

Diheterolevulosan III: Found C, 44.4; H, 6.14. Calc. for $C_{13}H_{20}O_{10}$ C, 44.4; H, 6.18%. Acetate: Found C, 50.1; H, 5.63. Calc. for $C_{24}H_{32}O_{16}$ C, 50.0; H, 5.55%.

Hydrolysis of the methyl ether of diheterolevulosan IV (m.p. 122–122.5°, $[\alpha]_D^{20} - 243^\circ$ (chloroform, $c = 2$) gave D-fructose 3,4,5-trimethylether (70% yield) identified by conversion to D-arabonamide 2,3,4-trimethylether (80% yield). This proves that diheterolevulosan IV is a di-D-fructopyranose 1,2', 2,1'-dianhydride.

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Note on the Electrolytic Methoxylation of Furan

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The electrolytic methoxylation of furan to 2,5-dimethoxy-2,5-dihydrofuran has previously been carried out by electrolyzing a methanolic solution of furan and ammonium bromide¹. It has now been found,

that dimethoxydihydrofuran is also formed, when the ammonium bromide is replaced by ammonium nitrate, sodium nitrate, sodium formate, boron fluoride etherate or sulfuric acid. The yield of dimethoxydihydrofuran (38–56 per cent) is somewhat lower than when ammonium bromide is used (86 per cent). These experiments indicate, that not only halogens, but also other oxidizing agents can oxidize furan in methanolic solution to dimethoxydihydrofuran.

EXPERIMENTAL

Solutions of ammonium nitrate (5.0 g), sodium nitrate (5.0 g), sodium formate (5.0 g), boron fluoride etherate (5.0 ml) and concentrated sulfuric acid (1.00 ml), in a mixture of methanol (250 ml) and furan (20.4 g = 0.30 mole) were electrolyzed as described previously¹. 16.1 ampere hours (0.60 faraday) was passed through the cell. After electrolysis, the acid electrolytes were neutralized with a solution of sodium methoxide. The results of the electrolyses are summarized below.

The methanol was in each case distilled off through a Vigreux column and the residues filtered or centrifuged to remove the inorganic salts (washing with ether). The resulting brown liquids were then distilled.

Electrolyte	Time of electrolysis (hours)	Current (ampere)	Potential across the cell (volt)	Temperature in the cell (°C)	Colour of the electrolyte after electrolysis	g of sodium used for neutralization
NH_4NO_3	6.7	2.9–2.0	5.8–6.8	–10°	yellowish-brown	1.46
$NaNO_3$	6.8	2.6–0.9	6.2–7.4	–10° to –14°	reddish-brown	0
$NaOOCH$	8.3	3.1–0.6	7.0–8.8	–9° to –18°	yellowish-brown	0
BF_3	6.0	2.8–1.9	6.1–6.6	–10° to –13°	slightly yellow	2.30
H_2SO_4	8.3	2.3–1.8	6.0–7.0	–11° to –12°	yellowish-brown	0.95

Electrolyte	Fraction (g)	Distillation pressure mm	B.p.	n_D^{25}	Yield of dimethoxydihydrofuran
NH ₄ NO ₃	1 (13.4)	14	49–51°	1.4327	15.6 g (fractions 1 and 2) = 40 %.
—	2 (2.2)	—	51–60°	1.4326	
—	3 (1.8)	—	68–130°	partly crystalline	
NaNO ₃	1 (11.8)	14	52–53°	1.4326	15.4 g (fractions 1 and 2) = 40 %.
—	2 (3.6)	—	53–58°	1.4330	
—	3 (1.5)	—	60–125°	1.4407	
NaOOCH	1 (14.7)	11	50–56°	1.4329	14.7 g (fraction 1)
—	2 (1.0)	—	59–110°	1.4393	= 38 %.
BF ₃	1 (19.6)	12	48–52°	1.4321	21.7 g (fractions 1 and 2) = 56 %.
—	2 (2.1)	13	52–60°	1.4320	
—	3 (5.2)	—	61–138°	1.4383	
H ₂ SO ₄	1 (8.6)	13	48–52°	1.4318	16.0 g (fractions 1 and 2) = 41 %.
—	2 (7.4)	—	52–55°	1.4319	
—	3 (5.6)	14	54–86°	1.4282	
—	4 (3.3)	—	88–156°	1.4382	

1. Clauson-Kaas, N. (to Kemisk Værk Køge A/S). Belg. patent 500356 (1951). Clauson-Kaas, N., Limborg, F. and Glens, K. *Acta Chem. Scand.* **6** (1952) 531.

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On the Existence of *α*-Glycol Groups in Lignin

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Lignin appears to contain three types of sulphonatable groups¹, designated X, Z and B, and model experiments

(treatment with sulphite solutions² and sulphide solutions³) have shown that the Z-groups may be *p*-alkoxybenzyl alcohol groups. Two phenylglycerol derivatives containing *p*-alkoxybenzyl alcohol groups, *viz.* veratrylglycerol (I) and its β -guaiacyl ether (II), have recently been studied by Adler *et al.*^{4,5} Like other *p*-alkoxybenzyl alcohols these substances are converted by sulphite solutions into sulphonic acids (III resp. IV). The rate of the sulphonation of veratrylglycerol is of about the same order of magnitude as the rate at which the Z-groups in lignin are sulphonated. It was therefore of inter-