

SHORT
COMMUNICATIONSRecyclization of Isopropyl 1-Aryl-4,5-dioxo-2-phenyl-4,5-dihydro-1*H*-pyrrol-3-yl(oxo)acetates in Reactions with AnilinesP. S. Silaichev^a, Z. G. Aliev^b, and A. N. Maslivets^a^a Perm State University, ul. Bukireva 15, Perm, 614990 Russia
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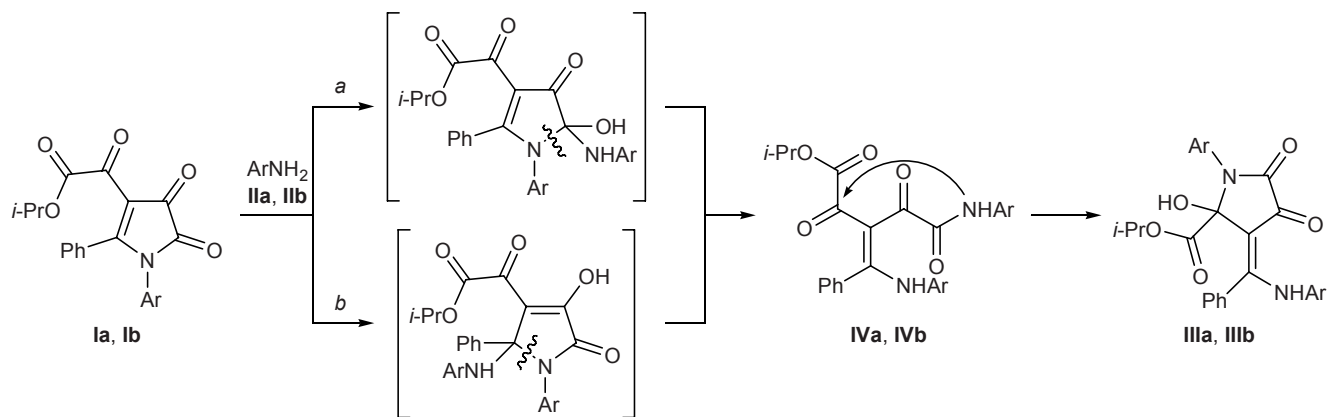
We previously reported on reactions of monocyclic 1*H*-pyrrole-2,3-diones with arylamines, which led to the formation of amine addition products at the C⁵ atom of pyrrolediones, 5-arylamino-3-hydroxy-1*H*-pyrrol-2(5*H*)-ones [1–3]. The reaction of isopropyl 1-aryl-4,5-dioxo-2-phenyl-4,5-dihydro-1*H*-pyrrol-3-yl(oxo)acetates **Ia** and **Ib** with anilines **IIa** and **IIb** at a ratio of 1:1 in anhydrous chloroform at room temperature (reaction time 8–10 h) gave the corresponding isopropyl 1-aryl-2-hydroxy-4,5-dioxo-3-[(*Z*)-phenyl(arylamino)methylidene]pyrrolidine-2-carboxylates **IIIa** and **IIIb** in good yields. The product structure was proved by X-ray analysis.

Presumably, compounds **IIIa** and **IIIb** are formed via initial addition of the primary amino group of reagent **IIa** or **IIb** at the C⁵ carbonyl carbon atom of pyrroledione **Ia** or **Ib** (path *a*) and cleavage of the pyrrole ring at the N¹–C⁵ bond. The subsequent closure of new pyrrolidine ring involves intramolecular nucleophilic addition of the NH group in intermediate **IVa** or **IVb** at

the ketone carbonyl carbon atom in the alkoxalyl fragment. An alternative mechanism (path *b*) implies initial addition of aniline **II** at the C² carbon atom of pyrroledione **I** and opening of the pyrrole ring at the N¹–C² bonds, which yields the same intermediate **IV**.

The described reaction is an example of recyclization of pyrrolediones by the action of anilines with cleavage of the pyrroledione ring and closure of new pyrrolidine ring.

Isopropyl 2-hydroxy-4,5-dioxo-1-phenyl-3-[(*Z*)-phenyl(phenylamino)methylidene]pyrrolidine-2-carboxylate (IIIa**).** A solution of 1.0 mmol of compound **Ia** and 1.0 mmol of aniline (**IIa**) in 15 ml of anhydrous chloroform was kept for 8 h at room temperature. The solvent was removed, and the residue was ground with ethanol. Yield 83%, mp 182–183°C (from toluene). IR spectrum, ν , cm⁻¹: 3255 br (OH, NH), 1753 (C=O, ester), 1723 (C⁵=O), 1616 br (C⁴=O, H-bonded). ¹H NMR spectrum, δ , ppm: 0.73 d (3H, Me, *J* = 6.4 Hz), 0.82 d (3H, Me, *J* = 6.4 Hz), 4.32 m

Ar = Ph (**a**), 4-MeOC₆H₄ (**b**).

(1H, OCH, $J = 6.4$ Hz), 6.88–7.43 m (16H, H_{arom} , OH), 12.67 br.s (1H, NH). Found, %: C 74.12; H 5.18; N 6.27. $C_{27}H_{24}N_2O_5$. Calculated, %: C 74.04; H 5.30; N 6.14.

Isopropyl 2-hydroxy-1-(4-methoxyphenyl)-3-[(Z)-(4-methoxyphenylamino)phenylmethylidene]-4,5-dioxopyrrolidine-2-carboxylate (IIIb) was synthesized in a similar way. Yield 79%, mp 195–196°C (from toluene). IR spectrum, ν cm^{-1} : 3242 br (OH, NH), 1752 (C=O, ester), 1719 ($C^5=O$), 1612 br ($C^4=O$, H-bonded). ^1H NMR spectrum, δ , ppm: 0.79 d (3H, Me, $J = 6.4$ Hz), 0.85 d (3H, Me, $J = 6.4$ Hz), 3.66 s (OMe), 3.74 s (OMe), 4.34 m (1H, OCH, $J = 6.4$ Hz), 6.75–7.44 m (14H, H_{arom} , OH), 12.62 br.s (1H, NH). Found, %: C 67.31; H 5.37; N 5.35. $C_{29}H_{28}N_2O_7$. Calculated, %: C 67.43; H 5.46; N 5.42.

The IR spectra were recorded on an FSM-1201 spectrophotometer from samples dispersed in mineral

oil. The ^1H NMR spectra were measured on a Bruker AM-400 spectrometer at 400 MHz using $\text{DMSO-}d_6$ as solvent and tetramethylsilane as internal reference. The purity of the products was checked by TLC on Silufol plates using benzene–ethyl acetate (5:1) or ethyl acetate as eluent.

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