

Short Note

4-[[**(1-Phenyl-1*H*-pyrazol-3-yl)oxy**]methyl]-1,3-dioxolan-2-one

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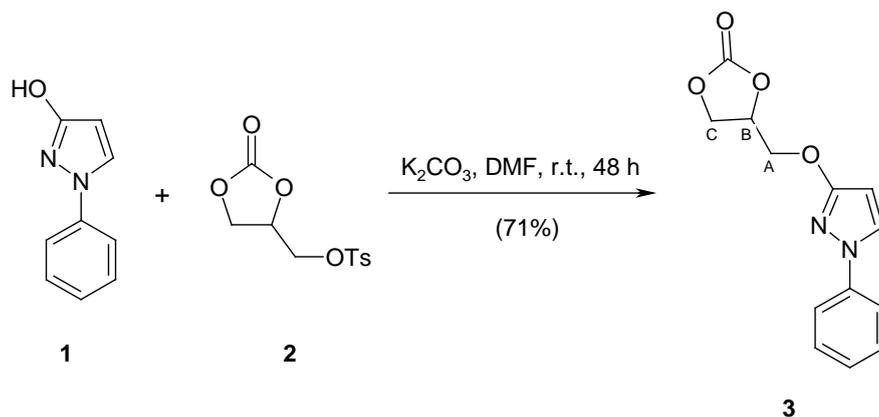
Abstract: The title compound was obtained by the reaction of tosylated glycerol carbonate with 1-phenyl-1*H*-pyrazol-3-ol in a good 71% yield. Detailed spectroscopic data (¹H-NMR, ¹³C-NMR, ¹⁵N-NMR, IR, MS) are presented.

Keywords: 1*H*-pyrazol-3-ol; glycerol; tosylated glycerol 1,2-carbonate; alkylation

1-Phenylpyrazole derivatives are known to have a broad spectrum of biological activities [1–6]. Recently, 1-phenyl-1*H*-pyrazol-3-ol was used as a versatile synthon for the preparation of various (het)aryl- and carbo-functionally substituted pyrazole derivatives employing Pd-catalyzed cross-coupling reactions [7,8]. In the present work, functionalization of 1-phenyl-1*H*-pyrazol-3-ol with tosylated glycerol 1,2-carbonate (TGC) was investigated. TGC is relatively new and efficient reagent, which have found application as an initiator of cationic ring-opening polymerization [9] and as a versatile bis-electrophile to access new functionalized glycidol derivatives [10,11]. TGC can be easily obtained by tosylation of glycerol carbonate (4-(hydroxymethyl)-1,3-dioxan-2-one) [10], the latter is an industrial product of glycerol valorization [12].

It is known that TGC reacts with 4-methoxyphenol in DMF in the presence of K₂CO₃ to afford *O*-alkylated product, 4-(3-methoxyphenoxy)methyl-1,3-dioxolan-2-one, in only 41% yield [11], while 55% of the arylsulfanyl analogue is obtained in analogous conditions from *m*-methoxythiophenol [10]. The reaction of 1-phenyl-1*H*-pyrazol-3-ol **1** with TGC **2** was carried out in DMF in the presence of K₂CO₃ and gave chemoselectively 4-[[**(1-phenyl-1*H*-pyrazol-3-yl)oxy**]methyl]-1,3-dioxolan-2-one **3** in 71% isolated yield. The structure of compound **3** was confirmed by its spectroscopic data (¹H NMR, ¹³C and ¹⁵N NMR, IR, MS) as well as by elemental analysis.

Scheme 1. Synthesis of the title compound 3.



Experimental

The melting point was determined on a Reichert–Kofler hot-stage microscope and is uncorrected. Mass spectrum: Shimadzu QP 1000 instrument (EI, 70 eV). IR spectrum: Perkin-Elmer FTIR Spectrum 1605 spectrophotometer (KBr-disc). The elemental analysis was performed at the Microanalytical Laboratory, University of Vienna. NMR spectra were recorded from CDCl₃ solutions on a Bruker Avance 500 instrument with a ‘directly’ detecting broadband observe probe (BBFO) at 298 K (500.13 MHz for ¹H, 125.76 MHz for ¹³C, 50.68 MHz for ¹⁵N). The centre of the solvent signal was used as an internal standard which was related to TMS with $\delta = 7.26$ ppm (¹H in CDCl₃) and $\delta = 77.0$ ppm (¹³C in CDCl₃). The digital resolutions were 0.2 Hz/data point in the ¹H and 0.4 Hz/data point in the ¹H-coupled ¹³C-NMR spectra (gated decoupling). The ¹⁵N-NMR spectrum (gradient-selected ¹⁵N, ¹H-HMBC) was referenced against external nitromethane.

4-[(1-Phenyl-1H-pyrazol-3-yl)oxy]methyl-1,3-dioxolan-2-one (3)

To a solution of 1-phenyl-1H-pyrazol-3-ol (**1**) (1.6 g, 1.0 mmol) in DMF (15 mL) K₂CO₃ (2.76 g, 2.0 mmol) and tosylate (**2**) (2.72 g, 1.0 mmol) were added. The mixture was stirred at r.t. for 48 h (TLC control, eluent: ethyl acetate–*n*-hexane, 1:2; R_f 0.25). Then, 50 mL of water were added and the mixture was extracted with 3 × 60 mL of ethyl acetate. The organic layers were combined, washed with brine, dried over anhydrous Na₂SO₄ and filtered. The solvent was evaporated under reduced pressure and the residue was purified by column chromatography (silica gel, eluent: ethyl acetate–*n*-hexane, 1:2) to give pure **3** as yellowish crystals, m.p. 95–96 °C. Yield: 1.86 g (71%).

IR (KBr) ν (cm⁻¹): 1786 (C=O), 1600, 1546, 1475, 1396, 1315, 1186, 1094, 989, 774, 751, 682.

MS (EI, 70 eV): (*m/z*, %) 260 (M⁺, 29), 160 (93), 77 (100), 51 (35), 43 (20).

¹H-NMR (CDCl₃): δ (ppm) 4.48 (dd, 1H, ²*J*(H_{1A},H_{2A}) = 11.9 Hz, ³*J*(H_{1A},H_B) = 4.0 Hz, H_{1A}), 4.51 (dd, 1H, ²*J*(H_{1C},H_{2C}) = 8.5 Hz, ³*J*(H_B,H_{1C}) = 6.1 Hz, H_{1C}), 4.54 (dd, 1H, ²*J*(H_{1A},H_{2A}) = 11.9 Hz, ³*J*(H_{2A},H_B) = 3.9 Hz, H_{2A}), 4.60 (t, 1H, ²*J*(H_{1C},H_{2C}) = 8.5 Hz, ³*J*(H_B,H_{2C}) = 8.5 Hz, H_{2C}), 5.07 (dddd, 1H, ³*J*(H_B,H_{2C}) = 8.5 Hz, ³*J*(H_B,H_{1C}) = 6.1 Hz, ³*J*(H_{1A},H_B) = 4.0 Hz, ³*J*(H_{2A},H_B) = 3.9 Hz, H_B), 5.92 (d, 1H,

$^3J(4\text{-H},5\text{-H}) = 2.6$ Hz, 4-H), 7.22 (m, 1H, Ph 4-H), 7.41 (m, 2H, Ph 3,5-H), 7.57 (m, 2H, Ph 2,6-H), 7.74 (d, 1H, $^3J(4\text{-H},5\text{-H}) = 2.6$ Hz, 5-H).

$^{13}\text{C-NMR}$ (CDCl_3): δ (ppm) 66.1 (C_C), 67.4 (C_A), 74.2 (C_B), 93.9 (C-4, $^1J(\text{C-4},4\text{-H}) = 180.6$ Hz, $^2J(\text{C-4},5\text{-H}) = 8.1$ Hz), 117.8 (Ph C-2,6), 125.6 (Ph C-4), 128.2 (C-5, $^1J(\text{C-5},5\text{-H}) = 187.0$ Hz, $^2J(\text{C-5},4\text{-H}) = 8.3$ Hz), 129.4 (Ph C-3,5), 139.8 (Ph C-1), 154.7 (C=O), 163.3 (C-3, $^2J(\text{C-3},4\text{-H}) = 2.2$ Hz, $^3J(\text{C-3},5\text{-H}) = 10.5$ Hz, $^3J(\text{C-3},\text{OCH}_2) = 2.2$ Hz).

$^{15}\text{N-NMR}$ (CDCl_3): δ (ppm) -185.5 (N-1), N-2 was not found.

Anal. Calcd for $\text{C}_{13}\text{H}_{12}\text{N}_2\text{O}_4$: C, 60.00%; H, 4.65%; N, 10.76%. Found: C, 59.78%; H, 4.50%; N, 10.74%.

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