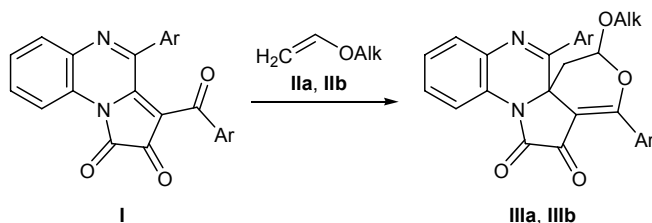


SHORT
COMMUNICATIONS**[4+2]-Cycloaddition of Alkyl Vinyl Ethers
to 3-Aroylpyrrolo[1,2-*a*]quinoxaline-1,2-dione****P. S. Silaichev, M. A. Kryuchkova, and A. N. Maslivets***Perm State University, ul. Bukireva 15, Perm, 614990 Russia
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Reactions of 3-aroilpyrrolo[1,2-*a*]quinoxaline-1,2-diones with activated alkenes were not studied previously. We examined reactions of 3-(4-chlorobenzoyl)-4-(4-chlorophenyl)pyrrolo[1,2-*a*]quinoxaline-1,2-dione (**I**) with alkyl vinyl ethers **IIa** and **IIb** at a ratio of 1:5 in boiling toluene (20–30 min, until violet color typical of initial compound **I** disappeared) and obtained new difficultly accessible bridged heterocyclic compounds, 16-alkoxy-2,14-bis(4-chlorophenyl)-15-oxa-3,10-diazatetracyclo[8.7.0.0^{1,13}.0^{4,9}]heptadeca-2,4,6,8,13-pentaene-11,12-diones **IIIa** and **IIIb**. Compounds **IIIa** and **IIIb** are likely to be formed via thermal [4+2]-cycloaddition of the O=C–C³=C^{3a} conjugated bond system in pyrrolo[1,2-*a*]quinoxaline-1,2-dione **I** at the polarized double C=C bond in vinyl ether **IIa** or **IIb**.

Ar = 4-ClC₆H₄, Alk = Et (**a**), Bu (**b**).

2,14-Bis(4-chlorophenyl)-16-ethoxy-15-oxa-3,10-diazatetracyclo[8.7.0.0^{1,13}.0^{4,9}]heptadeca-2,4,6,8,13-pentaene-11,12-dione (IIIa**).** A solution of 5.0 mmol of ethyl vinyl ether in 5 ml of anhydrous toluene was added to a solution of 1.0 mmol of 3-(4-chlorobenzoyl)-4-(4-chlorophenyl)pyrrolo[1,2-*a*]quinoxaline-1,2-dione (**I**) in 50 ml of anhydrous toluene. The mixture was heated for 20 min under reflux and cooled, the solvent was removed, and the precipitate was re-

crystallized from toluene. Yield 78%, mp 224–225°C. IR spectrum, ν , cm^{−1}: 1728 (C¹¹=O), 1713 (C¹²=O). ¹H NMR spectrum, δ , ppm: 0.81 t (3H, CH₃, *J* = 7.0 Hz), 2.18 d.d (1H, 17-H, *J* = 13.4, 4.6 Hz), 2.36 d (1H, 17-H, *J* = 13.4 Hz), 3.37 m (1H, OCH₂), 3.44 m (1H, OCH₂), 5.62 d (1H, 16-H, *J* = 4.6 Hz), 7.40–7.93 m (12H, H_{arom}). Found, %: C 65.75; H 4.38; N 5.15. C₃₀H₂₄Cl₂N₂O₄. Calculated, %: C 65.82; H 4.42; N 5.12.

16-Butoxy-2,14-bis(4-chlorophenyl)-15-oxa-3,10-diazatetracyclo[8.7.0.0^{1,13}.0^{4,9}]heptadeca-2,4,6,8,13-pentaene-11,12-dione (IIIb**)** was synthesized in a similar way from butyl vinyl ketone. Yield 74%, mp 219–220°C (from ethyl acetate). IR spectrum, ν , cm^{−1}: 1726 (C¹¹=O), 1714 (C¹²=O). ¹H NMR spectrum, δ , ppm: 0.72 t (3H, CH₃), 0.98 m (2H, CH₂), 1.14 m (2H, CH₂), 2.18 d.d (1H, 17-H, *J* = 13.6, 4.4 Hz), 2.35 d (1H, 17-H, *J* = 13.6 Hz), 3.29 m (1H, OCH₂), 3.39 m (1H, OCH₂), 5.60 d (1H, 16-H, *J* = 4.4 Hz), 7.38–7.90 m (12H, H_{arom}). Found, %: C 65.75; H 4.38; N 5.15. C₃₀H₂₄Cl₂N₂O₄. Calculated, %: C 65.82; H 4.42; N 5.12.

The IR spectra were measured on a FSM-1201 spectrophotometer from samples dispersed in mineral oil. The ¹H NMR spectra were recorded on a Bruker AM-400 spectrometer at 400 MHz using DMSO-*d*₆ as solvent and tetramethylsilane as internal reference. The purity of the isolated compounds was checked by TLC on Silufol plates using benzene–ethyl acetate (5:1) or ethyl acetate as eluent.

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