

AN INVESTIGATION OF THE DIOXANE LIGNIN OF COTTON BOLLS

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We have isolated the dioxane lignin from ripe cotton bolls of variety 108-F by Pepper's method [1], which we have used previously [2]. The lignin was purified by Björkman's method [3], and the dioxane lignin of the bolls (DLA-B) containing no carbohydrates was obtained. From the results of elementary and functional analyses we calculated the developed semiempirical formula of the DLA-B: $C_9H_{7.72}O_{1.33}(OCH_3)_{0.74}(OHphen)_{0.77}(OH_2)_{cat}^{0.11}(OH_{al})_{0.38}(OCO)_{0.28}(OOHCOOH)_{0.078}$. On comparing it with the dioxane lignin from the stems of the cotton plant in the flowering period purified by Björkman's method [$C_9H_{7.81}O_{1.39}(OCH_3)_{0.73}(OHphen)_{0.32}/(OH_2)_{cat}^{0.30}(OH_{al})_{1.04}(OCO)_{0.31}(OOHCOOH)_{0.065}$], it was found that they were close to one another differing only in the number of catechol groups although the total numbers of phenolic hydroxyls in them were the same. This is obviously due to the fact that the bolls are present in the same stage of development as the stems collected in the flowering period, since the bolls appear after the flowering of the cotton plant and their vegetation period is shorter than that of the stems. The UV spectrum of the DLA-B taken in aqueous dioxane showed a maximum in the 280 nm region ($\log \epsilon$ 3.43; c $3.258 \cdot 10^{-4}$ M) and a shoulder at 320-360 nm. The IR spectrum contained absorption bands characteristic for cotton dioxane lignins [2].

The gel chromatography of this lignin on an analytical column of Sephadex- G-75 with dimethyl sulfoxide as the eluent showed that the dioxane lignin of the bolls was polydisperse and consisted mainly of a macromolecular fraction with a molecular weight of 11,000-22,000.

The products of the alkaline nitrobenzene oxidation of the DLA-B and of the plant, identified by the GLC method [4], are given below (the yields of the products are given in percentages from the plant and the lignin, respectively):

Substance	Plant	DLA-B
p-Hydroxybenzoic acid	0.009	1.91
Ferulic acid	0.027	0.53
Vanillin	0.29	13.0
Acetovanillin	0.14	1.19
Sinapic acid	0.018	0.51
Syringaldehyde	0.18	8.87

Thus, in the DLA-B have been found three types of structural units: p-coumaryl, guaiacyl, and syringyl in a ratio of 1:7.7:4.9. A fourth type - catechyl - was not detected in the products of alkaline nitrobenzene oxidation, probably because of the instability of the structures and their ready oxidizability to quinones.

LITERATURE CITED

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