64. *Diazo Reaction of ortho-Aminohinokitiols.*

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As part of the determination of substituent positions in the derivatives of hinokitiol (I, A: $X_1 = X_2 = X_3 = H$), the authors reported on the Sandmeyer reaction¹⁾ and rearrangement²⁾ by the diazo reactions of *o'*-amino- (II, A: $X_1 = NH_2$, $X_2 = X_3 = H$) and *o*-aminohinokitiol (III, A: $X_1 = X_2 = H$, $X_3 = NH_2$). In the present report, the relationship between the reaction conditions and products of these diazo reactions, and the newly obtained three isomers of hydroxyhinokitiols are described.

Under the ordinary conditions used for the Sandmeyer reaction of aromatic amino compounds, i.e. heating the diazonium salt with cuprous halide and the corresponding hydrogen halide, II and III yield the expected halogen compounds¹⁾, as well as the corresponding rearrangement products²⁾ of 4-isopropylsalicylic acid (IV, B: $R_1 = COOH$, $R_2 = H$) and 2-isopropylsalicylic acid (V, B: $R_1 = H$, $R_2 = COOH$). The yield in percentage of the halogen compounds and that of rearrangement products in these Sandmeyer reactions, as result of several experiments, are given in Table I.

Table I.

	Replacement of NH_2 by Cl		Replacement of NH_2 by Br		Replacement of NH_2 by I	
	Cl-hin.	R. P.	Br-hin.	R. P.	I-hin.	R. P.
<i>o'</i>	35-45	0-10	10-15	30-40	0	50-60
<i>o</i>	15-22	20-30	7-11	30-35	0	50-60

hin. = hinokitiol

R. P. = Rearrangement Product

Neither II nor III yielded iodine compounds by Griess reaction³⁾ or Gattermann process⁴⁾, and only gave the corresponding rearrangement products IV and V with 50–60% yield. When the concentration of hydrogen halide used in the Sandmeyer reaction was low, both II and III gave a larger yield of the rearrangement products than the halogenohinokitiols.

Under the conditions that would yield phenols from aromatic amines, i.e. heating the diazonium salt with sulfuric acid, diazo reaction of p-aminohinokitiol, m.p. 131°, (VI, A: $X_1 = X_3 = H$, $X_2 = NH_2$)⁵⁾ yielded what was assumed to be a seven-membered quinone, rather than p-hydroxyhinokitiol. On the other hand, Haworth⁶⁾ has obtained a p-hydroxy compound from p-amino-m-methyltropone. However, neither II nor III yielded hydroxy compounds or quinones under these conditions, and gave, with 50–60% yield, the respective rearrangement products IV and V, as in the case of Griess reaction.

As shown above, the diazonium salts of these tropone compounds quite easily undergo rearrangement when heated by themselves or in the presence of acids, and give halogen compounds and rearrangement products when heated with acids and corresponding cuprous halides. From these results, it may be assumed that a rearrangement and replacement occur competitively in these Sandmeyer reactions. The reaction mechanism of these rearrangements was briefly described previously³⁾. In the Sandmeyer reaction, the fact that the yield of the halogen compounds are poor in the order of Cl, Br and I may be due to the size of the halogen atoms, their activity and their electronegativity.

Because heating causes rearrangement of diazonium salts, it seemed necessary to decompose the salt at a low temperature in order to obtain a hydroxyl compound. Therefore, o'-aminohinokitiol (II) was diazotized at a low temperature under the presence of cuprous halide whereby pale green crystals of m.p. 44–58° were obtained. Fractional crystallization of these from petroleum ether yielded three kinds of crystals: a) Pale green scales, m.p. 59–60° (Anal. Calcd. for $C_{10}H_{12}O_3$: C, 66.65; H, 6.71. Found: C, 66.06; H, 6.63.); b) pale green rhomboprisms, m.p. 51–52° (Anal. Calcd. for $C_{10}H_{12}O_3$: C, 66.65; H, 6.71. Found: C, 66.34; H, 6.22.); and c) colorless needles, m.p. 45–46° (Anal. Calcd. for $C_{10}H_{12}O_3$: C, 66.65; H, 6.71. Found: C, 67.18; H, 6.48). These compounds were found to contain no halogens, the analytical values of all three corresponded to those of hydroxyl compounds and no depression of the melting point was witnessed when fused with each other. All three compounds gave red coloration to an ether layer by the addition

of ferric chloride and formed copper complex by cupric sulphate. The sodium salts of these compounds were more readily soluble (in water) than tropolone or hinokitiol, yielding yellow solutions. From these results, it is assumed that these compounds are tautomers, probably similar to those of o-substituted hinokitiol derivatives⁷⁾ and α -thujaplicin⁸⁾ previously described. Details on the purity⁹⁾, stability and other characteristics (investigations on the ultraviolet spectra are in progress) of these isomers will be given after further studies.

Similar attempt on the o-aminohinokitiol (III) to obtain the corresponding hydroxyl compound only yielded the rearrangement product (V). The difference shown by the presence of the amino group in o- or o'-position seemed to point to the fairly great effect of the isopropyl group on the amino group in the ortho position.

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- 9) It is also deduced that the compound (b), m.p. 51-52°, may be a mixture of the other two.