

hydride. Finally 15 cc. of methanol was added, causing the crystallization of 0.24 g. of brown rods, whose melting point was 228°. The material was purified by filtering its chloroform solution through norit, evaporating the filtrate to a small volume and adding 10 volumes of methanol. The substance separated as irregular-shaped salmon-colored plates and rods, which melted at 232°. Recrystallization of the compound in the same manner gave a product whose melting point was 233° (corr.). When this preparation was mixed with an authentic sample of dehydrodeguelin, the melting point was not depressed. Also, oxidation with chromic acid gave dehydrodeguelone. In spite of these facts and the fact that the analytical data given below were the same as those for dehydrodeguelin, the optical properties of the material were not the same as those recorded for this compound. However, when a specimen of the substance was dissolved in chloroform and the solution treated with several volumes of methanol in which a few crystals of pure dehydrodeguelin were suspended, the material separated possessed the optical properties recorded for dehydrodeguelin.

Anal. Found: C, 70.40; H, 5.27; OCH₃, 15.9.

Summary

1. The preparation, purification, and some properties of deguelin, a constituent of several tropical fish-poisoning plants, are described.

2. Evidence is presented to show that deguelin is a dimethoxylactone, C₂₃H₂₂O₆.

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[CONTRIBUTION FROM THE NICHOLS LABORATORY, NEW YORK UNIVERSITY]

PREPARATION OF CERTAIN BROMINATED CINCHOPHENS

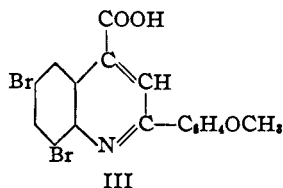
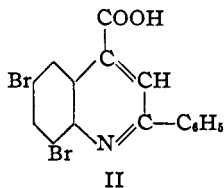
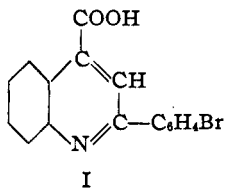
By H. G. LINDWALL, J. BANDES AND I. WEINBERG

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It has been the purpose of this investigation to synthesize some brominated derivatives of cinchophen (2-phenylcinchoninic acid) in order to study later the physiological effects of the introduction of halogen. Condensations of 5,7-di-bromoisatin, as well as of isatin, with certain methyl ketones have been effected by means of the Pfitzinger¹ method.

By the interaction of isatin and *p*-bromoacetophenone in the presence of potassium hydroxide in water and alcohol, 2-phenyl-4'-bromocinchoninic acid (I) was obtained. In the same manner, 5,7-dibromoisatin and acetophenone reacted to give 6,8-dibromo-2-phenylcinchoninic acid (II), while *p*-methoxyacetophenone and 5,7-dibromoisatin yielded 6,8-dibromo-2-phenyl-4'-methoxycinchoninic acid (III)



¹ Pfitzinger, *J. prakt. Chem.*, 56, 292 (1897).

The non-halogenated derivative corresponding to (III) (4'-methoxy-2-phenylcinchoninic acid) was first prepared by Ciusa and Lazzatto² by Döbner's method.³ This compound may also be prepared conveniently by the Pfitzinger method from isatin and *p*-methoxyacetophenone.

In the preparation of the 5,7-dibromoisatin it was found convenient to use a method described in the experimental part, employing 95% ethyl alcohol as a medium. This method has the advantage of speed as well as of good yield.

Experimental Part

5,7-Dibromoisatin.—Three grams of isatin and 40 cc. of 95% ethyl alcohol were heated on a steam-bath until the isatin was completely dissolved. While the solution was still hot, bromine (7.5 g.) was added slowly, drop by drop, with slow stirring of the mixture. The dibromo isatin began to separate from the mixture almost immediately upon the addition of the first few drops of bromine. After complete addition of bromine, the mixture was cooled slowly at first and later in ice. The product, after having been washed with water and with alcohol, was recrystallized from alcohol. 5,7-Dibromoisatin crystallizes from alcohol in long orange-red needles melting at 248–250°; yield, 80%.

Preparation of Substituted Cinchoninic Acids.—The procedure for the synthesis of 4'-bromo-2-phenylcinchoninic acid illustrates the general procedure. A mixture of 15 g. of isatin, 22.5 g. of *p*-bromoacetophenone, 122 cc. of ethyl alcohol and 60 cc. of 33% potassium hydroxide solution was refluxed for eight hours with stirring. The alcohol was removed by distillation and the excess *p*-bromoacetophenone by steam distillation. The residual aqueous solution was cooled, acidified with hydrochloric acid and filtered. The solid was washed with water, followed by ethyl alcohol, and was crystallized twice from ethyl acetate.

These cinchoninic acids, pale yellow needles, are practically insoluble in water, ether, cold alcohol and cold ethyl acetate, but readily soluble in hot alcohol and hot ethyl acetate. The yield of recrystallized product is about 65% of the theoretical amount.

TABLE I
SUBSTITUTED CINCHONINIC ACIDS

| Cinchoninic acid | Formula | Reactants | M. p., °C. | Nitrogen, % | | Bromine, % | |
|----------------------------------|---|--|------------|-------------|-------|------------|-------|
| | | | | Calcd. | Found | Calcd. | Found |
| 4'-Bromo-2-phenyl- | C ₁₆ H ₁₀ O ₂ NBr | Isatin and <i>p</i> -bromoacetophenone | 239–340 | 4.27 | 4.18 | 24.36 | 24.00 |
| 6,8-Dibromo-2-phenyl- | C ₁₆ H ₈ O ₂ NBr ₂ | 5,7-Dibromo-isatin and acetophenone | 270–271 | .. | .. | 39.28 | 38.90 |
| 6,8-Dibromo-2-phenyl-4'-methoxy- | C ₁₇ H ₁₂ O ₃ NBr ₂ | 5,7-Dibromo-isatin and <i>p</i> -methoxyacetophenone | 263–264 | .. | .. | 36.58 | 36.00 |
| 2-Phenyl-4'-methoxy- | C ₁₇ H ₁₄ O ₃ N | Isatin and <i>p</i> -methoxyacetophenone | 216 | 5.02 | 4.94 | ... | ... |

Summary

1. A convenient method of preparation of 5,7-dibromoisatin has been described.

² Ciusa and Lazzatto, *Gazz. chim. ital.*, **44**, [i] 64 (1914).

³ Döbner, *Ber.*, **20**, 277 (1887).

2. Isatin has been condensed with *p*-bromoacetophenone to yield 2-phenyl-4'-bromocinchoninic acid.

3. 5,7-Dibromoisatin has been condensed with acetophenone and with *p*-methoxyacetophenone to yield, respectively, 6,8-dibromo-2-phenylcinchoninic acid and 6,8-dibromo-2-phenyl-4'-methoxycinchoninic acid.

NEW YORK CITY

[CONTRIBUTION NO. 195 FROM THE DEPARTMENT OF CHEMISTRY, UNIVERSITY OF PITTSBURGH]

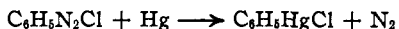
THE PREPARATION OF AROMATIC MERCURIC CHLORIDES FROM AROMATIC DIAZONIUM CHLORIDES

BY ROBERT E. McCLURE AND ALEXANDER LOWY

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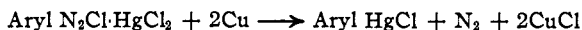
PUBLISHED JANUARY 12, 1931

In an investigation¹ by the authors upon the electrochemical reduction of benzenediazonium chloride to phenylhydrazine hydrochloride it was noted that another substance was formed when the mercury cathode was violently stirred. This product proved to be phenylmercuric chloride. A non-electrolytic experiment showed that the formation of the latter compound was purely a chemical reaction and may be represented by the following



This reaction appears somewhat similar to the Gattermann reaction and suggests the possible formation of an unstable phenylcupric halide. The nature of the reaction also suggested that other aromatic mercury compounds might be prepared in the same way. Further investigation confirmed this point of view and this paper describes the preparation of a number of these compounds.

Nesmejanow² prepared a number of aromatic mercury halides by the reaction



Experimental

It was evident in this type of reaction that the state of division of the mercury would be an important factor. A number of the usual types of stirrers were tried but even at high speed failed to give more than a small amount of the phenylmercuric chloride. An anchor-shaped stirrer, made from 4-mm. glass tubing with prongs drawn out to capillary fineness and with an opening at the base, gave good results. This stirrer was used in all the experiments described. The bottom of the stirrer was immersed in the mercury with the capillary tips extending into the solution. A fine spray of mercury was thrown from the tips by centrifugal action.

A Typical Experiment.—Five grams of redistilled aniline was dissolved in 30 cc. of concentrated hydrochloric acid and 50 cc. of water. The solution was cooled to 0°

¹ McClure and Lowy, *Trans. Am. Electrochem. Soc.*, **56**, 445-456 (1929).

² Nesmejanow, *Ber.*, **62B**, 1010 (1929).