

peculiar to the positive metals, and especially to those forming basic salts. Seubert and Schmidt believed this to be due to a dissociation of the chlorides into hydroxides and hydrochloric acid. They suppose, for instance, that an aqueous solution of  $\text{AlCl}_3$ , contains  $\text{Al}(\text{OH})_3$ ,  $3\text{HCl}$ . This view is rendered quite probable by the fact that solutions of copper, nickel, cobalt, and chromium exhibit the color of their *hydrated* salts.

Of other metals whose oxides possess a high heat of formation, aluminum has found some application in the reduction of oxides. Beketow has employed it with success to prepare some of the metals of the alkalies; and the experiments of Greene and Wahl of reducing manganese oxides by means of metallic aluminum are still fresh in our memory.

I am convinced that a continued study of the relative affinities of the metals for oxygen and other negative elements, will lead to important applications in metallurgy, and give new and valuable methods to synthetic and analytical chemistry.

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## OBSERVATIONS ON AMERICAN OIL OF TURPENTINE.

BY J. H. LONG.

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IN the February, 1893, number of the *Journal of Analytical and Applied Chemistry* I called attention to certain peculiarities of our American turpentine-oil as distilled from the crude turpentine produced in the southern states.

It is well known that the chief difference between the so-called French and American turpentines is found in their behavior toward polarized light, the French oil being laevo-rotatory, while that produced here has always been described as dextro-rotatory.

In the course of the examination of a large number of samples distilled in the laboratory from fresh crude turpentine sent me directly, I found that some disclosed a very low rotation, and a few were even laevo-rotatory. Through the courtesy of Mr. E. B. Martin, of Louisville, I was supplied with crude "gum" collected in small amounts from single trees, and from the tests of these samples it appeared that the laevo-rotation was

found only in the product from the so-called spruce trees, sparingly represented in the lower turpentine-producing region. As this spruce pine (*P. glabra*) is not considered important from the standpoint of the industry I found difficulty in securing material enough for satisfactory investigation. However, in April of this year six samples of the dip, or crude liquid exudation, collected near Mobile, from as many different trees, were sent me and from these I distilled the oils used in the tests below.

In odor, color, specific gravity, and boiling-point these oils showed no unusual features, the average specific gravity at  $\frac{20^{\circ}}{4^{\circ}}$  being 0.862. When examined by the polarimeter, using the 200 mm. tube, I found the "observed angle of rotation,"  $\alpha$ , as follows:

No. 1	$a_D =$	.....	$-64.750^{\circ}$
" 2	"	.....	$-69.075^{\circ}$
" 3	"	.....	$-64.541^{\circ}$
" 4	"	.....	$-63.100^{\circ}$
" 5	"	.....	$-63.333^{\circ}$
" 6	"	.....	$-70.333^{\circ}$

The laevo-rotation is in all cases very marked, the specific rotation in the last amounting to

$$[\alpha]_D = \dots\dots\dots -40.79^{\circ}$$

It is also interesting to note that the results are close for the six samples, but as the trees yielding them grew in the same orchard, and, therefore, under practically the same conditions, and as the samples were taken at nearly the same time, this agreement should not be unexpected. It may be recalled that the laevo-rotation of the French oil has usually been found much more uniform than the rotation of the American oil.

These observations seem to show the probable correctness of my former suggestion; *viz.*, that the negative rotation sometimes found in American oil may be due to the presence of products from spruce trees. This appears all the more probable when it is remembered that in numerous oils examined, known to be free from spruce, a marked positive rotation was always noted, while a low positive rotation was found only in those oils distilled in parts of the country where the spruce is occasionally found.

In the further study of these oils I mixed distillates 1 and 3 above and redistilled fractionally. The fractions were polarized as before with the following results:

Temperature.		$\alpha_D$ in 200 mm. tube.
156.	to 156.7	..... $-69.133^\circ$
156.7	" 157.2	..... $-67.683^\circ$
157.2	" 157.6	..... $-65.930^\circ$
157.6	" 159.4	..... $-63.200^\circ$
159.4	" 162.7	..... $-57.883^\circ$

A mixture of 2 and 6 gave:

Temperature.		$\alpha_D$ in 200 mm. tube.
156.	to 156.2	..... $-73.350^\circ$
156.2	" 156.7	..... $-72.416^\circ$
156.7	" 157.2	..... $-71.066^\circ$
157.2	" 158.7	..... $-68.865^\circ$
158.7	" 162.7	..... $-65.160^\circ$

These results confirm those obtained from other oils, showing that the absolute amount of rotation is decreased in the higher fractions.

It was stated by Berthelot (J. B., 1853, p. 522) that the dextro-rotatory American oil when heated in sealed tubes to above  $250^\circ$  is transformed into a substance with higher boiling-point and negative rotation. To test this behavior in the present case I heated a portion of the first fraction from 1 and 2 to a temperature of  $280^\circ$  during two hours in a sealed glass-tube. On cooling it was polarized without redistillation, and showed in the 200 mm. tube

$$\alpha_D = \dots \dots \dots -15.33^\circ.$$

The product was then sealed and heated again to  $300^\circ$  through several hours. On cooling, it was found to be yellowish and somewhat viscid; on distillation the liquid was found to have a much higher boiling-point than the original turpentine, but little passing over below  $170^\circ$ .

Three-fourths of the product distilled between this point and  $250^\circ$ , and this portion polarized gave in the same tube

$$\alpha_D = \dots \dots \dots -19.560^\circ.$$

A fraction of the distilled liquid collected from  $175^\circ$ - $180^\circ$  was strongly laevo-rotatory also.

The residue was very dark and became thick and resinous on

exposure to air. The distilled liquid had a marked odor of oil of lemons and this with its rotation suggest that it must be identical with the product described by Berthelot as iso-terebenthene, which may be obtained also from the laevo-rotatory French oil. While the ordinary product of long heating of turpentine-oil seems to be inactive dipentene we have here a very stable active product which is probably mainly laevo-limonene.

CHICAGO, October 22, 1894.

## IRIDIN, THE GLUCOSIDE OF THE IRIS ROOT.

BY G. DE LAIRE AND FERD. TIEMANN.

[TRANSLATED AND ABRIDGED BY S. S. EMERY.]

(Continued from Page 411 of Volume XV.)

*Iretol*.—Iretol, the third decomposition product of irigenin, may be separated from the alkaline solution of the three by supersaturating with dilute sulphuric acid (1 : 2), neutralizing with potassium carbonate, and, after filtering from the separated potassium sulphate, shaking ten to twelve times with ether, which dissolves only the iretol. The ether can not be completely distilled from this extract, as the crude iretol forms condensation products which are insoluble in water and ether; hence the last portion of the ether must be allowed to evaporate in the air. The iretol thus obtained is a crystalline mass, easily soluble in water, alcohol, ether, and acetic ether. By fractional precipitation by chloroform from the acetic ether solution it is obtained as white needles, melting at 186°.

Its molecular weight was found to be :

1.	2.	
By the lowering of the freezing-point of a glacial acetic acid solution. (Raoult's method.)	By the raising of the boiling- point of an alcoholic solution.	Calculated for $C_7H_8O_4$ .
181.2	159	156

It contains one methoxyl group, as shown by the following determinations :

### ANALYSIS.

	Per cent. $(OCH_3)$ .
Calculated for $C_6H_5O_3(OCH_3)$ .....	19.87
Found.....	17.26—19.22