vigorous stirring. After cooling, the separated sodium chloride was filtered off, and the ice-chilled filtrate was precipitated with a saturated solution of dry hydrogen chloride in toluene, until no more precipitate was obtained. The precipitate, which was white and crystalline, was sucked off and washed with a little petroleum ether. The raw product contained about 20 % NaCl, which was removed by dissolving the hydrochloride in alcohol, filtering off the salt and precipitating the hydrochloride with petroleum ether. The yield was 6.7 g (44 %). After recrystallization from alcohol the pure 2-(diphenylmethoxymethyl)-imidazoline hydrochloride melted at 203—205° C.

$C_{17}H_{18}N_2O \cdot HCl$ (302.8)

Calc.	N 9.25	Cl 11.7	
Found	» 9.2	» 11.7	

The free base was obtained by dissolving the hydrochloride in water and precipitating with N NaOH. This yielded an oil, which soon hardened into white crystals. After recrystallization from alcohol it melted at 102—103° C.

$C_{17}H_{18}N_2O$ (266.3)

Calc. N 10.5 eq. wt. 266.3
Found » 10.6 » 267.2 (titr. with 0.1 N H_2SO_4 with methyl red as indicator).

With picric acid the base gave a picrate with m. p. 202—204° C.

The hydrochloride was very soluble in water and gave a stable solution. If the solution was acidified with hydrochloric acid it almost immediately disintegrated into benzohydrol and 2-(hydroxymethyl)-imidazoline hydrochloride.

1. Halpern, B. N. Arch. intern. pharmacodynamie 68 (1942) 339.
2. Cf. Meier, R., and Bucher, K. Schweiz. med. Wochschr. 76 (1946) 294.
3. Rieveschl, G., Jr. U. S. P. 2421714 (1947).
4. Loew, E. R., Kaiser, M. E., and Moore, V. J. Pharmacol. 83 (1945) 120.
5. Cavallini, I. G. Farm. sci. e tec. 2 (1947) 89, 94; C. A. 41 (1947) 6989.
6. Klarer W., and Urech, E. Helv. Chim. Acta 27 (1944) 1762.

Substituted Benzyl Alcohols as Lignin Models

BENGT O. LINDGREN

Department of Organic Chemistry, Royal Institute of Technology and Central Laboratory of the Cellulose Industry, Stockholm, Sweden

In the discussions on the nature of the reactive group in lignin responsible for its sulphonation with sulphite cooking acid different model substances have played an important rôle. The model substances hitherto studied are subject to two fundamental objections. They either react far to slow or contain groups which, obviously, do not occur in lignin, at least not to such a degree that they can be responsible for the sulphonation reaction. It has recently been shown that it is possible to introduce 1.3 sulphonic acid groups on each »lignin unit» (1 methoxyl) [1].

Unpublish results of Erdtman and Lindgren [2] appear to show that the sulphonation which occurs in technical sulphite cookings and which results in the formation of lignin sulphonic acids with the ratio $SO_3H/OCH_3 = {}^1/_2$ is due to a substitution of hydroxyl groups of outstanding reactivity.
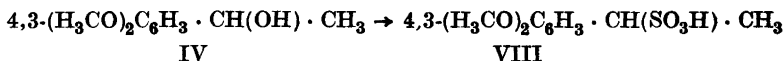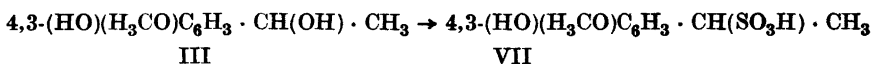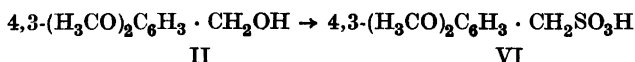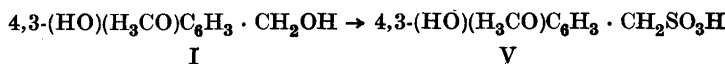
Holmberg [3] showed in an important paper that α-phenethyl alcohol reacts with sulphite cooking acid with formation of α-phenethyl-sulphonic acid $C_6H_5 \cdot CH(OH) \cdot CH_3 \rightarrow C_6H_5 \cdot CH(SO_3H) \cdot CH_3 \cdot$ Kratzl and Däubner [4] point out that the

yield of sulphonic acid in this reaction is low and therefore consider this alcohol not to be a suitable lignin model.

Investigations on the action of sulphite cooking acid on substituted chalkones [5] and benzyl ethers [6], however, show that substitution in the benzene ring has a great influence on the reactivity. It appeared to be possible that suitably substituted benzyl alcohols might prove to be better lignin models than α-phenethyl

lignin not only as regards sulphonation but also in other respects e. g. condensation with reactive phenols such as resorcinol and phloroglucinol under the conditions of the sulphite cooking. It is therefore possible to imitate the inhibition of the sulphite digestion of pine heart wood with these alcohols.

A more complete communication on these reactions and the reactivity of allied compounds will follow shortly.

$$4,3\text{-}(HO)(H_3CO)C_6H_3 \cdot CH_2OH \rightarrow 4,3\text{-}(HO)(H_3CO)C_6H_3 \cdot CH_2SO_3H$$
$$\text{I} \qquad\qquad\qquad\qquad \text{V}$$

$$4,3\text{-}(H_3CO)_2C_6H_3 \cdot CH_2OH \rightarrow 4,3\text{-}(H_3CO)_2C_6H_3 \cdot CH_2SO_3H$$
$$\text{II} \qquad\qquad\qquad\qquad \text{VI}$$

$$4,3\text{-}(HO)(H_3CO)C_6H_3 \cdot CH(OH) \cdot CH_3 \rightarrow 4,3\text{-}(HO)(H_3CO)C_6H_3 \cdot CH(SO_3H) \cdot CH_3$$
$$\text{III} \qquad\qquad\qquad\qquad\qquad \text{VII}$$

$$4,3\text{-}(H_3CO)_2C_6H_3 \cdot CH(OH) \cdot CH_3 \rightarrow 4,3\text{-}(H_3CO)_2C_6H_3 \cdot CH(SO_3H) \cdot CH_3$$
$$\text{IV} \qquad\qquad\qquad\qquad\qquad \text{VIII}$$

alcohol and benzyl alcohol. For that reason a series of alcohols which appear to be more lignin similar have been subjected to sulphite cookings. Vanillyl alcohol (I), veratryl alcohol (II), apocynol (III) and O-methyl-apocynol (IV) were heated with normal sulphite cooking acid and it was found that they react very quickly and quantitatively to the corresponding sulphonic acids (V—VIII). These alcohols, undoubtedly, are the best lignins models available at present. They tally with

M. p. of pyridin salt of: V 189—190°; VI 149°; VII 164—164.5°; VIII 148°.

1. Aulin-Erdtman, G., Björkman, A., Erdtman, H., and Hägglund, S-E. Svensk Papperstidn. 50 (1947) no. 11B, 81.
2. Cf. Svensk Papperstidn. 49 (1946) 199.
3. Hedén, S., and Holmberg, B. Svensk Kem. Tid. 48 (1936) 207.
4. Kratzl, K., and Däubner, H. Ber. 77 (1944) 520.
5. Kratzl, K., and Däubner, H. Ber. 77 (1944) 522.
6. Richtzenhain, H. Ber. 72 (1939) 2152.