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LETTERS TO THE EDITOR

Alkylation of Phenol with 1-Phenyl-3,5-dimethyl-4-chloromethylpyrazole under Phase Transfer Catalysis

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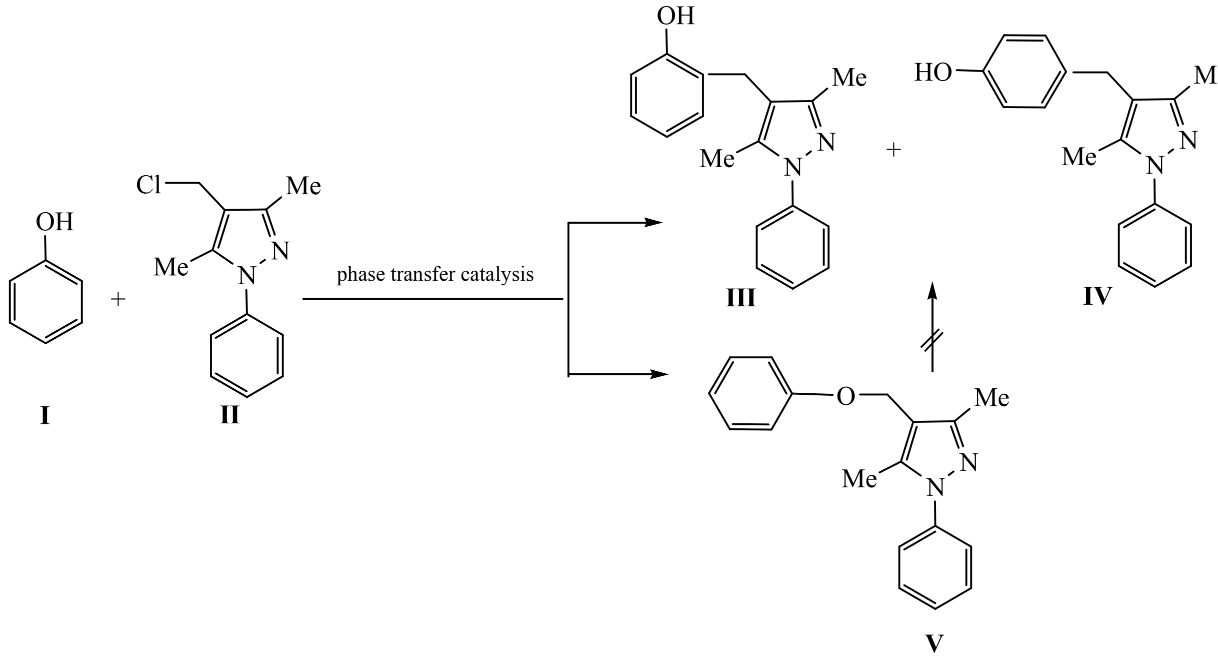
It is known that heating of 1,3,5-trimethylpyrazol-4-ylmethanol in the presence of benzyl and hexyl alcohols affords mainly the mixed ethers of trimethylpyrazolylcarbinol [1]. A similar reaction of trimethylpyrazolylcarbinol with phenol does not yield the pyrazolylmethyl phenyl ether, but the products of phenol *C*-alkylation in the *ortho*- and *para*-positions [2].

In order to determine whether *C*-alkylated phenol is a precursor of pyrazolylmethyl ether [3], in the present work we report the results of phenol **I** alkylation with 1-phenyl-3,5-dimethyl-4-chloromethylpyrazole **II** under phase transfer catalysis.

At the phenol alkylation the formation of ambident ions is not excluded [4]. In this case both *O*- and *C*-alkyl derivatives can be formed. Thus, at the alkylation of phenol **I** with 1-phenyl-3,5-dimethyl-4-chloromethylpyrazole **II** we isolated and characterized the *O*- (**V**) and *C*-alkylated products (**III**, **IV**) (1:1) in a total yield of 63%. According to the ^{1}H NMR data, the *C*-alkylated products (**III**, **IV**) are a mixture of *ortho*- and *para*-isomers in a ratio of 9:1. The proton signal of the hydroxy group of the isomer **III** appears downfield (8.99 ppm) in comparison with the corresponding signal of the isomer **IV** (8.21 ppm). Isomer **III** was isolated in pure form by crystallization.



Further investigation showed that the *O*-alkylated phenol **V** is not subjected to any changes under heating to 200°C (it is not transformed into a *C*-alkylated product). Based on these data, one can conclude that non-catalytic alkylation of phenol with 1,3,5-trimethylpyrazol-4-ylmethanol leads exclusively to *C*-alkylated products [2].

The IR spectra were obtained on a Specord 75-UR instrument (thin layer). The ^{1}H NMR spectra were recorded on a Varian Mercury instrument (300 MHz) in DMSO-d_6 and $CDCl_3$.

1-Phenyl-3,5-dimethyl-4-chloromethylpyrazole **II** was synthesized by a known method [5], bp 160°C (1 mm Hg), n_D^{20} 1.5864.

2-(3,5-Dimethyl-1-phenyl-1*H*-pyrazol-4-ylmethyl)-phenol (III), 4-(3,5-dimethyl-1-phenyl-1*H*-pyrazol-4-ylmethyl)phenol (IV), 3,5-dimethyl-4-phenoxy-methyl-1-phenyl-1*H*-pyrazole (V). A mixture of 9.4 g of phenol, 4 g of sodium hydroxide, 50 ml of dioxane, and 1 g of benzyltriethylammonium chloride was stirred for 0.5 h at 70°C. Then 11.0 g of 1-phenyl-3,5-dimethyl-4-chloro-methylpyrazol **II** dissolved in 25 ml of dioxane was added dropwise within 1 h, and the stirring was continued for 12 h. After the dioxane removal, the residue was washed with water and extracted with chloroform (2×50 ml). After distilling the chloroform off, to the residue was added 50 ml of CCl_4, and the mixture was kept for 1 day. The resulting crystals were filtered off. Yield 9.1 g (32.3%), mp 190–220°C. IR spectrum, ν, cm^{-1}: 1510 (pyrazole), 1590 (Ph), 3200–3400 (OH). The ratio of *ortho*- (**III**) and *para*-isomers (**IV**) is 9:1 (^{1}H NMR). Recrystallization from a water–ethanol mixture (1:4) yields pure isomer **III,** 8.2 g, mp 220°C. ^{1}H NMR spectrum (DMSO-d_6), δ, ppm (*J*, Hz): 2.12 s (3H, CH_3), 2.26 s (3H, CH_3), 3.64 s (2H, CH_2), 6.61 d.d.d (1H, J_1 7.6, J_2 4, J_3 1.1), 6.76 d. d (1H, J_1 8.0, J_2 1.1), 6.80 d. d (1H, J_1 7.6, J_2 1.6), 6.91 d. d. d (1H, C_6H_4, J_1 8.0, J_2 7.4, J_3 1.6), 7.25–7.32 and 7.37–7.45 m (5H, C_6H_5), 8.99 (1H, OH). Found, %: C 77.31; H 6.72; N 9.72. $C_{18}H_{18}N_2O$. Calculated, %: C 77.69; H 6.47; N 10.07.

After the solvent (CCl_4) removal, the residue was distilled to give 8.9 g (31.4%) of compound **V**, bp 170°C (1 mm Hg), n_D^{20} 1.5960. IR spectrum, ν, cm^{-1}: 1510 (ring), 1580 (Ph). ^{1}H NMR spectrum ($CDCl_3$), δ, ppm (*J*, Hz): 2.32 s (6H, CH_3), 4.85 s (2H, CH_2), 7.21–7.45 m (10H, 2 C_6H_5). Found, %: C 77.69; H 6.47; N 10.07. $C_{18}H_{18}N_2O$. Calculated, %: C 77.69; H 6.47; N 10.07.

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