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SHORT COMMUNICATIONS

Two Methods for Generation of Aroyl(quinoxalin-2-yl)ketene

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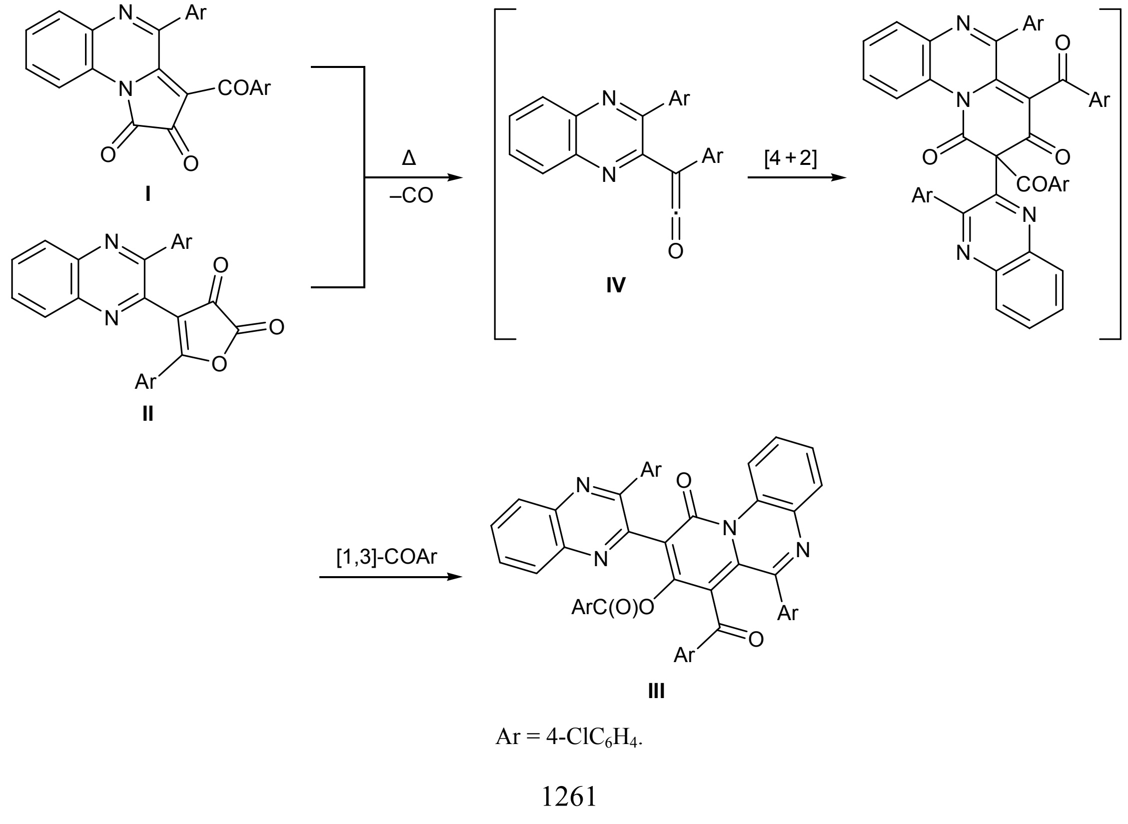
By heating a solution of 3-(4-chlorobenzoyl)-4-(4-chlorophenyl)pyrrolo[1,2-*a*]quinoxaline-1,2-dione (**I**) [1] in boiling anhydrous 1,2,4-trimethylbenzene (pseudocumene, 169–170°C) or a solution of 5-(4-chlorophenyl)-4-[3-(4-chlorophenyl)quinoxalin-2-yl]furan-2,3-dione (**II**) in boiling anhydrous *p*-xylene (138–139°C) we obtained 4-(4-chlorobenzoyl)-5-(4-chlorophenyl)-2-[3-(4-chlorophenyl)quinoxalin-2-yl]-1-oxo-1*H*-pyrido[1,2-*a*]quinoxalin-3-yl 4-chlorobenzoate (**III**) in almost quantitative yield.

Compound **III** is formed as a result of thermal decarbonylation of pyrroloquinoxalinedione **I** or furandione **II**, with generation of aroyl(quinoxalinyl)ketene **IV** which undergoes dimerization via [4+2]-cycloaddition involving imidoylketene fragment of one molecule **IV** and ketene C=C bond of the other and subsequent [1,3]-acylotropic migration of the aroyl group. The different decarbonylation temperatures of compounds **I** and **II** indicate different thermal stabilities of the dioxopyrrole and dioxofuran rings.

The spectral parameters of compound **III** were very similar to those of model 4-benzoyl-5-phenyl-2-(3-phenylquinoxalin-2-yl)-1-oxo-1*H*-pyrido[1,2-*a*]quinoxalin-3-yl benzoate whose structure was determined



Ar = 4-ClC$_6$H$_4$.

by X-ray analysis [2]. The ^{1}H NMR spectra of these compounds characteristically contained doublets from the 10-H proton (δ 8.13 and 8.12 ppm, respectively), which is deshielded due to interaction with the C^1=O carbonyl oxygen atom, and their IR spectra displayed absorption bands belonging to the ester (1752 and 1745 cm^{-1}) and ketone and lactam carbonyl groups (broadened bands at 1655 and 1662 cm^{-1}).

4-(4-Chlorobenzoyl)-5-(4-chlorophenyl)-2-[3-(4-chlorophenyl)quinoxalin-2-yl]-1-oxo-1*H*-pyrido-[1,2-*a*]quinoxalin-3-yl 4-chlorobenzoate (III). *a*. A solution of 1.0 mmol of compound **I** in 5 ml of anhydrous 1,2,4-trimethylbenzene was heated for 10 min under reflux until violet color typical of the initial pyrroloquinoxaline disappeared. The mixture was cooled, and the precipitate was filtered off. Yield 96%.

b. A solution of 1.0 mmol of compound **II** in 5 ml of anhydrous *p*-xylene was heated for 20 min under reflux until carbon(II) oxide no longer evolved. The mixture was cooled, and the precipitate was filtered off. Yield 95%, mp 304–305°C (decomp., from acetonitrile). IR spectrum, ν, cm^{-1}: 1752 (C=O, ester), 1655 (C^1=O, 4-C=O). ^{1}H NMR spectrum, δ, ppm: 7.40–7.95 m (23H, H_{arom}), 8.13 d (1H, 10-H, J = 8.1 Hz). Found, %: C 65.82; H 2.85; Cl 16.95; N 6.72. $C_{46}H_{24}Cl_4N_4O_4$. Calculated, %: C 65.89; H 2.88; Cl 16.91; N 6.68.

The IR spectrum was recorded on an FSM-1201 spectrometer. The ^{1}H NMR spectrum was run on a Bruker AM-400 instrument at 400 MHz using DMSO-d_6 as solvent and TMS as internal reference.

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REFERENCES

1. Silaichev, P.S., Kryuchkova, M.A., and Maslivets, A.N., *Russ. J. Org. Chem.*, 2009, vol. 45, p. 1730.
2. Lisovenko, N.Yu., Krasnykh, O.P., Aliev, Z.G., Vostrov, E.S., Tarasova, O.P., and Maslivets, A.N., *Khim. Geterotsikl. Soedin.*, 2001, p. 1429.