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IMIDAZO[4,5-*c*]FURAN – A NEW HETEROCYCLIC SYSTEM

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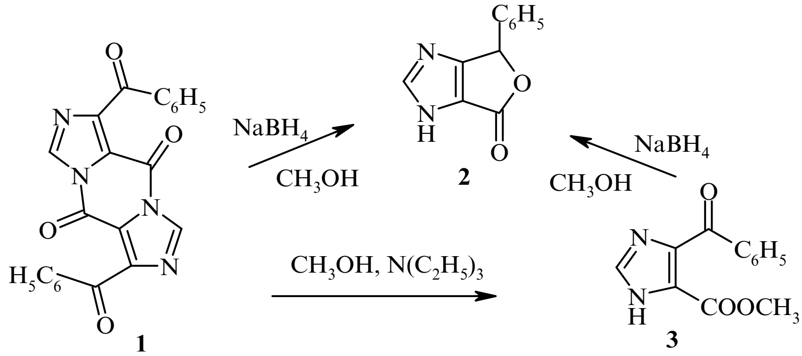
Diimidazo[1,5-*a*;1',5'-*d*]pyrazin-5,10-diones of type **1** (R = Cl, OAlk, NHAr) are suitable synthons for the synthesis of derivatives of imidazol-4,5-dicarboxylic acid [1,2], imidazo[4,5-*d*]pyridazines [3], and imidazo[5,1-*c*]-oxazoles [4]. The tricycle **1** (R = Ph) was converted into imidazo[4,5-*c*]furan **2** on treatment with $NaBH_4$ in methanol.



The fact that compound **1** is poorly soluble in methanol, while the lactone **2** is readily formed by reduction of the keto ether **3** with $NaBH_4$, confirms that the conversion **1** → **3** occurs in two stages *via* the intermediate **2**. An additional argument for this assertion is the formation of compound **3** in high yield when the starting material **1** was heated in anhydrous methanol in the presence of either CH_3ONa or $N(C_2H_5)_3$.

4,9-Dibenzoyldiimidazo[1,5-*a*;1',5'-*d*]pyridazin-5,10-dione (1). Yield 68% [3]; mp >300°C, M^+ 396. IR spectrum (nujol mull), cm^{-1}: 2950, 2870, 1720, 1615, 1570, 1450, 1380. Found, %: C 66.91; H 3.16; N 13.96. $C_{22}H_{12}N_4O_4$. Calculated, %: C 66.67; H 3.05; N 14.14.

4-Phenyl-1,4,5,6-tetrahydroimidazo[4,5-*c*]furan (2). Keto ether **3** (2.3 g, 0.01 mol) was added with stirring at room temperature to a solution of sodium borohydride (0.608 g, 0.016 mol) in methanol (150 ml). After stirring for 6 h, the solution was treated with dilute hydrochloric acid until the excess sodium borohydride was completely destroyed. The solution at pH 7 was evaporated in vacuum. The residue was recrystallized from 1:10 ethanol–water to give compound **2** (1.74 g, 87%); mp 184°C, M^+ 200. IR spectrum (nujol mull), cm^{-1}: 2970, 2815, 1693, 1570, 1443-1457, 1372, 1157, 953, 714. Found, %: C 66.12; H 3.89; N 14.16. $C_{11}H_8N_2O_2$. Calculated, %: C 66.00; H 4.00; N 14.00.

4-Benzoyl-5-methoxycarbonylimidazole (3). Compound **1** (3.96 g, 0.01 mol) was boiled in anhydrous methanol (100 ml) in the presence of a catalytic amount of triethylamine for 40 min. The solution was evaporated in vacuum and the residue was recrystallized from DMF–water to give compound **3** (3.77 g, 82%); mp 200°C, M^+ 230. IR spectrum (nujol mull), cm^{-1}: 2985, 2785, 1705, 1657, 1470, 1430, 1340, 1186, 1157, 1070, 900. Found, %: C 62.46; H 4.49; N 12.32. $C_{12}H_{10}N_2O_3$. Calculated, %: C 62.61; H 4.38; N 12.17.

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