

380°, the following percentage yields of mercaptans were obtained: methyl 41%, ethyl 35%, propyl 45%, butyl 52%, *iso*-butyl 45%, *iso*-amyl 47%.

Propyl, butyl and *iso*-amyl mercaptans have been found to give constant-boiling mixtures with the corresponding alcohols and ternary mixtures with the alcohols and water.

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[CONTRIBUTION FROM THE LABORATORY OF THE WERNER DRUG AND CHEMICAL, CO.]

## AN ALKYLENE AND SOME ALKYL HALIDES OF 2(4-HYDROXY-3-METHOXY-STYRYL)QUINOLINE.

BY LOUIS F. WERNER.

Received December 8, 1920.

In a recent paper,<sup>1</sup> the author showed that the methiodides of some of the 2(hydroxy-styryl)quinolines could be used as indicators. It was thought of interest to determine whether any variation in color exists in compounds of this type prepared from other alkyl halides. 2(4-hydroxy-3-methoxy-styryl)quinoline was the base selected for this work, as of the bases available this is the most readily prepared and purified.

The following halides were combined with 2(4-hydroxy-3-methoxy-styryl)quinoline: ethyl iodide, propyl iodide, *isopropyl* iodide, butyl iodide, *isobutyl* iodide, *iso*-amyl iodide and allyl bromide.

With the exception of the compounds resulting from *isopropyl* and *isobutyl* iodides, all of these compounds were found to be indicators, and gave a fuchsin-red solution in aqueous alkaline solution, and a faintly yellow solution in neutral or acid acetate. The *isopropyl* and *isobutyl* derivatives, on the contrary, showed but little difference in color, the aqueous solution in each case being light yellow in acid or neutral solution, and only light brown in the presence of sodium hydroxide. This exceptional behavior is evidently associated with the branch chain structure of these alkyl derivatives, although the *iso*-amyl group showed the usual behavior. Possibly these groups were more mobile, and migrated to a position in the nucleus.

It was expected that the introduction of various alkyl groups might cause a modification of the colors of these dyes, but no variation could be detected in the shade of color of any of these derivatives, nor did the introduction of the allyl group cause any modification of the shade. A determination of the hydrogen-ion concentration at which the change from red to yellow takes place, would possibly show a difference for these various compounds.

### Experimental.

**General Method of Preparation.**—These compounds were prepared by heating 2(4-hydroxy-3-methoxy-styryl)quinoline with an excess of the

<sup>1</sup> Werner, THIS JOURNAL, 42, 2309 (1920).

alkyl or alkylene halide at 140° to 155° for 4 hours, in the dark. The reaction product was extracted with hot alcohol, to remove tarry impurities and unchanged base, and then washed with cold alcohol upon a Büchner funnel.

They are moderately soluble in hot water and hot alcohol, slightly soluble in cold alcohol and in water, and practically insoluble in other common organic solvents. With the exception of the *isopropyl* and *isobutyl* iodides, all of these compounds gave a yellow aqueous solution under neutral or acid conditions, but these solutions were changed by the addition of alkalies to a fuchsin-red color.

Derivative.	Reaction Temp. °C.	Color.	M. p. (corr.) °C.	Analyses.			
				Subs. G.	N. Cc.	N. Calc.	Found.
Ethiodide	140°	brick red	231	0.6040	19.2 (27°, 754 mm.)	3.23	3.50
<i>iso</i> -Propyl iodide	140	light tan	266	0.6186	19.4 (29°, 756 mm.)	3.13	3.43
Propyl iodide	150-5	bright vermilion	221	0.6104	19.0 (28°, 751 mm.)	3.13	3.40
<i>iso</i> -Butyl iodide	150-5	orange-red	259	0.6000	18.0 (29°, 756 mm.)	3.04	3.28
Butyl iodide	155-60	deep orange	219	0.6647	17.9 (27°, 751 mm.)	3.04	2.96
<i>iso</i> -Amyl iodide	155	orange	185	0.6545	18.2 (30°, 748 mm.)	2.95	2.99
Allyl-bromide	150	bright orange	237	0.6147	19.3 (29°, 748 mm.)	3.52	3.40

### Summary.

The addition of straight chain alkyl iodides and allyl bromide to the nitrogen atom of 2(4-hydroxy-3-methoxy-styryl)quinoline, gave compounds having the properties of indicators, but no difference in shades or colors of these compounds was observed when aqueous solutions were used as indicators. It was found, however, that with the exception of the *iso*amyl compound, which behaved like the straight chain compounds, except the compounds of the branch chain alkyls did not have this property of an indicator except to a very slight degree.

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### SOME DERIVATIVES OF PHENOXARSIN.<sup>1</sup>

BY W. LEE LEWIS, C. D. LOWRY AND F. H. BERGHEIM.

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The following study was undertaken to determine whether certain derivatives of phenoxarsin possessed therapeutic properties, and in general to study the effect of linkage between the rings in secondary aromatic arsines.

A comparison of diphenyl chloro-arsine, (C<sub>6</sub>H<sub>5</sub>)<sub>2</sub>AsCl, with the three condensation products of arsenic chloride with each diphenyl amine,<sup>2</sup>

<sup>1</sup> This work was done in part under a grant from the Interdepartmental Social Hygiene Board, Washington, D. C., Dr. T. A. Storey, Secretary. Published with the permission of Gen. Amos A. Fries, C. W. S., U. S. A.

<sup>2</sup> A. Contardi. *Giorn. chim. applicata* 2, 100-12 (1920); *C. A.* 14, 2628 (1920).