SOME DERIVATIVES OF 3-ARYL-2H-1,4-BENZOXAZINE

V. G. Tishchenko and R. A. Minakova

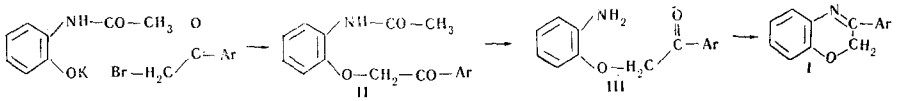
UDC 547.867.6.07

Arylacyl esters of o-acetamidophenol, which are cyclized to 3-aryl-2H-1,4-benzoxazines by a saponification of the acetamido group, are obtained by the reaction of ω-bromomethyl aryl ketones with potassium o-acetamidophenoxide.

3-Aryl-2H-1,4-benzoxazines (I) can be considered to be cyclic analogs of N-arylidene-o-anisidine. A comparative study of these compounds is of interest to shed light on the problem of the effect of cyclization on the optical characteristics of benzylidene–aniline derivatives.

The goal of this study was the synthesis of compounds of the I type. Two compounds of this series are described in [1, 2] and were synthesized by a reduction of o-nitrophenylphenacyl esters.

We synthesized I on the basis of N-acetyl-o-aminophenol.



The characteristics of the previously undescribed phenacyl esters of N-acetyl-o-aminophenol are presented in Table 1.

Like Zellmann and Donner [1], we could not isolate the phenacyl ester of o-aminophenol (III); saponification of the acetamido group of II gave a substance which has a melting point close to that described in [1] for I and gives a reaction characteristic for benzylidene–aniline derivatives [3] (formation of a fluorescent precipitate on mixing ether solutions of the compound and sulfuric acid). Since the compound obtained did not contain an imino group (according to functional analysis), it could be assumed that there is an azomethine group in the molecule, and structure I can be assigned to it.

By introducing various ω-bromomethyl aryl ketones into the reaction with N-acetamidophenol, we obtained various substituted I compounds (Table 2).

In the process of studying the optical characteristics of compounds of the I series, the need arose to synthesize 3-phenyl-2H-1,4-benzoxazine-2-one (IV). It was proposed that this compound be obtained via the scheme

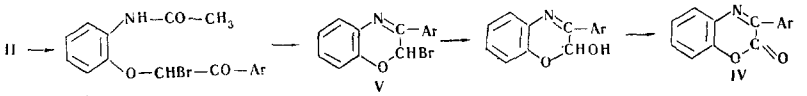


TABLE 1. Phenacyl Esters of N-Acetyl-o-aminophenol (II)

Aryl	mp, °C	Empirical formula	N, %		Yield, %
			found	calculated	
C_6H_5	105	$C_{16}H_{15}NO_3$	5,0	5,2	33
p-ClC_6H_4	132	$C_{16}H_{14}ClNO_3$	4,5	4,6	35
p-$C_2H_5OC_6H_4$	78	$C_{18}H_{19}NO_4$	4,5	4,5	30
p-$CH_3C_6H_4$	106	$C_{17}H_{17}NO_3$	5,0	4,9	35
p-$C_6H_5C_6H_4$	128	$C_{22}H_{19}NO_3$	4,3	4,1	40
1-$C_{10}H_7$	134	$C_{20}H_{17}NO_3$	4,1	4,4	30

All-Union Scientific-Research Institute of Single Crystals, Scintillation Materials, and Especially Pure Substances, Kharkov. Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 2, pp. 164-166, February, 1971. Original article submitted February 10, 1970.

TABLE 2. 3-Aryl-2H-1,4-benzoxazines

Aryl	mp, °C	Empirical formula	N, % found	N, % calculated	Yield, %
C_6H_5	111*	$C_{14}H_{11}NO$	6,9	6,7	40
p-$C_2H_5OC_6H_4$	153	$C_{16}H_{15}NO_2$	5,6	5,5	35
p-ClC_6H_4	158	$C_{14}H_{10}ClNO$	5,8	5,7	30
p-$CH_3C_6H_4$	106 †	$C_{15}H_{13}NO$	6,3	6,3	30
p-$C_6H_5C_6H_4$	171	$C_{20}H_{15}NO$	5,0	4,9	35
1-$C_{10}H_7$	148	$C_{18}H_{13}NO$	5,4	5,4	30

* mp 102-103 deg [1].

† mp 90-92 deg [2].

Bromination of the phenacyl ester of N-acetyl-o-aminophenol in dioxane–ether [4] led to the formation of the ω-bromophenacyl ester of N-acetyl-o-aminophenol. This compound was readily converted to 2-bromo-3-phenyl-2H-1,4-benzoxazine (V), which, however, was not altered by prolonged refluxing in alcoholic KOH. At the same time, a substance whose elementary analysis corresponded to benzoxazinone IV was obtained by brief heating of V with chromic anhydride.

EXPERIMENTAL

Arylacyl Ester of N-Acetyl-o-aminophenol. N-Acetyl-o-aminophenol (0.05 mole) was added to a solution of 0.55 mole of KOH in alcohol, and 0.05 mole of ω-bromomethyl aryl ketone was added to it in portions with stirring. The reaction mass was heated at 50-60 deg for 30 min. The precipitate of potassium bromide was removed by filtration; the solution was treated with activated charcoal, evaporated until crystallization started, and cooled in an ice bath. The precipitated crystals (generally colorless needles) were filtered and crystallized from alcohol–water (3:1) or hexane (see Table 1).

3-Aryl-2H-1,4-benzoxazines. The arylacyl ester of N-acetyl-o-aminophenol (0.05 mole) was dissolved in 50 ml of 10% alcoholic KOH, 10 ml of water was added, and the mixture was refluxed for 30 min. The flaky crystals that formed on cooling of the solution were filtered, crystallized from alcohol or hexane, and chromatographed on aluminum oxide (activity V, hexane).

ω-Bromophenacyl Ester of N-acetyl-o-aminophenol. Bromine (1 ml) was added dropwise to a solution of 5.4 g (0.02 mole) of the phenacyl ester of N-acetyl-o-aminophenol in 150 ml of ether–dioxane (1:1). The reaction mass was diluted with water, and the ether layer was separated and evaporated to give ~ 90% of colorless needles with mp 146-147 deg (from methanol). Found %: Br 23.0; N 4.0. $C_{16}H_{14}BrNO_3$. Calc. %: Br 23.0; N 4.0.

2-Bromo-3-phenyl-2H-1,4-benzoxazine (V). The ω-bromophenacyl ester of N-acetyl-o-aminophenol [3.48 g (0.01 mole)] was added to a mixture of 60 ml of 20% alcoholic KOH and 5 ml of water, and the mixture was refluxed for 45 min. The yellowish plates that formed on cooling were filtered and crystallized from methanol to give ~ 60% of a product with mp 148 deg. Found %: Br 27.7; N 4.9. $C_{14}H_{10}BrNO$. Calc. %: Br 27.8; N 4.9.

3-Phenyl-2H-1,4-benzoxazine-2-one (IV). Chromic anhydride [2 g (0.01 mole)] was added to a solution of 2.88 g (0.01 mole) of V in 30 ml of tert-butanol, and the mixture was heated at 70-75 deg for 15-20 min. After cooling, the solution was diluted with water, and the resulting precipitate was crystallized from methanol to give 60% of fine, colorless needles with mp 198 deg. Found %: N 6.1. $C_{14}H_9NO_2$. Calc. %: N 6.3.

LITERATURE CITED

1. E. Zellmann and A. Donner, Ber., 23, 172 (1890).
2. F. Kunckell-Rostock, Ber. Pharm., 23, 269 (1913); Chem. Zbl., 2, 154 (1913).
3. V. I. Minkin, O. A. Osipov, M. I. Knyazhanskii, A. D. Garnovskii, and E. A. Medyantseva, Zh. Obshch. Khim., 35, 397 (1965).
4. M. I. Shevchuk and A. V. Dombrovskii, Zh. Obshch. Khim., 33, 1135 (1963).