

SHORT
COMMUNICATIONS

[4+2]-Cycloaddition of Alkyl Vinyl Ethers to 4,5-Diaroyl-1*H*-pyrrole-2,3-diones

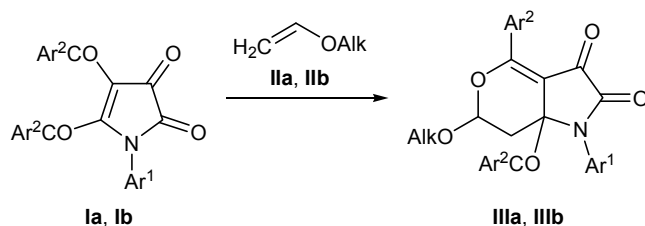
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Reactions of 4,5-diaroyl-1*H*-pyrrole-2,3-diones with activated alkenes were not reported previously. We examined the reaction of 1-aryl-4,5-diaroyl-1*H*-pyrrole-2,3-diones **Ia** and **Ib** with alkyl vinyl ethers **IIa** and **IIb** at a ratio of 1:1.5 in anhydrous benzene. The reaction mixtures were heated at 60–70°C until the bright red color typical of initial pyrrolediones **I** disappeared (25–30 min), and the products were 6-alkoxy-7a-aroyle-1,4-diaryl-7,7a-dihydropyrano[4,3-*b*]pyrrole-2,3(1*H*,6*H*)-diones **IIIa** and **IIIb**. Compounds **IIIa** and **IIIb** are likely to be formed via thermal [4+2]-cycloaddition of the conjugated O=C–C⁴=C⁵ bond system in pyrrolediones **Ia** and **Ib** to the polarized C=C bond in alkyl vinyl ethers **IIa** and **IIb**.



I, III, Ar¹ = 4-MeOC₆H₄, Ar² = 2,5-Me₂C₆H₃ (**a**), Ar¹ = Ar² = 4-MeC₆H₄ (**b**); **II, III**, Alk = Et (**a**), Bu (**b**).

6-Ethoxy-7a-(2,5-dimethylbenzoyl)-4-(2,5-dimethylphenyl)-1-methoxyphenyl-1,2,3,6,7,7a-hexahydropyrano[4,3-*b*]pyrrole-2,3-dione (IIIa). A solution of 1.5 mmol of ethyl vinyl ether in 5 ml of anhydrous benzene was added to a solution of 1.0 mmol of compound **Ia** in 50 ml of anhydrous benzene. The mixture was heated for 25 min at 60–70°C and cooled, the solvent was removed, and the residue was recrystallized from benzene–hexane (1:1). Yield 86%, mp 151–

152°C. IR spectrum, ν , cm⁻¹: 1725, 1690. ¹H NMR spectrum, δ , ppm: 1.18 t (3H, CH₃, *J* = 6.8 Hz), 2.04 s (3H, CH₃), 2.06 s (3H, CH₃), 2.18 s (3H, CH₃), 2.27 s (3H, CH₃), 2.38 d.d (1H, 7-H, *J* = 12.8, 9.6 Hz), 2.96 d.d (1H, 7-H, *J* = 12.8, 4.2 Hz), 3.77 m (1H, OCH₂) 3.81 s (3H, OCH₃), 3.94 m (1H, OCH₂), 5.64 d.d (1H, CH, *J* = 9.6, 4.2 Hz), 6.95–7.29 m (10H, H_{arom}). Found, %: C 73.39; H 6.18; N 2.63. C₃₃H₃₃NO₆. Calculated, %: C 73.45; H 6.16; N 2.70.

6-Butoxy-7a-(4-methylbenzoyl)-1,4-bis(4-methylphenyl)-1,2,3,6,7,7a-hexahydropyrano[4,3-*b*]pyrrole-2,3-dione (IIIb) was synthesized in a similar way. Yield 78%, mp 150–151°C. IR spectrum, ν , cm⁻¹: 1720, 1684. ¹H NMR spectrum, δ , ppm: 0.92 t (3H, CH₃, *J* = 7.2 Hz), 1.39 m (2H, CH₂), 1.60 m (2H, CH₂), 2.31 s (3H, CH₃), 2.37 s (3H, CH₃), 2.41 s (3H, CH₃), 3.04 d.d (1H, 7-H, *J* = 12.4, 4.8 Hz), 3.35 d.d (1H, 7-H, *J* = 12.4, 8.8 Hz), 3.78 m (1H, OCH₂), 4.03 m (1H, OCH₂), 5.80 d.d (1H, 6-H, *J* = 8.8, 4.8 Hz), 6.97–7.72 m (12H, H_{arom}). Found, %: C 75.74; H 6.31; N 2.61. C₃₃H₃₃NO₅. Calculated, %: C 75.69; H 6.35; N 2.67.

The IR spectra were recorded on an FSM-1201 spectrometer from samples dispersed in mineral oil. The ¹H NMR spectra were obtained on a Bruker AM-400 instrument 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) and ethyl acetate as eluent.

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