided only by raising the temperature at the outset to 160°. At this temperature, the viscosity is diminished sufficiently to enable a complete distillation to be carried out without frothing. During the latter part of the summer, however, and during the autumn, the amount of this mucilaginous substance evidently increased, and to such an extent that it became practically impossible to distil off the volatile oil. Partial success was secured by the addition of concentrated sodium hydroxide solution to the distilling flask.

The resin left after distillation is pale yellow, similar to the best grades of commercial resin. Acid number 167.

The volatile oil, freed from water by standing in contact with calcium chloride, was a limpid liquid with a fragrant odor suggesting at once the presence of limonene. The physical constants of the oil follow:

Sp. gr.: 20°, 0.8478.

Sp. rotation: 20°, -105°36'.

Index of refraction: 20°, 1.4734.

Acid number: 0.

Saponification number: 1.54.

Iodine number: 378.

Solubility in ethyl alcohol at 22.5°:

95 per cent. alcohol 1.35 parts required to dissolve 1 part of volatile oil.

90 per cent. alcohol 4.80 parts required to dissolve 1 part of volatile oil.

85 per cent. alcohol 8.10 parts required to dissolve 1 part of volatile oil.

80 per cent. alcohol 16.20 parts required to dissolve 1 part of volatile oil.

70 per cent. alcohol 56.00 parts required to dissolve 1 part of volatile oil.

Comparative evaporation with the volatile oil of *P. palustris*, at room temperature, in shallow watch glasses, 0.2 gram of each used.

Time.	<i>P. palustris</i> . Per cent.	<i>P. serotina</i> . Per cent.
Loss after ½ hour.....	35.7	20.30
Loss after 1 hour.....	62.5	37.30
Loss after 1½ hours.....	91.7	53.40
Loss after 2 hours.....	96.0	68.47
Loss after 5 hours.....	97.8	98.8

On fractionation the following results were obtained:

Temperatures.	Per cent. distillate.	Index of refraction, 20°.	Rotation in 100 mm. tube 20°.
172-175°	27.4	1.4716	—87°55'
175-180°	57.0	1.4724	—92°21'
180-185°	8.4	1.4744	—92°14'
185-+	7.2	1.5045

Repeated fractionation at atmospheric pressure showed some polymerization. From a fraction, 175-176°, a large yield of limonene tetrabromide was obtained. Melting-point 103°-104°. The solution of the tetrabromide in chloroform was levo-rotatory, —70.0°.

A study of the oxygen absorbing power of this volatile oil in comparison with that of the ordinary spirits of turpentine obtained from *P. palustris* showed a much larger absorption by the oil of *P. serotina* during the early days of the experiment, but the total absorption after three months' exposure to northern light was practically the same in each.

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ON THE OXIDATION OF OLIVE OIL.

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Some years ago it became a question of the determination of the kind of "wool oil" that had been employed in the manufacture of certain "tops." Tops may be defined as wool roving or wool which has been partially spun. In their manufacture the wool is scoured and oiled, usually with an olive oil emulsified with either ammonia or sal soda, then it is carded and spun. As the tops are stored "in the grease," as the expression is, two months may elapse before they are used, so that the oil spread over these fibers has ample opportunity for oxidation.

The oils extracted from the tops had the characteristics shown in the table below:

Top. No.	1.	2.	3.	4.
Date left mill.	Aug.	Nov.	Nov.	Nov.
Date tested.	Jan.	Dec.	Jan.	Dec.
Iodine No.	39	53.6	42.1	45.5
Saponif. No.	213	225	221.5	207.5
				216.0
				40.5
				221.5