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RECYCLIZATION OF FURANDIONES TO GIVE PYRROLEDIONES BY THE ACTION OF MESITYLAMINE

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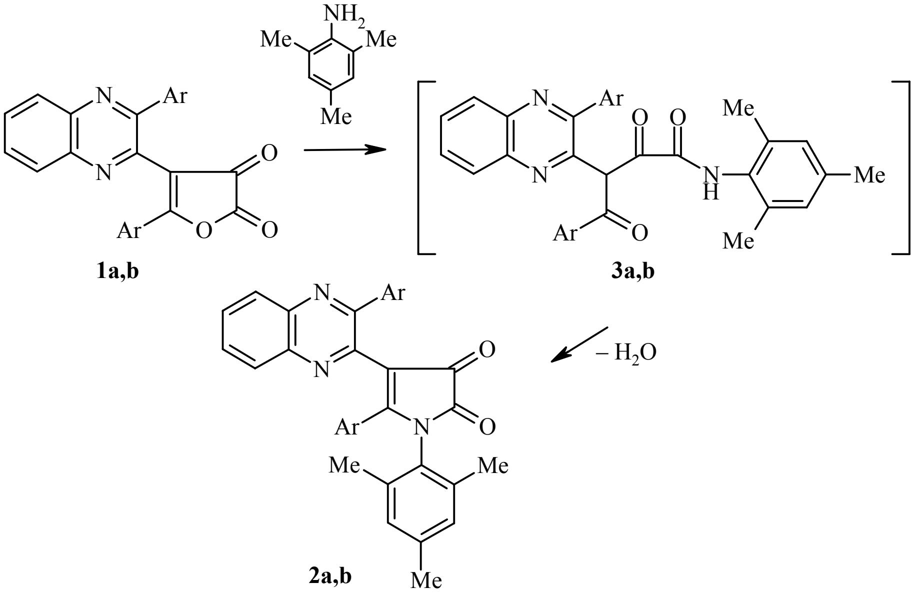
The reaction of 4-unsubstituted 5-aryl- and 4,5-diaryl-2,3-dihydro-2,3-furandiones with anilines yields arylamides of β-unsubstituted and β-aryl-substituted aroylpyruvic acids, which exist either in the enol [1] or diketo form [2] depending on the nature of the substituent at the β-position.

In our laboratory, the corresponding 4-heteryl-5-aryl-1-mesityl-2,3-dihydro-2,3-pyrrolediones, namely, 3-aryl-2-(2-aryl-4,5-dioxo-4,5-dihydro-1-mesityl-3-pyrrolyl)quinoxalines (**2a,b**) were isolated in the reaction of 5-aryl-4-heteryl-2,3-dihydro-2,3-furandiones, namely, 3-aryl-2-(2-aryl-4,5-dioxo-4,5-dihydro-3-furyl)quinoxalines (**1a,b**) with mesitylamine.



1–3 a Ar = Ph, **b** Ar = *p*-MeC_6H_4

Nucleophilic attack by the amino group at $C_{(2)}$ of the furandione ring in **1a** and **1b** occurs in the first step of this reaction along with opening of this ring at the $O_{(1)}–C_{(2)}$ bond, which is characteristic for substituted 2,3-dihydro-2,3-furandiones [1, 2]. The intermediate amides **3a** and **3b** spontaneously cyclize to give pyrrolediones **2a** and **2b**.

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A similar ring closure in arylamides of β-aryl-substituted aroylpyruvic acids occurs upon the dehydration of these compounds carried out at reflux in acetic acid over 2 h [3]. However, in the present case, ring closure is observed under mild conditions due to reasons probably similar to the Ingold-Thorpe *gem*-dialkyl effect [4] and to the favorable steric conditions for approximation of the mesitylamide amino group and aroyl carbonyl group generated by the bulky 3-aryl-2-quinoxaline substituent at the "sp^3-hybridized carbon atom of the adjacent unit" [4] in intermediate amides **3a,b**.

The spectral indices of pyrrolediones **3a,b** are in good accord with the literature data for this type of compound [1].

2-(1-Mesityl-2-phenyl-4,5-dioxo-4,5-dihydro-3-pyrrolyl)-3-phenylquinoxaline (2a). A solution of mesitylamine (0.16 ml, 0.001 mol) in absolute chloroform (5 ml) was added dropwise to a solution of furandione **1a** (0.38 g, 0.001 mol) in absolute chloroform (5 ml). The solvent was evaporated to half-volume and the precipitate formed was filtered off to give 0.28 g (57%) **2a**; mp 190-192°C (cyclohexane). Found, %: C 80.12; H 5.07; N 8.38. $C_{33}H_{25}N_3O_2$. Calculated, %: C 80.00; H 5.05; N 8.49. IR spectrum (vaseline mull), ν, cm^{-1}: 1755 ($C_{(2)}$=O), 1710 ($C_{(3)}$=O). ^1H NMR spectrum at 400 MHz (DMSO-d_6) with HMDS as the internal standard, δ, ppm: 2.04 (3H, s, Me); 2.11 (3H, s, Me); 2.25 (3H, s, Me); 6.33-8.13 (16H, m, $2C_6H_5+C_6H_4+C_6H_2$).

2-(1-Mesityl-4,5-dioxo-2-*p*-tolyl-4,5-dihydro-3-pyrrolyl)-3-*p*-tolylquinoxaline (2b) was obtained in 56% yield (0.29 g); mp 222-224°C (cyclohexane). Found, %: C 80.94; H 5.61; N 8.08. $C_{35}H_{29}N_3O_2$. Calculated, %: C 80.31; H 5.55; N 8.03. IR spectrum (vaseline mull), ν, cm^{-1}: 1754 ($C_{(2)}$=O), 1712 ($C_{(3)}$=O). ^1H NMR spectrum at 400 MHz (DMSO-d_6) with HMDS as the internal standard, δ, ppm: 2.05 (3H, s, Me); 2.13 (3H, s, Me); 2.25 (3H, s, Me); 2.35 (3H, s, Me); 2.45 (3H, s, Me); 6.50-8.15 (14H, m, $3C_6H_4+C_6H_2$).

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