

LETTERS
TO THE EDITOR

Aqueous Hydrolysis of Pyrazol-1-ylacetates

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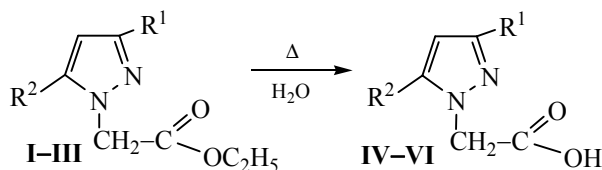
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Received November 10, 2011

DOI: 10.1134/S107036321205026X

The pyrazole esters ($n = 2$) are known to be hydrolyzed in the presence of bases [1–3]. We found that pyrazole esters **I–III** ($n = 1$) are hydrolyzed with water in the absence of bases.



I, IV, $R^1 = R^2 = H$; **II, V**, $R^1 = CH_3$, $R^2 = H$ and $R^1 = H$, $R^2 = CH_3$; **III, VI**, $R^1 = R^2 = CH_3$.

This behavior of the esters **I–III** is apparently caused by the negative inductive effect of pyrazole ring. This is supported by the fact that the reaction time increases 2.5 times when passing from compound **I** to compound **III**. Another important fact which must be taken into account when considering the mutual influence of the directly bonded atoms is the proximity of the pyrazole ring to the carbonyl carbon. As the distance between the atoms increases ($n = 2$), the electrophilicity of the carbonyl carbon decreases, therefore the stability of esters with respect to water increases.

Pyrazol-1-ylacetic acid (IV). A mixture of 5 g of compound **I** and 25 ml of water was heated at 100°C for 10 h. After cooling, the mixture was alkalized with an aqueous solution of Na_2CO_3 and extracted with 50 ml of ether. The aqueous solution was evaporated to a half volume and neutralized with hydrochloric acid. The resulting crystals were filtered off. Yield 2.5 g (70%), white crystals, mp 175–178°C (water). IR spectrum, ν , cm^{-1} : 1530 (ring), 1700 (C=O), 3100–3400 (COOH). 1H NMR spectrum (DMSO- d_6), δ , ppm (J , Hz): 4.84 s (2H, CH_2), 6.19 d.d (1H, 4-H, J 2.3, 1.8), 7.34 d (1H, 5-H, J 1.8), 7.57 d (1H, 3-H, J 2.3), 12.63 br.s (1H, OH). Found, %: C 47.85; H 4.38; N 22.51. $C_5H_6N_2O_2$. Calculated, %: C 47.61; H 4.76; N 22.22.

3(5)-Methylpyrazol-1-ylacetic acid (V) was obtained similarly from 5 g of the ester **II**, the reaction time was

15 h. Yield 2.8 g (68%). The isomers molar ratio is 3:5–3:1, respectively. White crystals, mp 160–163°C (water). IR spectrum, ν , cm^{-1} : 1530 (ring), 1680 (C=O), 3100–3400 (COOH). 1H NMR spectrum (DMSO- d_6), δ , ppm (J , Hz): 2.19 s (3H, 3- CH_3), 2.22 s (3H, 5- CH_3), 4.70 s and 4.73 s (2H, N- CH_2), 5.98 d (1H, 4-H, J 2.2), 7.2 d (1H, 3-H, J 1.8), 7.4 d (1H, 5-H, J 2.2), 12.60 br.s (1H, OH). Found, %: C 51.12; H 5.64; N 20.35. $C_6H_8N_2O_2$. Calculated, %: C 51.42; H 5.71; N 20.00.

3,5-Dimethylpyrazol-1-ylacetic acid (VI) was prepared similarly from 5 g of the ester **III**, the reaction time is 25 h. Yield 2.7 g (65%). White crystals, mp 188–190°C (water) [5]. IR spectrum, ν , cm^{-1} : 1540 (ring), 1700 (C=O), 3300–3400 (OH). 1H NMR spectrum (DMSO- d_6), δ , ppm (J , Hz): 2.11 s (3H, 3- CH_3), 2.18 s (3H, 5- CH_3), 4.63 s (2H, N CH_2), 5.71 s (1H, 4-H), 12.57 br.s (1H, OH). Found, %: C 54.85; H 6.73; N 18.32. $C_7H_{10}N_2O_2$. Calculated, %: C 54.54; H 6.49; Br 45.71; N 18.18.

The IR spectra were registered on a Specord IR-75 instrument from KBr pellets. The 1H NMR spectra were recorded on a Varian Mercury-300 spectrometer in DMSO- d_6 . The initial pyrazol-1-ylacetates **I–III** were obtained by the known methods [4]; ethyl pyrazol-1-ylacetate (**I**): bp 95–98°C (3 mm Hg), n_D^{20} 1.4690; ethyl 3(5)-methylpyrazol-1-ylacetate (**II**): bp 104–108°C (3 mm Hg), n_D^{20} 1.4620 [the isomers ratio is (3:5)–(4:1)]; ethyl 3,5-dimethylpyrazol-1-ylacetate (**III**): bp 110–115°C (3 mm Hg), n_D^{20} 1.4700.

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