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ALKYLATION AND ACYLATION OF 1-(4-PHENYLAMINOPHENYL)-DIHYDROPYRIMIDINE-2,4-(1H,3H)-DIONES

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The C- and N-substituted derivatives of 1-(4-phenylaminophenyl)dihydropyrimidine-2,4-(1H,3H)-diones have been obtained by alkylation and acylation. The secondary amino group takes part in the acylation reaction, before the amide group of the heterocycle.

Keywords: pyrimidinediones, alkylation, acylation.

The presence of a heterocyclic and two aromatic rings and also a secondary amino group in 1-(4-phenylaminophenyl)dihydropyrimidine-2,4-(1H,3H)-dione (**1**) makes it an interesting subject for electrophilic substitution reactions. It was shown by us in [1] that the course of the bromination reaction also depends on the methyl groups in positions 5 or 6 of the heterocycle.

In continuation of the study [2] of the alkylation of pyrimidinedione derivatives, we have carried out the alkylation and acylation of compounds **1** in the present work.

N(3)-Alkylation occurs on reacting compound **1** with dimethyl sulfate in the presence of an equivalent of NaOH or KOH at room temperature, and products **2** are formed in yields up to 90%. Alkylation with methyl iodide occurs with far more difficulty and with lower yields of reaction products.

The absorption band of the amide group at 3228 cm^{-1}, which is well evident in the spectra of compounds **1**, was absent from the IR spectra of compounds **2**. In the ^1H NMR spectra the protons of the methyl group at N(3) appeared as singlets at 3.10-3.28 ppm. The singlet of the proton of the unsubstituted amide group of the heterocycle of the initial compounds **1** was detected in the range 7.6-7.8 ppm.

Alkylation of the aromatic part of compounds **1** was carried out with alcohols using acids as solvent. Reaction with isopropyl alcohol and with cyclohexanol occurs readily in sulfuric and orthophosphoric acids and leads to the formation of the alkyl derivatives **3** and **4** in good yield. In the case of alkylation with tertiary butyl alcohol, reaction was continued for 40 h in orthophosphoric acid. In sulfuric acid resinification occurred and the yield did not exceed 30%. The best results of alkylation with *tert*-butyl alcohol were achieved on carrying out the reaction in trifluoroacetic acid. The *tert*-butyl derivatives **5** were isolated in 77-88% yield.

The dialkyl derivative **6a** was obtained by the alkylation of N(3)-methyldihydropyrimidinedione **2a** with *tert*-butyl alcohol in trifluoroacetic acid and by the action of dimethyl sulfate or methyl iodide in the presence of KOH on the 4-*tert*-butyl derivative **5a**.

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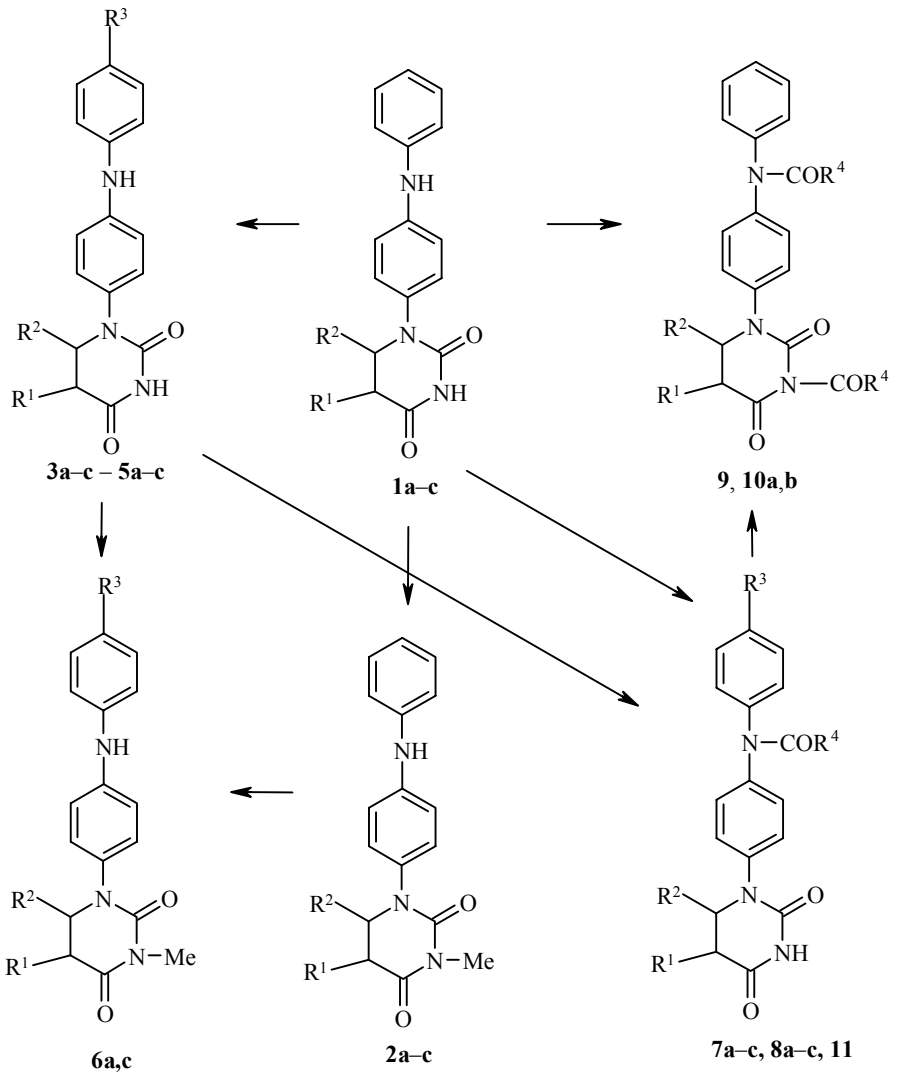

2a-8a, 9, 10a, **11** $R^1 = R^2 = H$; **3b-5b, 7b, 8b, 10b** $R^1 = Me$, $R^2 = H$; **2c-8c** $R^1 = H$, $R^2 = Me$;
3a-c $R^3 = Me_2CH$; **4a-c** $R^3 = C_6H_{11}$; **5a-c 6a**,**c**, **11** $R^3 = Me_3C$; **7a-c, 8a-c** $R^3 = H$;
7a-c, 10a,b, 11 $R^4 = Me$; **8a-c**, **9** $R^4 = Ph$

There were two overlapping quartets of phenylene protons in the ^1H NMR spectra of compounds **3** and **5** at 6.9-7.2 ppm and signals for the methyl or cyclohexyl fragments appeared at high field.

The secondary aromatic amino group proved to be the more reactive in the acylation of compounds **1**. Compounds **7** and **8** were formed on reaction of an equivalent amount of acetyl chloride on compound **1** in pyridine solution. On acylation with acetic anhydride substitution takes place at the N(3) of the heterocycle and diacyl derivatives **9** and **10a,b** are formed. The singlet of the secondary amino group at 8 ppm was absent from the ^1H NMR spectra of compounds **7** and **8**, but a singlet was observed at 10 ppm for the amide group. In the monoacetylated derivatives **7** there was a singlet for the protons of the acetyl group at 1.9 ppm. The presence of a benzoyl group in compounds **8** was confirmed by the integral curve corresponding to 14 protons at 6-7 ppm. The signal for the proton of the amide group of the heterocycle was absent from the ^1H NMR spectra of the diacyl derivatives **9** and **10**.

The N-acetyl derivative **11** was formed on boiling 1-[4-(*tert*-butylphenylamino)phenyl]-dihydropyrimidine-2,4-(1H,3H)-dione (**4a**) with an equivalent quantity of acetyl chloride in pyridine for 4 h.

EXPERIMENTAL

The IR spectra were taken on a UR 20 instrument (KBr disks). The ^{1}H NMR spectra were obtained on Bruker AW 80 (80 MHz), Tesla BS-487 (80 MHz), and Jeol FX 100 (100 MHz) instruments, internal standard was HMDS. A check on the progress of reactions and the purity of the compounds obtained was effected by TLC on Silufol UV 254 plates.

3-Methyl-1-(4-phenylaminophenyl)dihydropyrimidine-2,4-(1H,3H)-dione (2a). Dimethyl sulfate (23 ml, 24 mmol) was added to a boiling mixture of dihydrouracil **1a** (14.05 g, 50 mmol), 10% NaOH (100 ml), and 1,4-dioxane (200 ml). The reaction mixture was left for 28 h at room temperature, diluted with water (100 ml), and acidified with HCl to an acid reaction with Congo Red. Yield 8.2 g (55.6%); mp 203-204°C (2-propanol). ^{1}H NMR spectrum (CF_3COOH), δ, ppm, *J* (Hz): 2.75 (2H, t, *J* = 6, CH_2CO); 2.97 (3H, s, NCH_3); 3.60 (2H, t, *J* = 6, NCH_2); 6.93-7.50 (9H, m, ArH). Found, %: C 69.7; H 5.8; N 13.6. $C_{17}H_{17}N_3O_2$. Calculated, %: C 69.2; H 5.8; N 14.9.

3,5-Dimethyl-1-(4-phenylaminophenyl)dihydropyrimidine-2,4-(1H,3H)-dione (2b) was obtained from 5-methyldihydrouracil **1b** (14.76 g, 50 mmol), 10% NaOH (50 ml), 1,4-dioxane (150 ml), and dimethyl sulfate (15 ml, 210 mmol) in a similar manner to **2a**. Yield 10.5 g (75%); mp 155-156°C (ethanol). ^{1}H NMR spectrum ($CDCl_3$), δ, ppm: 1.07 (3H, d, 5-CH_3); 2.00-3.11 (2H, m, CH_2); 3.18 (3H, s, N-CH_3); 3.40-4.00 (1H, m, CH); 5.60-6.00 (1H, m, 1NH); 6.63-7.37 (9H, ArH). Found, %: C 69.9; H 6.7; N 13.9. $C_{18}H_{19}N_3O_2$. Calculated, %: C 70.3; H 6.3; N 13.6.

3,6-Dimethyl-1-(4-phenylaminophenyl)dihydropyrimidine-2,4-(1H,3H)-dione (2c) was obtained from 6-methyldihydrouracil **1c** (14.76 g, 50 mmol), 10% NaOH (50 ml), 1,4-dioxane (150 ml), and dimethyl sulfate (15 ml, 210 mmol) analogously to compound **2a**. Yield 10.5 g (75%); mp 155-156°C (ethanol). ^{1}H NMR spectrum ($CDCl_3$), δ, ppm: 1.07 (3H, d, 6-CH_3); 2.00-3.11 (2H, m, CH_2CO); 3.18 (3H, s, N-CH_3); 3.40-4.00 (1H, m, CH); 5.60-6.00 (1H, m, 1NH); 6.63-7.37 (9H, m, ArH). Found, %: C 69.9; H 6.2; N 13.6. $C_{18}H_{19}N_3O_2$. Calculated, %: C 70.3; H 6.3; N 13.6.

1-[4-(4-Isopropylphenylamino)phenyl]dihydropyrimidine-2,4-(1H,3H)-dione (3a). 2-Propanol (2 ml) was added with stirring to a solution of pyrimidinedione **1a** (7.0 g, 12.5 mmol) in 80% sulfuric acid (50 ml) at 80°C, and heating was continued for 24 h. The reaction mixture was poured into cold water (200 ml). The precipitated solid was filtered off. Yield 2.7 g (32.5%); mp 250-251°C (ethanol). ^{1}H NMR spectrum (CF_3COOH), δ, ppm, *J* (Hz): 0.5-1.0 (6H, m, 2CH_3); 2.68 (2H, t, *J* = 6, CH_2CO); 3.68 (2H, t, *J* = 6, CH_2N); 7.06 (4H, d, *J* = 8, ArH); 7.21 (4H, d, *J* = 4, ArH); 9.37 (1H, s, 1NH). Found, %: C 70.6; H 6.4; N 12.8. $C_{17}H_{21}N_3O_2$. Calculated, %: C 70.6; H 6.6; N 13.0.

1-[4-(4-Isopropylphenylamino)phenyl]-5-methyldihydropyrimidine-2,4-(1H,3H)-dione (3b). 2-Propanol (2.5 ml) was poured with stirring into a solution of 5-methyldihydrouracil **1b** (1.52 g, 5 mmol) in 80% sulfuric acid (80 ml), and the mixture was heated at 80°C for 30 h. The reaction mixture was cooled, poured into water (100 ml), and neutralized with ammonia. The solid was filtered off, and crystallized from a mixture of chloroform–hexane, 1:5. Yield 0.89 g (51%); mp 179-180°C (ethanol). ^{1}H NMR spectrum ($CDCl_3$+CF_3COOH), δ, ppm, *J* (Hz): 0.82 (3H, d, *J* = 6, CH_3); 1.10-1.40 (6H, m, 2CH_3); 2.82-3.20 (1H, m, CH); 3.80-4.00 (2H, m, CH_2); 7.21-7.60 (9H, m, ArH); 9.38 (1H, s, NH). Found, %: N 12.71. $C_{20}H_{23}N_3O_2$. Calculated, %: N 12.46.

1-[4-(4-Isopropylphenylamino)phenyl]-6-methyldihydropyrimidine-2,4-(1H,3H)-dione (3c). 2-Propanol (2 ml) was added to a solution of 6-methyldihydrouracil **1c** (1.52 g, 5 mmol) in 80% sulfuric acid (80 ml) with stirring and heating to 80°C. The product was isolated analogously to compound **1b**. Yield 1.38 g (81%); mp 160-161°C (ethanol). ^{1}H NMR spectrum ($CDCl_3$), δ, ppm, *J* (Hz): 0.96 (3H, d, *J* = 7, CH_3); 1.34-1.75 (6H, m, 2CH_3); 2.37-3.01 (3H, m, CH_2, CH); 5.82-6.10 (1H, m, 1NH); 6.75-7.50 (8H, m, ArH). Found, %: N 12.52. $C_{20}H_{23}N_3O_2$. Calculated, %: N 12.46.

1-[4-(4-Cyclohexylphenylamino)phenyl]dihydropyrimidine-2,4-(1H,3H)-dione (4a). Cyclohexanol (15 ml) was added to a solution of dihydrouracil **1a** (14.2 g, 50 mmol) in 80% orthophosphoric acid (100 ml) with stirring and heating to 80°C and the mixture heated for 50 h. The reaction mixture was poured into water (200 ml). Yield 3.6 g (19.8%); mp 148.5-149.5°C (ethanol). ^{1}H NMR spectrum ($CDCl_3$), δ, ppm, *J* (Hz): 1.20-1.94 (14H, m, cyclohexyl, CH_3); 2.75 (2H, t, *J* = 6, CH_2CO); 3.75 (2H, t, *J* = 6, NCH_2); 5.10-6.80 (1H, m, 1NH); 6.75-7.25 (8H, m, ArH); 8.0 (1H, br. s, 1NH). Found, %: C 73.01; H 7.1; N 11.8. $C_{22}H_{25}N_3O_2$. Calculated, %: C 72.8; H 6.9; N 11.6.

1-[4-(4-Cyclohexylphenylamino)phenyl]-5-methyldihydropyrimidine-2,4-(1H,3H)-dione (4b). Cyclohexanol (3 ml) was added to a solution of 5-methyldihydrouracil **1b** (1.42 g, 5 mmol) in 80% sulfuric acid (80 ml) with stirring and the mixture was heated for 30 h at 80°C. The product was isolated analogously to compound **4a**. Yield 0.8 g (42.44%); mp 114-115.6°C (ethanol). ^{1}H NMR spectrum ($CDCl_3$), δ, ppm: 1.1-2.1 (14H, m, cyclohexyl, CH_3); 2.80 (1H, s, CH); 3.10-3.90 (2H, m, CH_2); 6.80-7.30 (9H, ArH, 1NH); 9.70 (1H, s, 1NH). Found, %: N 11.35. $C_{23}H_{27}N_3O_2$. Calculated, %: N 11.14.

1-[4-(4-Cyclohexylphenylamino)phenyl]-6-methyldihydropyrimidine-2,4-(1H,3H)-dione (4c). Cyclohexanol (3 ml) was added with stirring to a solution of 6-methyldihydrouracil **1c** (1.42 g, 5 mmol) in 80% sulfuric acid (80 ml). The product was isolated analogously to compound **4a**. Yield 0.8 g (42.44%); mp 160-161°C (ethanol). ^{1}H NMR spectrum ($CDCl_3$), δ, ppm: 1.20-1.94 (14H, cyclohexyl, CH_3); 2.52-3.145 (2H, m, AB portion of ABX system, CH_2); 3.675-4.125 (1H, m, CH); 7.00-7.70 (8H, two overlapping quartets, ArH); 7.90 (1H, s, 1NH). Found, %: N 11.31. $C_{23}H_{27}N_3O_2$. Calculated, %: N 11.14.

1-[4-(4-*tert*-Butylphenylamino)phenyl]dihydropyrimidine-2,4-(1H,3H)-dione (5a). A solution of dihydrouracil **1a** (2.82 g, 10 mmol), *tert*-butyl alcohol (10 ml, 100 mmol), and trifluoroacetic acid (14 ml) was boiled for 3 h. The reaction mixture was poured into cold water (100 ml). Yield 2.9 g (87.7%); mp 190-191.5°C (ethanol). ^{1}H NMR spectrum (DMSO-d_6), δ, ppm, *J* (Hz): 1.22 (9H, s, $3CH_3$); 2.65 (2H, t, *J* = 6, CH_2CO); 3.70 (2H, t, *J* = 6, NCH_2); 6.88-7.15 (8H, m, ArH); 7.80 (1H, s, NH); 9.86 (1H, s, NHCO). Found, %: N 13.02. $C_{19}H_{22}N_3O_2$. Calculated, %: N 12.95.

1-[4-(4-*tert*-Butylphenylamino)phenyl]-5-methyldihydropyrimidine-2,4-(1H,3H)-dione (5b). A solution of 5-methyldihydrouracil **1b** (2.95 g, 10 mmol) in *tert*-butyl alcohol (10 ml, 100 mmol) and trifluoroacetic acid (14 ml) was boiled for 3 h. The product was isolated analogously to compound **5a**. Yield 2.71 g (78.88%); mp 213-214°C (ethanol). ^{1}H NMR spectrum (acetic acid-d_4), δ, ppm, *J* (Hz): 1.17 (3H, d, *J* = 6.4, CH_3); 1.29 (9H, s, $3CH_3$); 2.72-3.12 (1H, m, CH); 3.52-3.80 (2H, m, CH_2, AB portion of ABX system); 6.80-7.30 (8H, two overlapping quartets, ArH); 9.00 (1H, s, NH). Found, %: N 12.31. $C_{20}H_{24}N_3O_2$. Calculated, %: N 12.42.

1-[4-(4-*tert*-Butylphenylamino)phenyl]-6-methyldihydropyrimidine-2,4-(1H,3H)-dione (5c). A solution of 6-methyldihydrouracil **1c** (2.95 g, 10 mmol) in *tert*-butyl alcohol (10 ml, 100 mmol) and trifluoroacetic acid (14 ml) was boiled for 3 h. The product was isolated analogously to compound **5a**. Yield 2.64 g (78.1%); mp 226-227°C (ethanol). ^{1}H NMR spectrum (acetone-d_6), δ, ppm, *J* (Hz): 1.30 (3H, d, *J* = 6.4, CH_3); 2.50-3.30 (2H, m, CH_2); 3.90-4.20 (1H, br. s, NH); 7.00-7.50 (8H, m, ArH). Found, %: N 12.30. $C_{20}H_{24}N_3O_2$. Calculated, %: N 12.42.

1-[4-(4-*tert*-Butylphenylamino)phenyl]-3-methyldihydropyrimidine-2,4-(1H,3H)-dione (6a). Dimethyl sulfate (2.6 ml, 8 mmol) was added to a mixture of compound **5a** (1.6 g, 5.7 mmol), 10% NaOH (10 ml), and 1,4-dioxane (20 ml) at the boiling point. The mixture was boiled for 3 h and left for 28 h at room temperature. The liquid fraction was distilled off on a rotary evaporator. The oily mass was diluted with water (~1:3), and the crystals obtained were filtered off. Yield 1.1 g (55%); mp 68.5-70°C (chloroform–hexane, 1:3). ^{1}H NMR spectrum (acetone-d_6), δ, ppm, *J* (Hz): 1.26 (9H, s, $3CH_3$); 2.86 (2H, t, *J* = 8, $COCH_2$); 3.06 (3H, s, N-CH_3); 3.78 (2H, t, *J* = 8, N-CH_2); 4.75-5.50 (1H, br. s, 1NH); 6.80-7.50 (8H, m, ArH). Found, %: N 11.85. $C_{21}H_{25}N_3O_2$. Calculated, %: N 11.96.

1-[4-(4-*tert*-Butylphenylamino)phenyl]-3,6-dimethyldihydropyrimidine-2,4-(1H,3H)-dione (6c). Dimethyl sulfate (2.6 ml, 8 mmol) was added to a mixture of compound **5c** (1.69 g, 5 mmol), 10% NaOH (10 ml), and 1,4-dioxane (20 ml) at the boiling point. The mixture was boiled for 3 h, left for 28 h at room temperature, then diluted with water. The solution was acidified with HCl to an acid reaction to Congo Red. Yield 1.65 g (87.1%); mp 118-119°C (chloroform–hexane, 1:3). ^{1}H NMR spectrum (acetone-D_6), δ, ppm, *J*, (Hz): 1.13 (3H, d, J = 6.6, CH_3); 1.27 (9H, s, $3CH_3$); ν_a 2.54, ν_b 3.13, J_{AX} = -3.9, J_{BX} = 6.1, J = 16.5 or ν_a 3.76, ν_b 2.75 ppm, J_{AX} = 48.0, J_{BX} = 58.4, J = 16.5 (2H, AB portion of ABX system); 3.09 (3H, s, N-CH_3); 3.80-4.10 (1H, br. s, 1H); 6.90-7.50 (9H, m, ArH). Found, %: N 11.63. $C_{22}H_{27}N_3O_2$. Calculated, %: N 11.55.

3-[N-Acetyl-(4-phenylaminophenyl)]dihydropyrimidine-2,4-(1H,3H)-dione (7a). Acetyl chloride (1.96 g, 25 mmol) was added to a mixture of dihydrouracil **1a** (2.82 g, 10 mmol) in pyridine (25 ml) at the boiling point and the mixture was boiled for 6 h. The reaction mixture was left at room temperature for 12 h and then filtered. The filtrate was diluted with water (~1 : 3). The precipitated solid was filtered off, washed with water, and with 2-propanol. Yield 0.9 g (27.8%); mp 248-249°C (ethanol). ^{1}H NMR spectrum (CF_3COOH), δ, ppm: 1.94 (3H, s, $COCH_3$); 2.55-2.90 (2H, m, CH_2CO); 3.50-3.80 (2H, m, NCH_2); 6.90-7.50 (9H, m, ArH); 9.15 (1H, s, 1NH). Found, %: N 13.50. $C_{18}H_{17}N_3O_2$. Calculated, %: N 13.67.

1-[N-Acetyl-(4-phenylaminophenyl)]-5-methyldihydropyrimidine-2,4-(1H,3H)-dione (7b) was obtained from 5-methyldihydrouracil **1b** (5.9 g, 20 mmol), acetyl chloride (5.3 g, 75 mmol), and pyridine (25 ml) analogously to compound **7a**. Yield 5.8 g (84.7%); mp 178-179°C (2-propanol). ^{1}H NMR spectrum (DMSO-d_6), δ, ppm, *J* (Hz): 1.04 (3H, d, J = 8, 5-CH_3); 1.68 (3H, s, NCH_3); 2.57-3.00 (1H, m, CH); 3.50-3.75 (2H, m, NCH_2); 7.32 (9H, ArH); 10.40 (1H, s, 1NH). Found, %: N 10.65. $C_{24}H_{21}N_3O_2$. Calculated, %: N 10.95.

1-[N-Benzoyl-(4-phenylaminophenyl)]dihydropyrimidine-2,4-(1H,3H)-dione (8a) was obtained from dihydrouracil **1a** (14 g, 50 mmol) and benzoyl chloride (7.8 g, 70 mmol) in pyridine (25 ml) analogously to compound **7a**. Yield 11.2 g (58.4%); mp 256-257°C (methyl ethyl ketone). ^{1}H NMR spectrum (CF_3COOH), δ, ppm: 2.65 (2H, t, CH_2CO); 3.67 (2H, t, NCH_2); 6.87-8.00 (14H, m, ArH); 9.12 (1H, s, 1NH). Found, %: N 10.81. $C_{23}H_{19}N_3O_3$. Calculated, %: N 10.90.

1-[N-Benzoyl-(4-phenylaminophenyl)]-5-methyldihydropyrimidine-2,4-(1H,3H)-dione (8b) was obtained from 5-methyldihydrouracil **1b** (14 g, 50 mmol) and benzoyl chloride (7.8 g, 70 mmol) in pyridine (25 ml) analogously to compound **7a**. Yield 10.6 g (50.5%); mp 216-217°C (2-propanol). ^{1}H NMR spectrum (CF_3COOH), δ, ppm, *J* (Hz): 0.95 (3H, two d, J = 8, J = 3); 2.50-2.75 (1H, m, CH); 3.30-3.70 (2H, m, CH_2); 6.25-7.75 (14H, m, ArH). Found, %: N 10.61. $C_{24}H_{21}N_3O_3$. Calculated, %: N 10.52.

1-[N-Benzoyl-(4-phenylaminophenyl)]-6-methyldihydropyrimidine-2,4-(1H,3H)-dione (8c) was obtained from 6-methyldihydrouracil **1c** (7.4 g, 25 mmol) and benzoyl chloride (11.25 g, 100 mmol) analogously to compound **8a**. Yield 5.9 g (60%); mp 207-208°C (toluene). ^{1}H NMR spectrum (CF_3COOH), δ, ppm, *J* (Hz): 0.87 (3H, d, J = 3, CH_3); 2.37-2.88 (2H, AB portion of ABX system, J = 18, J = 8.6); 3.60-4.00 (1H, m, CH); 6.25-7.50 (14H, m, ArH); 9.12 (1H, s, 1NH). Found, %: N 10.35. $C_{24}H_{21}N_3O_3$. Calculated, %: N 10.52.

3-Benzoyl-[N-benzoyl-(4-phenylaminophenyl)]dihydropyrimidine-2,4-(1H,3H)-dione (9). A mixture of dihydrouracil **1a** (2.8 g, 10 mmol) and benzoyl chloride (11.54 ml, 100 mmol) in pyridine (25 ml) was boiled for 24 h. The reaction mixture was cooled, and poured into cold water (150 ml). The precipitated oily mass was separated and washed with water. The mass crystallized on standing. Yield 2.5 g (51.0%); mp 205-206.5°C (a 2-propanol–water mixture). ^{1}H NMR spectrum (DMSO-d_6), δ, ppm, *J* (Hz): 2.42 (2H, t, J = 6, $COCH_2$); 3.40 (2H, t, J = 6, NCH_2); 6.50-7.20 (19H, m, ArH). Found, %: C 73.61; N 8.71. $C_{30}H_{23}N_3O_4$. Calculated, %: C 73.50; N 8.58.

3-Acetyl-1-[N-acetyl-(4-phenylaminophenyl)]dihydropyrimidine-2,4-(1H,3H)-dione (10a). A mixture of dihydrouracil **1a** (5.06 g, 20 mmol), acetic anhydride (23 ml), and potassium acetate (5 g, 50 mmol) was heated at 60°C for 6 h. After heating the mixture was stored for 24 h, and poured into cold water (150 ml). Yield 3 g (41%); mp 117-118°C (a mixture of chloroform–hexane, 1:5). ^{1}H NMR spectrum (acetic acid-d_4),

δ, ppm, *J* (Hz): 2.087 (3H, s, $COCH_3$); 2.14 (3H, s, $COCH_3$); 2.85 (2H, t, *J* = 7, $COCH_2$); 3.87 (2H, t, *J* = 6.6, NCH_2); 7.40 (8H, m, ArH). Found, %: C 65.81; H 5.14; N 11.26. $C_{20}H_{19}N_3O_4$. Calculated, %: C 65.74; H 5.24; N 11.50.

3-Acetyl-1-[N-acetyl-(4-phenylaminophenyl)]-5-methyldihydropyrimidine-2,4-(1H,3H)-dione (10b) was obtained from 5-methyldihydrouracil **1b** (2.95 g, 10 mmol), potassium acetate (4 g, 40 mmol), and acetic anhydride (20 ml) analogously to compound **10a**. Yield 1.8 g (47.6%); mp 172-173.5°C (chloroform–hexane). ^{1}H NMR spectrum (acetic acid-d_4), δ, ppm: 1.32 (3H, d, *J* = 10 Hz); 2.00 (3H, s, CH_3); 2.09 (3H, s, CH_3); 2.72-3.01 (1H, m, CH); 6.8-7.4 (8H, m, ArH). Found, %: H 5.63; N 11.35. $C_{21}H_{21}N_3O_4$. Calculated, %: H 5.55; N 11.08.

1-[4-(N-Acetyl-4-*tert*-butylphenylamino)phenyl]dihydropyrimidine-2,4-(1H,3H)-dione (11). Acetyl chloride (1.96 g, 25 mmol) was added at the boiling point to a mixture of compound **5a** (1.67 g, 5 mmol) and pyridine (13 ml), and the mixture boiled for 4 h. The reaction mixture was left at room temperature for 12 h and filtered. The filtrate was diluted with water (~1:3), and the solid filtered off. Yield 0.8 g (47.47%); mp 110-111°C (ethanol–water). ^{1}H NMR spectrum (acetic acid-d_4), δ, ppm, *J* (Hz): 2.51 (2H, t, *J* = 9.7, $COCH_2$); 2.61 (3H, s, $COCH_3$); 3.52 (3H, s, NCH_3); 3.82 (2H, t, *J* = 7.5, NCH_2); 7.00-7.50 (9H, m, ArH). Found, %: C 67.76; N 12.53. $C_{19}H_{19}N_3O_3$. Calculated, %: C 67.64; N 12.46.

REFERENCES

1. K. Rutkauskas and Z.-I. Beresnevichyus, *Chemija*, **1**, 65 (1997).
2. K. Kantminiene, Z. Beresnevicius, G. Mikulskiene, J. Kilberg, and J. Braddefalk, *J. Chem. Res. (Synop.)*, **1**, 16 (1999).