dienon-3-ol-17 (I, R_1 *or* R_2 = H *or* Br), nor the corresponding pseudo-bromide, 2-(*or* 4)-9-dibromo-α-oestradiol (II, R_1 *or* R_2 = H *or* Br). Consequently our product has the only alternative structure, 2,4-dibromo-α-oestradiol (III).

It is highly probable that the introduction of bromine by bromoacetamide will be of service in the case of other phenolic compounds which defy clean-cut halogenation by the more usual methods.

Experimental

One-half gram of α-oestradiol and 0.54 g. of recrystallized N-bromoacetamide were dissolved in 40 cc. absolute alcohol and the reaction mixture was allowed to stand at room temperature for about eighteen hours. By this time the originally faintly yellow solution had become almost colorless. The alcohol solution was evaporated on the hot plate to about one-third of its volume and allowed to cool, when the brominated product was precipitated by the addition of water. On crystallization from alcohol-water, 0.54 g. of 2,4-dibromo-α-oestradiol was obtained as beautiful colorless rosets of needles, melting at 215.5–216.5° (cor.) to an emerald-green liquid, with gas evolution. From the filtrate another 0.2 g. of the product was obtained by dilution with water and recrystallization.

Anal.[5] Calcd. for $C_{18}H_{22}O_2Br_2$: C, 50.20; H, 5.14. Found: C, 50.10; H, 5.13.

No turbidity developed when an alcoholic silver nitrate solution of the substance was allowed to stand for twenty hours, and the material was recovered unchanged after solution for an hour in alcoholic potassium hydroxide.

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(5) Analysis by D. M. Bowen.

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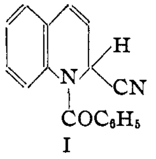
RECEIVED APRIL 13, 1940

The Formation of Reissert's Compounds in Non-aqueous Media

BY ROBERT BURNS WOODWARD

By shaking quinoline with benzoyl chloride and an aqueous solution of potassium cyanide, Reissert[1] prepared 1-benzoyl-1,2-dihydroquinaldonitrile (I).



I

This compound was remarkable in that it split on hydrolysis into benzaldehyde and quinaldinic acid. The availability of a considerable number of substances differing from Reissert's original compound only in the nature of the acyl group would afford the possibility of a new general method for the reduction of carboxylic acids to aldehydes. However, the ready hydrolysis of many aliphatic acid chlorides vitiates Reissert's original method.

In an attempt to surmount this difficulty, we have investigated the formation of Reissert's compound in non-aqueous media. Dieckmann and Kämmerer[2] observed the formation of the substance in unstated amount while investigating the action of quinoline and other tertiary bases in accelerating the formation of benzoyl cyanide from benzoyl chloride and hydrogen cyanide in ether solution. We found that the formation of acyl cyanide was largely preponderant when benzoyl chloride was used and exclusive in the case of acetyl chloride, either on conducting the reaction in ether or other inert solvents, or on using quinoline as its own solvent. No reaction was observed when acetonitrile, benzonitrile, ether, dioxane, acetone or chloroform was substituted for water in the original procedure of Reissert.

On the other hand, quinoline and potassium cyanide reacted smoothly with either benzoyl or cinnamoyl chloride[3] in liquid sulfur dioxide to give the corresponding aroyl dihydroquinaldonitrile in excellent yield. The use of acetyl chloride, however, led to the formation of intractable dark mixtures from which no pure product could be isolated.

The striking difference in this case between liquid sulfur dioxide and the organic solvents is in consonance with the probable ionic character of the reaction.

Experimental

1-Benzoyl-1,2-dihydroquinaldonitrile.—Ten grams of benzoyl chloride, 10 g. of quinoline (freshly distilled *in vacuo*) and 7 g. of potassium cyanide were placed in a pressure bottle. After approximately 35 cc. of liquid sulfur dioxide had been added, the bottle was sealed and allowed to stand with occasional shaking for twenty-four hours. The sulfur dioxide was then allowed to evaporate, and the residue washed successively with water, dilute hydrochloric acid and ether. On crystallization from alcohol of the white powder so obtained, 16 g. of 1-benzoyl-1,2-dihydroquinaldonitrile separated as glistening needles, m. p. 154–155°, of a very faint greenish tinge which was lost on two further crystallizations.

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(1) Reissert, *Ber.*, **38**, 1610 (1905).

(2) Dieckmann and Kämmerer, *ibid.*, **40**, 3737, Note 2 (1907).

(3) *Cf.* Sugasawa and Tsuda, *J. Pharm. Soc. Japan*, **56**, 557 (1936); *C. A.*, **32**, 5836 (1938). The original is here incorrectly reported as appearing on p. 103.

1-Cinnamoyl-1,2-dihydroquinaldonitrile was prepared from 12 g. of freshly made cinnamoyl chloride in exactly the same manner as the benzoyl compound; needles from alcohol, m. p. 149–150°; yield, 16 g.

Anal. Calcd. for $C_{19}H_{14}ON_2$: C, 79.75; H, 4.93; N, 9.73. Found: C, 79.62; H, 5.02; N, 9.80.

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RECEIVED APRIL 17, 1940

COMMUNICATIONS TO THE EDITOR

ELECTROPHORETIC ISOLATION OF CONSTITUENTS OF RAGWEED POLLEN EXTRACTS*

Sir:

Dialyzed extracts of giant ragweed pollen were studied with the Tiselius[1] moving boundary technique at approximately *p*H 7.4 and 1.5°. Employing the Philpot–Svensson[2] cylindrical lens system to visualize the boundaries, we have found a major constituent which is negatively charged, unpigmented and migrates more slowly than the pigmented constituents. The latter are also negatively charged. The major unpigmented constituent may constitute as much as 75% of the material in fresh extracts when estimated by the criterion of the integration of the Philpot–Svensson curves. Similar Longsworth[3] diagrams have been obtained. The unpigmented fraction is highly skin reactive in individuals with ragweed hay fever. It may be introduced into the skin by electrophoresis in these cases by the positive pole even though the substance is negatively charged at the *p*H employed. The electrical mobility of the unpigmented constituent is 0.5×10^{-5} cm. sec.$^{-1}$ in 0.05 *M* phosphate buffer at *p*H 7.0.[4] Variations have been observed in the pigmented portions of the electrophoretic diagrams and apparently depend on the extent and nature of the dialysis as well as the age and treatment of the pollen grains.

COLUMBIA UNIVERSITY AND
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NEW YORK CITY, AND THE
BIOLOGICAL LABORATORIES
COLD SPRING HARBOR

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H. GETTNER
J. GAGARIN
L. JENNINGS

RECEIVED MAY 17, 1940

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* This investigation has been aided by a grant from the Josiah Macy, Jr., Foundation.

(1) A. Tiselius, *Trans. Faraday Soc.*, **33**, 524 (1937).

(2) H. Svensson, *Kolloid-Z.*, **87**, 190 (1939).

(3) L. G. Longsworth and D. A. MacInnes, *Chem. Rev.*, **24**, 271 (1939).

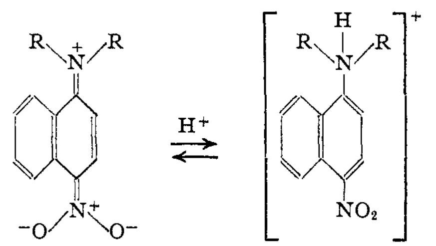
(4) H. A. Abramson, A. Sookne and L. S. Moyer, *J. Allergy*, **10**, 317 (1939); H. A. Abramson and M. H. Gorin, *Chem. Prod.*, **3**, 37 (1940).

THE STERIC INHIBITION OF RESONANCE

Sir:

It has been shown recently[1] that the concept of the steric inhibition of resonance offers an adequate explanation for the differences in acidity observed with trinitrotriphenylmethanes.

Using exactly the same reasoning, we have attacked this problem from a different point of view, *i. e.*, by a consideration of the basic strengths of substituted 4-nitro-1-naphthylamines.



(I)

(yellow) (practically colorless)

The electron pair of the amino nitrogen atom (upon which depends the basicity of the molecule) is no longer present in the resonance isomer I. If the alkyl groups in I are large, they will inhibit the ability of the group R_2N– and the benzene ring to become coplanar. The result of this must be a diminution in resonance. This reduction in resonance by steric hindrance should result in an increase in the electron density at the amino nitrogen atom and thus lead to an increase in basicity. We have shown that the basicity of the substituted amine (I, $R = CH_3$) is much greater than that of the unsubstituted amine (I, $R = H$) and that this difference is far too great to be explained by an inductive effect of the methyl groups.

The decrease in resonance reduces the polar character of these molecules[2] and should consequently lower the melting points (if other crystal

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(1) Wheland and Danish, THIS JOURNAL, **62**, 1125 (1940).

(2) Birtles and Hampson, *J. Chem. Soc.*, 10 (1937).