Brief Communications

Reaction of 6-amino-1,3-dimethyluracil with hexafluoroacetone and ethyl trifluoropyruvate benzoylimines

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Heating of 6-amino-1,3-dimethyluracil with hexafluoroacetone and ethyl trifluoropyruvate benzoylimines in DMF in the presence of Et_3N results in 1,3-dimethyl-7-phenyl-5,5-bis(trifluoromethyl)-1,2,3,4,5,8-hexahydropyrimido[4,5-*d*]pyrimidine-2,4-dione and 5-benzoylamido-1,3-dimethyl-5-trifluoromethyl-1,2,3,4,5,6-hexahydropyrrolo[2,3-*d*]pyrimidine-2,4,6-trione, respectively.

Key words: 6-amino-1,3-dimethyluracil, cyclocondensation, imines of polyfluoroketones, pyrimido[4,5-*d*]pyrimidine-2,4-dione, 1*H*-pyrrolo[2,3-*d*]pyrimidine.

Acylimines of polyfluoroketones are mainly used as both heterodienes and dienophiles in syntheses of heterocycles.[1—3] At the same time, two electrophilic centers in molecules of hexafluoroacetone acylimines and three electrophilic centers in molecules of trifluoropyruvate acylimines allows the consideration of these compounds as potential substrates in reactions with bidentate nucleophiles. Indeed, we found that in the reaction with 6-amino-1,3-dimethyluracil (**1**) hexafluoroacetone benzoylimine (**2**) and ethyl trifluoropyruvate benzoylimine (**3**) form the corresponding C-alkylation products **4** and **5**, which on heating in dimethylformamide in the presence of triethylamine are transformed into pyrimido[4,5-*d*]- (**6**) and pyrrolo[2,3-*d*]pyrimidines **7** (Scheme 1).

The structure of obtained compounds **4—7** was confirmed by data of ^1H and ^{19}F NMR spectroscopy and elemental analysis. In particular, the ^1H NMR spectra of uracils **4** and **5** contain the characteristic signals of the NH_2 group at 6.5—6.6 ppm.

Experimental

^1H and ^{19}F NMR spectra were recorded on a Bruker DPX 200 spectrometer. Melting points were determined in a glass capillary.

***N*-[1-(6-Amino-1,3-dimethyl-2,4-dioxo-1,2,3,4-tetrahydropyrimidin-5-yl)-2,2,2-trifluoro-1-(trifluoromethyl)ethyl]benzamide (4).** A mixture of aminouracil **1** (1.55 g, 0.01 mol) and benzoylimine **2** (2.69 g, 0.01 mol) in DMF (10 mL) was stirred at 20 °C and then poured into water (50 mL). The precipitate that formed was filtered off and recrystallized from benzene to give uracil **4** in 85% yield (3.61 g) with m.p. 195 °C (softening), 245—252 °C (melting with decomposition). Found (%): C, 45.05; H, 3.14; N, 13.45. $C_{16}H_{14}F_6N_4O_3$. Calculated (%) C, 45.29; H, 3.33; N, 13.20. ^1H NMR (DMSO-d_6), δ: 3.19 and 3.33 (both s, 3 H each, MeN); 6.66 (s, 2 H, NH_2); 7.48 (m, 3 H, CH arom.); 7.87 (d, 2 H, CH arom., J = 7 Hz); 8.65 (s, 1 H, NH). ^{19}F NMR (DMSO-d_6), δ: 6.0 and 19.04 both s.

Ethyl 2-(6-amino-1,3-dimethyl-2,4-dioxo-1,2,3,4-tetrahydropyrimidin-5-yl)-2-benzoylamino-3,3,3-trifluoropropionate (5). Uracil **5** was obtained (75%, 3.22 g) similarly from aminouracil **1** (1.55 g, 0.01 mol) and benzoylimine **3** (2.73 g,

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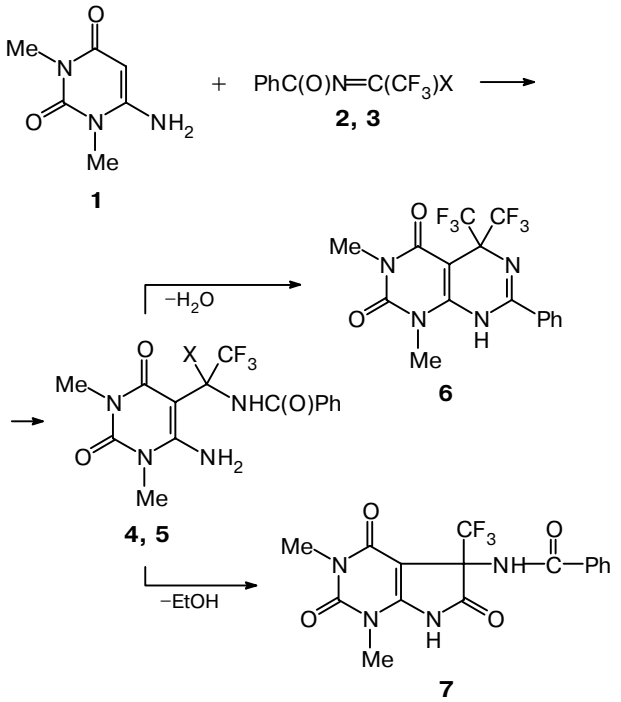
Scheme 1



X = CF_3 (**2**, **4**); C(O)OEt (**3**, **5**)

0.01 mol). M.p. 275—278 °C (decomp.). Found (%): C, 50.65; H, 4.58; N, 12.95. $C_{18}H_{19}F_3N_4O_5$. Calculated (%) C, 50.47; H, 4.47; N, 13.08. ^{1}H NMR (DMSO-d_6), δ: 1.23 (t, 3 H, MeC); 3.31 and 3.42 (both s, 3 H each, MeN); 4.28 (m, 2 H, CH_2); 6.53 (s, 2 H, NH_2); 7.51 (m, 3 H, CH arom.); 7.83 (d, 2 H, CH arom., J = 7 Hz); 12.14 (s, 1 H, NH). ^{19}F NMR (DMSO-d_6), δ: 3.3 s.

1,3-Dimethyl-7-phenyl-5,5-bis(trifluoromethyl)-1,2,3,4,5,8-hexahydropyrimido[4,5-*d*]pyrimidine-2,4-dione (6). A mixture of aminouracil **1** (1.55 g, 0.01 mol), benzoylimine **2** (2.69 g, 0.01 mol), and triethylamine (0.2 mL) in DMF (10 mL) was heated for 5 h at 90—100 °C. Then the reaction mixture was cooled, and benzene (20 mL) was added. The precipitate that formed was filtered off and recrystallized from benzene. Compound **6** was obtained in 48% yield (1.94 g) with m.p. 280 °C (decomp.). Found (%): C, 47.15; H, 3.12; N, 13.62. $C_{16}H_{12}F_6N_4O_2$. Calculated (%): C, 47.30; H, 2.98; N, 13.79. ^{1}H NMR (DMSO-d_6), δ: 3.25 and 3.56 (both s, 3 H each, MeN); 7.40—7.60 (m, 3 H, CH arom.); 7.92 (d, 2 H, CH arom., J = 7 Hz); 9.60 (s, 1 H, NH). ^{19}F NMR (DMSO-d_6), δ: 5.54 s.

5-Benzoylamino-1,3-dimethyl-5-trifluoromethyl-1,2,3,4,5,6-hexahydropyrrolo[2,3-*d*]pyrimidine-2,4,6-trione (7). A mixture of aminouracil **1** (1.55 g, 0.01 mol), benzoylimine **3** (2.73 g, 0.01 mol), and triethylamine (0.2 mL) in DMF (10 mL) was heated for 5 h at 90—100 °C. Then the reaction mixture was cooled, poured into water (50 mL), and acidified to pH 4. The precipitate that formed was filtered off and recrystallized from benzene. Pyrrolopyrimidine **7** was obtained in 61% yield (2.33 g) with m.p. 304—306 °C. Found (%): C, 50.35; H, 3.54; N, 14.68. $C_{16}H_{13}F_3N_4O_4$. Calculated (%): C, 50.27; H, 3.43; N, 14.66. ^{1}H NMR (DMSO-d_6), δ: 3.22 and 3.52 (both s, 3 H each, MeN); 7.30—7.50 (m, 3 H, CH arom.); 7.90 (d, 2 H, CH arom., J = 7 Hz); 9.80 (s, 1 H, NH); 12.15 (br.s, 1 H, NH). ^{19}F NMR (DMSO-d_6), δ: 4.76 s.

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