ried through the remaining steps, which consisted first in lengthening the acetic acid chain to a propionic acid chain through the Arndt–Eistert reaction. The dimethyl ester of the *trans*-7-methoxy-1-propionic acid-2-methyl-2-carboxytetrahydrophenanthrene (m. p. 101–102°) was cyclized by sodium and the product was converted to *d,l*-equilenin by the usual hydrolysis and decarboxylation, including the hydrolysis of the methoxy group. The synthetic equilenin crystallized from benzene in thin colorless plates which melted at 265–267° (natural equilenin, 258°) to a red liquid. The structure of the synthetic equilenin was established definitely by its conversion to 3′,3′-dimethyl-7-methoxy-1,2-cyclopentenophenanthrene, identical with the compound obtained from natural equilenin by the procedure of Cohen, Cook and Hewett [*J. Chem. Soc.*, 445 (1935)], the method employed by these investigators to establish the structure of equilenin. The synthetic equilenin was resolved by converting it to its *l*-menthoxyacetic ester, from which was isolated the ester which proved to be identical (mixed melting point) with the *l*-menthoxyacetic ester (m. p. 172–174°) of natural equilenin.

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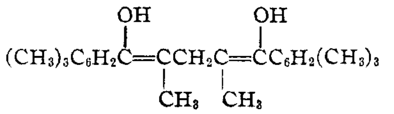
RECEIVED MARCH 28, 1939

1,2-DIARYLACETYLENE GLYCOLS. A NEW TYPE OF ENE-DIOL

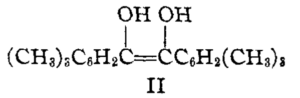
Sir:

The isolation of the dienol I in solid form[1] suggested that an ene-diol such as 1,2-dimesitylacetylene glycol (II), being more highly conjugated,



$(CH_3)_3C_6H_2\overset{OH}{C}=\underset{CH_3}{C}CH_2\underset{CH_3}{C}=\overset{OH}{C}C_6H_2(CH_3)_3$

I



$(CH_3)_3C_6H_2\overset{OH}{C}=\overset{OH}{C}C_6H_2(CH_3)_3$

II

might possess still greater stability. This has proved to be true. The ene-diol is formed by the action of the binary mixture, Mg + MgI_2,[2] on dimesityl diketone or 2,4,6-trimethylbenzoyl chloride.

The ene-diol is a white solid (plates) which melts at 144–145° in a nitrogen-filled sealed tube.

Anal. Calcd. for $C_{20}H_{24}O_2$: C, 81.04; H, 8.16. Found: C, 81.02; H, 8.01.

It can be kept indefinitely in an atmosphere of dry nitrogen but when exposed to air autoxidizes rapidly even in the solid state, giving the corresponding benzil. The ene-diol rearranges to 2,4,6,2′,4′,6′-hexamethylbenzoin under the influence of hydrochloric acid or piperidine. It reduces Tollens' reagent as well as cupric acetate solution at 0°. It is immediately oxidized by sodium 2,6-dichlorobenzeneoneindophenol. The isomeric benzoin does not react with Tollens' reagent or cupric acetate solution in the cold nor with the indophenol even when heated.

2,4,6-Triethylbenzoyl chloride gives a similar but even more stable ene-diol when treated with the binary mixture.

These ene-diols are unique in that in them the ene-diol grouping is not conjugated with a carbonyl group.[3] However, it is conjugated with two aromatic nuclei. This consideration suggested that the remarkable stability of the new ene-diols might be shared by their vinylogs derived from ketones of the types $RCO(CH{=}CH)_nCOR$ and $RCO(C_6H_4)_nCOR$. Evidence of this already has been brought forward by Lutz and Reveley,[4] who report the existence in solution of an ene-diol obtained by the reduction of 1,2-di-(2,4,6-trimethylbenzoyl)-ethylene.

A detailed report of our work will be presented in the near future.

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[1] Fuson, Ross and McKeever, THIS JOURNAL, **61**, 414 (1939).

[2] Gomberg and Bachmann, *ibid.*, **49**, 236 (1927).

[3] See Barnes and Green, *ibid.*, **60**, 1549 (1938).

[4] Paper presented at the Baltimore meeting of the American Chemical Society, April 4, 1939.

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RECEIVED MARCH 23, 1939

PANTOTHENIC ACID AND THE FILTRATE (CHICK ANTI-DERMATITIS) FACTOR

Sir:

An extensive series of investigations on pantothenic acid, a factor stimulating the growth of yeast, has been conducted by Williams and coworkers, culminating in the preparation and elementary analysis of the calcium salt.[1] Properties so far described for the filtrate[2] (chick anti-derma-

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[1] Williams, Weinstock, Rohrmann, Truesdail and Meyer, THIS JOURNAL, **61**, 454 (1939).

[2] (a) Lepkovsky and Jukes, *J. Biol. Chem.*, **114**, 109 (1936); (b) Jukes, *ibid.*, **117**, 11 (1937); (c) Woolley, Waisman, Mickelsen and Elvehjem, *ibid.*, **125**, 715 (1938).