

SHORT
COMMUNICATIONSReaction of 1-Methyl-3,4-dihydroisoquinolines
with Alkyl 4-Aryl-2,4-dioxobutanoatesV. V. Khalturina^a, Yu. V. Shklyaev^a, and A. N. Masliviets^b^a Institute of Technical Chemistry, Ural Division, Russian Academy of Sciences, Perm, Russia^b Perm State University, ul. Bukireva 15, Perm, 614990 Russia
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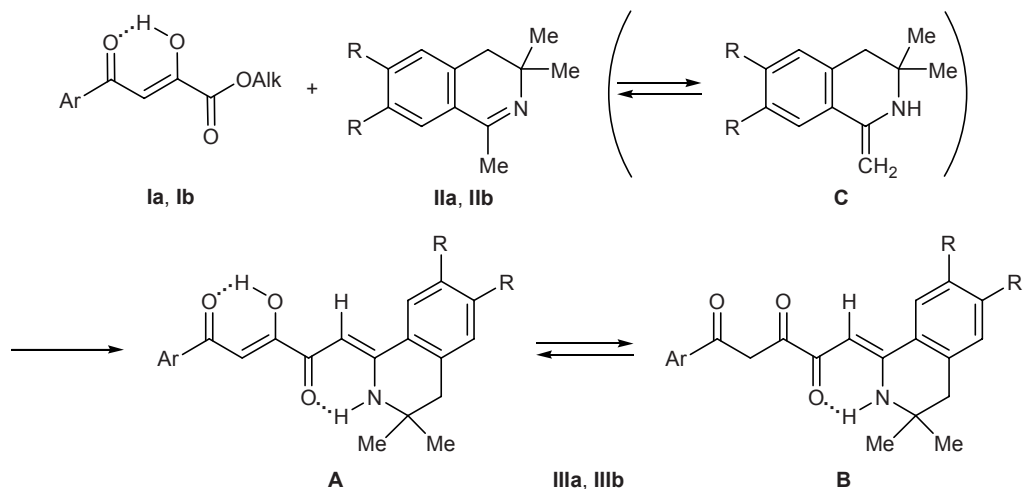
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We previously reported on the acylation of enamino tautomers of substituted 1-methyl-3,4-dihydroisoquinolines at the exocyclic methylene group with 5-aryl-2,3-dihydrofuran-2,3-diones and obtained the corresponding (2*Z*,5*Z*)-1-aryl-3-hydroxy-5-[3,3-dimethyl-3,4-dihydroisoquinolin-1(2*H*)-ylidene]pent-2-ene-1,4-diones [1, 2]. In the present communication we describe the reaction of aroylpyruvic acid alkyl esters **I** with substituted 1-methyl-3,4-dihydroisoquinolines **II**. Our interest in this reaction originates from the fact that esters **I** (alcoholysis products of 5-aryl-2,3-dihydrofuran-2,3-diones [3]) usually differ in chemical behavior from parent furandiones [4]. It should also be noted that esters **I** may be prepared by the Claisen condensation of acetophenones with dialkyl oxalates [5] and that they are more accessible compounds than 5-aryl-2,3-dihydrofuran-2,3-diones.

By heating alkyl (*Z*)-4-aryl-2-hydroxy-4-oxobut-2-enoates (alkyl aroylpyruvates) **Ia** and **Ib** with isoquinolines **IIa** and **IIb** (molar ratio 1:1) in boiling anhydrous chloroform for 5–7 h we obtained the corresponding (2*Z*,5*Z*)-1-aryl-3-hydroxy-5-[3,3-dimethyl-3,4-dihydroisoquinolin-1(2*H*)-ylidene]pent-2-ene-1,4-diones **IIIa** and **IIIb** which were identified by comparing with authentic samples whose structure was confirmed by X-ray analysis.

The spectral parameters of compounds **IIIa** and **IIIb** in DMSO-*d*₆ solution indicated that they exist as mixtures of enol and ketone tautomers **A** and **B** at a ratio of ~9:1.

Presumably, the described transformation involves acylation of the exocyclic methylene group in enamino tautomer **C** of isoquinolines **II** with the ester group of



I, Alk = Me, Ar = Ph (**a**); Alk = Et, Ar = C₆H₄NO₂-*p* (**b**); **II**, R = H (**a**), OMe (**b**); **III**, R = H, Ar = Ph (**a**); R = OMe, Ar = C₆H₄NO₂-*p* (**b**).

compounds **I**. This process is not typical of esters **I**; they usually react with nucleophiles via replacement at the most electrophilic α -carbon atom [4, 6].

(2Z,5Z)-5-[3,3-Dimethyl-3,4-dihydroisoquinolin-1(2H)-ylidene]-3-hydroxy-1-phenylpent-2-ene-1,4-dione (IIIa). A solution of 5.0 mmol of ester **Ia** and 5.0 mmol of isoquinoline **IIa** in 20 ml of anhydrous chloroform was heated for 5 h under reflux (the progress of the reaction was monitored by TLC). The mixture was cooled, and the precipitate was filtered off. Yield 1.06 g (89%), mp 146–148°C (decomp.; from ethyl acetate–ethanol, 2:1). IR spectrum, ν , cm^{-1} : 3150 br (NH, OH, assoc.), 1593 br (C=O, assoc.). ^1H NMR spectrum, δ , ppm: **A**: 1.32 s (6H, Me), 2.99 s (2H, 4'-H), 6.51 s (1H, 5-H), 7.16 s (1H, 2-H), 7.36–8.07 m (9H, H_{arom}), 12.06 s (1H, NH), 15.95 br.s (1H, OH); **B**: 1.28 s (6H, Me), 2.95 s (2H, 4'-H), 4.51 s (2H, 2-H), 6.30 s (1H, 5-H), 7.34–8.07 m (9H, H_{arom}), 11.57 s (1H, NH). ^{13}C NMR spectrum, δ_{C} , ppm: 27.38 (Me), 50.05 ($\text{C}^{4'}$), 85.09 ($\text{C}^{3'}$), 93.58 (C^3), 112.05 (C^2), 119.78–135.86 (C_{arom}), 159.37 (C^3), 180.00 (C^1), 180.82 (C^4), 188.17 (C^1). Found, %: C 75.99; H 6.11; N 3.88. $\text{C}_{22}\text{H}_{21}\text{NO}_3$. Calculated, %: C 76.06; H 6.09; N 4.03.

(2Z,5Z)-5-[6,7-Dimethoxy-3,3-dimethyl-3,4-dihydroisoquinolin-1(2H)-ylidene]-3-hydroxy-1-(4-nitrophenyl)pent-2-ene-1,4-dione (IIIb) was synthesized in a similar way. Yield 86%, mp 148–150°C (decomp.; from ethanol). IR spectrum, ν , cm^{-1} : 3190 br (NH, OH, assoc.), 1603 br (C=O, assoc.). ^1H NMR spectrum, δ , ppm: **A**: 1.32 s (6H, Me), 2.91 s (2H, 4'-H), 3.86 s (3H, OMe), 3.87 s (3H, OMe), 6.44 s (1H, 5-H), 6.98 s (1H, H_{arom}), 7.22 s (1H, 2-H), 7.31 s (1H, H_{arom}), 7.08–8.38 m (4H, C_6H_4), 12.07 s (1H, NH), 16.20 br.s (1H, OH); **B**: 1.27 s (6H, Me), 2.87 s

(2H, 4'-H), 3.85 s (3H, OMe), 3.86 s (3H, OMe), 4.55 s (2H, 2-H), 6.22 s (1H, 5-H), 6.96 s (1H, H_{arom}), 7.26 s (1H, H_{arom}), 7.06–8.23 m (4H, C_6H_4), 11.56 s (1H, NH). Found, %: C 63.59; H 5.41; N 6.03. $\text{C}_{24}\text{H}_{24}\text{N}_2\text{O}_7$. Calculated, %: C 63.71; H 5.35; N 6.19.

The IR spectra were recorded on an FMS-1201 spectrometer from samples dispersed in mineral oil. The ^1H NMR spectra were obtained on a Bruker WP-400 spectrometer using $\text{DMSO}-d_6$ as solvent and TMS as internal reference. The purity of the products was checked by TLC on Silufol plates; eluent ethyl acetate–benzene, 1:5; development with iodine vapor.

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