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SYNTHESIS OF 2-OXO(THIO)-N,4-DIARYL-1,2,3,4-TETRAHYDROPYRIMIDINE-5-CARBOTHIOAMIDES

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Abstract. It was found that 2-acylthioacetamides enter Biginelli reaction with aromatic aldehydes and urea/thiourea forming 2-oxo(thio)-N,4-diaryl-1,2,3,4-tetrahydropyrimidine-5-carbothioamides. Under the influence of $K_3[Fe(CN)_6]$ in alkaline environment, the expected 2-oxo(thio)-N,4-diaryl-5-(benzothiazole-2'-yl)-1,2,3,4-tetrahydropyrimidines were not been received while 2-oxo(thio)-N,4-diaryl-1,2,3,4-tetrahydropyrimidine-5-carbamides were the products of interaction.

Keywords: Biginelli reaction, cyclization, regioselectivity, heterocycle, oxidation.

1. Introduction

2-Acylthioacetamides are well-known polyfunctional reagents which can be the starting compounds for the synthesis of various nitrogen- and sulfur-containing compounds [1, 2]. There are known one-pot reactions of 2-acylthioacetamides with methylene-containing nitriles and aldehydes [3, 4]: Meldrum's acid and aldehydes [3-5], the products of which are 1,4-dihydropyridine and 1,5-dihydro-4H-thiochromeno[2,3-*b*]-pyridine-5-ones, respectively. However, 2-acylthioacetamides multicomponent reactions have not been widely studied despite the fact that multicomponent reactions have recently gained tremendous importance in organic and medicinal chemistry.

Heterocyclization of 2-acylthioacetamides with aldehydes and ureas/thioureas (Biginelli reaction) has not been studied at all. Biginelli reaction is a general method for the synthesis of 3,4-dihydropyrimidine-2-ones, which derivatives exhibit a wide spectrum of biological effect including antiviral, anticancer, and antihypertensive properties [6-8].

The purpose of this research is to establish the possibility of introducing 2-acylthioacetamides in Biginelli reaction, investigate the regio direction of this

reaction as well as the possibility of the derived compounds functionalization.

2. Experimental

All chemicals were of analytical grade and commercially available. All reagents and solvents were used without further purification and drying.

The starting 2-acylthioacetamides were synthesized by the procedures described in [1].

1H and ^{13}C NMR spectra were recorded using a Varian VXR-300 spectrometer at 300 and 75.4 MHz, respectively. Chemical shifts are reported relative to TMS (1H , ^{13}C). IR spectra were recorded on a Bruker Vertex 70 FT-IR spectrometer.

6-Methyl-2-oxo(thio)-N,4-diaryl-1,2,3,4-tetrahydropyrimidine-5-carbothioamides (4a-j) (general method). A solution of 1 mmol of 2-thioacetamide (**1a-d**), 1 mmol of aldehyde (**2a-e**), 1 mmol of urea/thiourea (**3a-c**) and 0.2 mmol of boric acid in 2–3 ml of acetic acid were heated at 373–383 K for 4–8 h. Upon cooling a crystalline precipitate of tetrahydropyrimidine (**4a-j**) was isolated. If the precipitate did not drop the reaction mixture was poured into saturated sodium chloride aqueous solution. The precipitate was filtered, dried, and purified by crystallization from ethanol, nitromethane or benzonitrile.

6-Methyl-2-oxo-N-phenyl,4-naphthyl-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4a).

Yield: 0.216 g (58 %); white solid; mp 432–434 K. IR (KBr): 3350, 3220, 3100–2900, 1685, 1540, 1470 cm^{-1} .

1H NMR (300 MHz, DMSO- d_6): δ = 2.04 (s, 3H, 6-CH₃), 6.48 (s, 1H, H-4), 7.16 (m, 1H, Ar), 7.27 (m, 2H, Ar), 7.45 (m, 6H, Ar), 7.63 (m, 1H, Ar), 7.81–9.92 (m, 2H, Ar), 8.30 (m, 1H, Ar), 8.77 (s, 1H, NH-1), 11.07 (s, 1H, NHC=S). ^{13}C NMR (100 MHz, DMSO- d_6): δ = 16.8 (CH₃-6); 53.7 (C-4); 113.5, 123.5, 123.8, 125.1,

125.3, 125.4, 125.5, 127.7, 128.0, 128.2, 130.3, 132.7, 133.5 (Ar); 139.0 (C-6); 152.6 (C=O); 195.0 (NHC=S). Anal. Calcd. for C₂₂H₁₉N₃OS: C 70.75; H 5.31; N 11.25; S 8.59. Found: C 70.96; H 5.07; N 11.28; S 8.66.

6-Methyl-2-oxo-N-phenyl,4-(4'-ethoxyphenyl)-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4b).

Yield: 0.257 g (70 %); white solid; mp 458–461 K. IR (KBr): 3240, 3100–2900, 1650, 1510, 1430 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 1.32 (t, J = 6.6 Hz, 3H, CH₃CH₂O), 1.94 (s, 3H, 6-CH₃), 3.98 (q, J = 6.6 Hz, 2H, CH₃CH₂O), 5.65 (s, 1H, H-4), 6.83 (d, J = 8.4 Hz, 2H, *p*-C₆H₄), 7.20 (m, 3H, Ar), 7.31–7.42 (m, 3H, Ar+NH), 7.79 (d, J = 8.4 Hz, 2H, *p*-C₆H₄), 8.60 (s, 1H, NH-1), 11.06 (s, 1H, NHC=S). Anal. Calcd. for C₂₀H₂₁N₃O₂S: C 65.37; H 5.76; N 11.44; S 8.73. Found: C 65.47; H 6.04; N 11.26; S 8.95.

6-Methyl-2-thio-N-phenyl,4-(4'-ethoxyphenyl)-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4c).

Yield: 0.280 g (73 %); white solid; mp 495–497 K. IR (KBr): 3300–3180, 3100–2900, 1670, 1570, 1500, 1470 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 1.32 (t, J = 6.8 Hz, 3H, CH₃CH₂O), 1.96 (s, 3H, 6-CH₃), 3.99 (q, J = 6.8 Hz, 2H, CH₃CH₂O), 5.63 (s, 1H, H-4), 6.85 (d, 2H, J = 8.4 Hz, *p*-C₆H₄), 7.18 (m, 3H, Ar), 7.33 (m, 2H, Ar), 7.60 (d, 2H, J = 8.4 Hz, *p*-C₆H₄), 9.22 (s, 1H, NH-3), 9.89 (s, 1H, NH-1), 11.21 (s, 1H, NHC=S). Anal. Calcd. for C₂₀H₂₁N₃OS₂: C 62.63; H 5.52; N 10.96; S 16.72. Found: 62.83; H 5.25; N 11.04; S 17.00.

1,6-Dimethyl-2-thio-N-phenyl,4-(4'-ethoxyphenyl)-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4d).

Yield: 0.199 g (50 %); white solid; mp 498–501 K. IR (KBr): 3180, 3100–2900, 1660, 1530 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 1.33 (t, J = 6.6 Hz, 3H, CH₃CH₂O), 2.12 (s, 3H, 6-CH₃), 3.46 (s, 3H, NCH₃), 3.97 (q, J = 6.6 Hz, 2H, CH₃CH₂O), 5.56 (s, 1H, H-4), 6.85 (d, J = 7.8 Hz, 2H, *p*-C₆H₄), 7.17 (m, 2H, Ar), 7.23 (m, 1H, Ar), 7.34 (m, 2H, Ar), 7.68 (d, J = 7.8 Hz, 2H, *p*-C₆H₄), 9.34 (s, 1H, NH-3), 11.43 (s, 1H, NHC=S). Anal. Calcd. for C₂₁H₂₃N₃OS₂: C 63.44; H 5.83; N 10.57; S 16.13. Found: C 63.70; H 6.06; N 10.72 S 15.97.

1,6-Dimethyl-2-thio-N-phenyl,4-(4'-tolyl)-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4e).

Yield: 0.176 g (48 %); white solid; mp 468–470 K. IR (KBr): 3180, 3100–2900, 1660, 1600, 1530 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 2.11 (s, 3H, 6-CH₃), 2.28 (s, 3H, *p*-CH₃C₆H₄), 3.46 (s, 3H, NCH₃), 5.59 (d, J = 3.0 Hz, 1H, H-4); 7.10 (m, 4H, Ar), 7.25 (m, 1H, Ar), 7.37 (m, 2H, Ar), 7.69 (d, J = 7.8 Hz, 2H, *p*-C₆H₄), 9.38 (d, J = 3.0 Hz, 1H, NH-3), 11.41 (s, 1H, NHC=S). Anal. Calcd. for C₂₀H₂₁N₃S₂: C 65.36; H 5.76; N 11.43; S 17.45. Found: 65.49; H 6.02; N 11.14 S 17.58.

6-Methyl-2-oxo-N-phenyl,4-(4'-[Trifluoromethyl]phenyl)-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4f).

Yield: 0.196 g (50 %); white solid; mp 443–445 K. IR (KBr): 3200, 3100, 3000–2900, 1665, 1500, 1440 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 1.96 (s, 3H, 6-CH₃), 5.78 (s, 1H, H-4); 6.50 (s, 1H, H-3); 7.19 (m, 1H, Ar), 7.33 (m, 3H, Ar), 7.50–7.69 (m, 5H, Ar), 8.79 (s, 1H, NH-1), 11.13 (s, 1H, NHC=S). Anal. Calcd. for C₁₉H₁₆F₃N₃OS: C 58.30; H 4.12; N 10.74; S 8.19. Found: C 58.54; H 4.37; N 11.01 S 7.93.

6-Methyl-2-thio-N-(4'-tolyl),4-naphthyl-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4g).

Yield: 0.262 g (65 %); white solid; mp 518–521 K. IR (KBr): 3390, 3100–2900, 1665, 1545, 1470 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 2.03 (s, 3H, 6-CH₃), 2.25 (s, 3H, *p*-CH₃C₆H₄), 6.43 (s, 1H, H-4); 7.07 (d, J = 8.0 Hz, 2H, *p*-C₆H₄), 7.31 (m, 2H, Ar), 7.53 (m, 4H, Ar), 7.87 (m, 2H, Ar), 8.32 (m, 1H, Ar), 9.32 (s, 1H, NH-3), 11.13 (s, 1H, NHC=S). ¹³C NMR (100 MHz, DMSO-d₆): δ = 16.2 (CH₃-6); 20.7 (*p*-CH₃C₆H₄); 53.9 (C-4); 115.0, 123.5, 123.9, 125.5, 126.0, 128.3, 128.6, 129.4, 130.0, 133.3, 135.4, 136.3 (Ar); 138.3 (C-6); 173.5 (NHCSNH); 194.0 (NHC=S). Anal. Calcd. for C₂₃H₂₁N₃S₂: C 68.45; H 5.24; N 10.41; S 15.89. Found: C 68.66; H 5.49; N 10.27; S 16.13.

6-Methyl-2-oxo-N-(4'-tolyl),4-phenyl-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4h).

Yield: 0.262 g (61 %); white solid; mp 291–293 K. IR (KBr): 3400, 3200, 3100–2900, 1665, 1510, 1440 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 1.93 (s, 3H, 6-CH₃), 2.28 (s, 3H, *p*-CH₃C₆H₄), 5.72 (s, 1H, H-4); 6.50 (s, 1H, NH-3), 7.10 (d, J = 6.8 Hz, 2H, *p*-C₆H₄), 7.23 (m, 1H, Ar), 7.31 (m, 4H, Ar), 7.45 (m, 2H, Ar), 8.62 (s, 1H, NH-1), 11.00 (s, 1H, NHC=S). Anal. Calcd. for C₁₉H₁₉N₃OS: C 67.63; H 5.68; N 12.45; S 9.50. Found: C 67.52; H 5.44; N 12.26; S 9.71.

6-Methyl-2-oxo-N-([3'-trifluoromethyl]phenyl),4-phenyl-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4i).

Yield: 0.215 g (55 %); white solid; mp 520–522 K. IR (KBr): 3400, 3100–2950, 1670, 1520, 1450 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 1.95 (s, 3H, 6-CH₃), 5.72 (s, 1H, H-4); 7.32 (m, 5H, Ar), 7.53 (m, 3H, Ar), 7.91 (m, 1H, Ar), 8.13 (s, 1H, NH-3), 8.75 (s, 1H, NH-1), 11.29 (s, 1H, NHC=S). Anal. Calcd. for C₁₉H₁₆F₃N₃OS: C 58.30; H 4.12; N 10.74; S 8.19. Found: C 58.44; H 3.89; N 10.95; S 7.93.

6-Methyl-2-oxo-N-(3'-chlorophenyl),4-phenyl-1,2,3,4-tetrahydropyrimidine-5-carbothioamide (4j).

Yield: 0.207 g (58 %); white solid; mp 462–464 K. IR (KBr): 3400, 3200–2950, 1680, 1590, 1490, 1430 cm⁻¹. ¹H NMR (300 MHz, DMSO-d₆): δ = 1.93 (s, 3H, 6-CH₃), 5.71 (s, 1H, H-4); 7.23 (m, 2H, Ar), 7.26–7.38 (m, 2H, Ar), 7.51 (m, 2H, Ar), 7.82 (s, 1H, NH-3), 8.68 (s, 1H, NH-1), 11.14 (s, 1H, NHC=S). Anal. Calcd. for C₁₈H₁₆ClN₃OS: C 60.41; H 4.51; N 11.74; S 8.96. Found: C 60.66; H 4.77; N 12.01; S 9.13.

6-Methyl-2-oxo(thio)-*N*,4-diaryl-1,2,3,4-tetrahydropyrimidine-5-carbamides (6a-c) (general method). A suspension of 1 mmol of tetrahydropyrimidine (4a-c) in a solution of 0.140 g (2.5 mmol) of KOH in 1 ml of water was added dropwise to a solution of 0.658 g (2 mmol) of $K_3[Fe(CN)_6]$ in 4 ml of water. After stirring at 293 K for 6 h (6a-c) precipitate was filtered. The products of reaction were purified by crystallization with ethanol, nitromethane, or benzonitrile.

6-Methyl-2-oxo-*N*-phenyl,4-naphthyl-1,2,3,4-tetrahydropyrimidine-5-carbamide (6a).

Yield: 0.271 g (76 %); white solid; mp 460–462 K. IR (KBr): 3400, 3230, 3100–2920, 1630, 1596, 1520 cm^{-1} . 1H NMR (300 MHz, DMSO- d_6): δ = 2.11 (s, 3H, 6-CH₃), 6.22 (s, 1H, H-4); 6.93 (m, 1H, Ar), 7.15 (m, 2H, Ar), 7.49 (m, 7H, Ar+NH), 7.88 (m, 2H, Ar), 8.28 (m, 1H, Ar), 8.77 (s, 1H, NH-1), 8.68 (s, 1H, NH-1), 9.57 (s, 1H, NHC=O). Anal. Calcd. for C₂₂H₁₉N₃O₂: C 73.93; H 5.36; N 11.76. Found: C 74.15; H 5.58; N 12.03.

6-Methyl-2-oxo-*N*-phenyl,4-(4'-ethoxyphenyl)-1,2,3,4-tetrahydropyrimidine-5-carbamide (6b).

Yield: 0.256 g (73 %); white solid; mp 488–490 K. IR (KBr): 3250, 3100, 3000, 2920, 1670, 1600, 1510, 1440 cm^{-1} . 1H NMR (300 MHz, DMSO- d_6): δ = 1.30 (t, J = 6.6 Hz, 3H, CH₃CH₂O), 2.04 (s, 3H, 6-CH₃), 3.96 (q, J = 6.4 Hz, 2H, CH₃CH₂O), 5.33 (s, 1H, H-4), 6.82 (d, J = 8.2 Hz, 2H, *p*-C₆H₄), 6.95 (m, 2H, Ar), 7.20 (m, 3H, Ar), 7.38–7.53 (m, 3H, Ar+NH), 8.62 (s, 1H, NH-1), 9.47 (s, 1H, NHC=O). Anal. Calcd. for C₂₀H₂₁N₃O₃: C 68.36; H 6.02; N 11.96. Found: C 68.52; H 6.05; N 12.15.

6-Methyl-2-thio-*N*-phenyl,4-(4'-ethoxyphenyl)-1,2,3,4-tetrahydropyrimidine-5-carbamide (6c).

Yield: 0.260 g (71 %); white solid; mp 478–483 K. IR (KBr): 3350, 3180, 3100–2960, 1680, 1630, 1600, 1562, 1510, 1480 cm^{-1} . 1H NMR (300 MHz, DMSO- d_6): δ = 1.31 (t, J = 6.6 Hz, 3H, CH₃CH₂O), 2.06 (s, 3H, 6-CH₃), 3.97 (q, J = 6.6 Hz, 2H, CH₃CH₂O), 5.33 (s, 1H, H-4), 6.86 (d, 2H, J = 8.4 Hz, *p*-C₆H₄), 7.00 (m, 1H, Ar), 7.18 (m, 1H, Ar), 7.53 (d, 2H, J = 8.4 Hz, *p*-C₆H₄), 9.32 (s, 1H, NH-3), 9.65 (s, 1H, NHC=S); 9.88 (s, 1H, NH-1). Anal. Calcd. for C₂₀H₂₁N₃O₂S: C 65.37; H 5.76; N 11.44. Found: C 65.27; H 6.04; N 11.65; S 17.00.

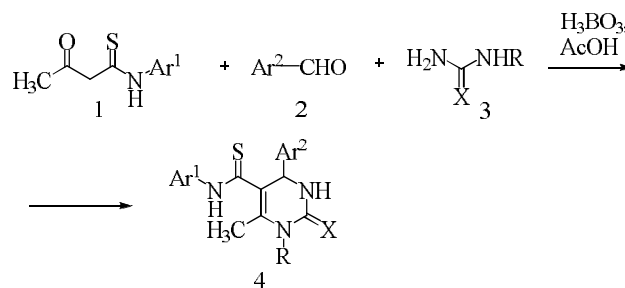
3. Results and Discussion

We have found that 2-acylthioacetamides (1a-d) react with aldehydes (2a-e) and urea/thiourea (3a-c) in the presence of a catalyst – boric acid. The synthesis has been carried out in acetic acid within the temperature range of 373–383 K. In case of catalyst absence the reaction did not proceed.

The reaction proceeds selectively leading to formation of 6-methyl-2-oxo(thio)-*N*,4-diaryl-1,2,3,4-

tetrahydropyrimidine-5-carbothioamides (4a-j) (the yield is 48–70 %). Electron-donor substitutes of *N*-aryl and 4-aryl rings in reagents (4a-j) promote slightly better yields of desired products (70–73 %) in comparison with electron-acceptor substitutes (50–55 % yields). Interaction with asymmetric *N*-methylthiourea (3c) is carried out regioselectively with formation of 1,6-dimethyl-2-thio-*N*,4-diaryl-1,2,3,4-tetrahydropyrimidine-5-carbothioamides (4d-e) with 48–50 % yields.

2-Acylthioacetamides in this cyclocondensation act as 1,2-center (bifunctional) reagents. It should be mentioned that formally heterocyclization is realized as an attack of urea/thiourea (3a-c) aminogroup on carbonyl instead of thiocarbonyl group of 2-acylthioacetamides (1a-d). Taking into account that the ability of polarization and size of carbonyl group are smaller than of the thiocarbonyl one and the aminogroup is a strong basis, the reaction of regioselectivity is consistent with HSAB theory (hard and soft acids and bases) (see Scheme 1).



R = H (3a,b; 4a-c,f,j; 6a-c), CH₃ (3c; 4d,e)

X = O (3a; 4a,b,f,h-j; 6a,b), S (3b,c; 4c-e,g,g; 6c)

Ar¹ = Ph (1a; 4a-f; 6a-c), 4-CH₃C₆H₄ (1b; 4g,h), 3-CF₃C₆H₄ (1c; 4i), 3-ClC₆H₄ (1d)

Ar² = Ph (2a; 4h-j), 1-naphthyl (2b; 4a,g; 6a), 4-C₂H₅OC₆H₄ (2c; 4b-d; 6b,c), 4-CH₃C₆H₄ (2d; 4e), 4-CF₃C₆H₄ (2e; 4f)

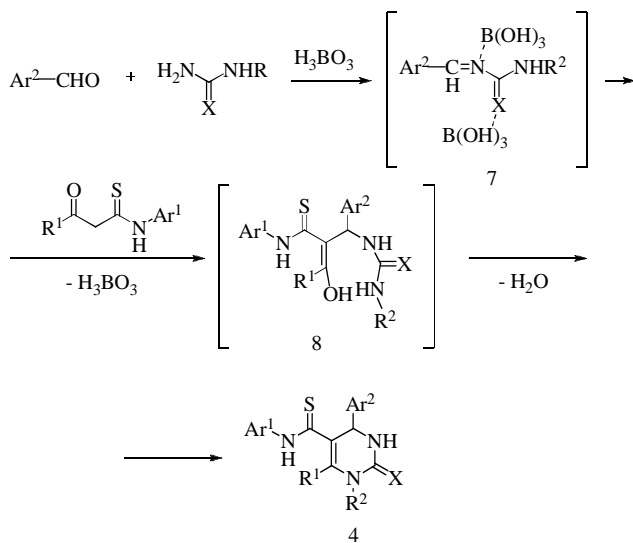
Scheme 1

Probably, the reaction intermediate is azomethine, which is derived from an aldehyde and urea/thiourea [9–11]. It is considered that boric acid with intermediate azomethine and carbonyl compound form reactive adducts (7), with an increased electrophilicity of C-atom groups C=N and C=O, respectively [12].

We can assume that interaction of intermediate compounds (7) with 2-acylthioacetamide (1) leads to the intermediate (8), in which intramolecular cycle closure takes place, which is associated with cleavage of water and formation of tetrahydropyrimidine-2-ones(thiones) (4) (see Scheme 2).

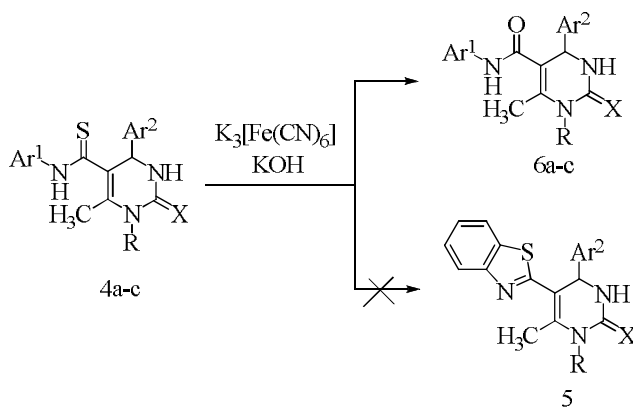
It was previously reported that *N*-arylthioamide can oxidize in 1,2,4-thiadiazoles [13–16] and benzothiazoles [17–19]. We also know that thioamides in the process of oxidation can be desulfurized and converted to amides

[17-19]. The direction of the reaction possibly depends on the substrate structure.



Scheme 2

For the oxidation of *N*-arylthioamide group of compounds (**4a-c**) with the aim to synthesize 2-oxo(thio)-5-(benzothiazole-2'-yl)-1,2,3,4-tetrahydropyrimidines (**5a-c**), we used the system $K_3[Fe(CN)_6]/KOH$ that is usually used for similar purposes (Jacobson's reaction) (see Scheme 3).



Scheme 3

It was established that attempt of oxidation of (**4a-c**) tetrahydropyrimidines does not lead to the cycle closure of benzothiazole fragment. The process proceeds resulting in amide group due to desulfurization.

The reaction products are 2-oxo(thio)-*N*,4-diaryl-1,2,3,4-tetrahydropyrimidine-5-carbamides (**6a-c**) (yield 71–76 %) instead of expected 5-(benzothiazole-2'-yl)-1,2,3,4-tetrahydropyrimidines (**5a-c**).

The structure of the synthesized compounds was confirmed by 1H , ^{13}C NMR and IR-spectroscopy, and composition according to elemental analysis (see Experimental above).

The signals of all proton-containing fragments are present in 1H NMR spectra of compounds (**4a-j**), (**6a-c**). Singlets of protons of the methyl group of 6-Me (1.90–2.12 ppm), proton 4-H (5.33–6.49 ppm), 1-NH (8.61–8.76 ppm for 2-oxo-tetrahydropyrimidines (**4a,b,f,h-k**) and 9.38–10.03 ppm and for 2-thio-tetrahydropyrimidines (**4c-e,g**), 3-NH (6.51–7.50 and 9.22–9.39 ppm for compounds (**4a,b,f,h-k**) and (**4c-e,g**), respectively), NHC=S (11.00–11.43 ppm), CONH (9.47–9.65 ppm). Signals of vicinal protons NH^3-CH^4 are observed as extended singlets or doublets with a small spin-spin coupling constants ($J \leq 3.0$ Hz).

In the ^{13}C NMR spectra of compounds (**4a,g**), the signals of carbonyl and thiocarbonyl groups are the most informative ones: $NH-C=S$ (194–195.0 ppm), $NHCSNH$ (173.5 ppm), $NHCONH$ (152.6 ppm) and carbon 4-C (53.7–53.9 ppm).

In the IR-spectra of compounds (**4a-j**), (**6a-c**), NH groups of absorption bands occur in aromatic fragments of CH and C=O groups (3400–3180, 3100–2900 and 1685–1650 cm^{-1} , respectively).

4. Conclusions

It was shown for the first time that 2-acylthioacetamides may be introduced into Biginelli reaction. It has been established that the interaction between reagents proceeds with involvement of hard reaction centres, *i.e.* the reaction is consistent with the HSAB theory. Previously unknown 2-oxo(thio)-*N*,4-diaryl-1,2,3,4-tetrahydropyrimidine-5-carbothioamides have been synthesized and characterized. It has been shown that an attempt of oxidizing them by $K_3[Fe(CN)_6]/KOH$ system leads to the desulfurization and formation of 2-oxo(thio)-*N*,4-diaryl-1,2,3,4-tetrahydropyrimidine-5-carbamides.

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СИНТЕЗ 2-ОКСО(ТІО)-N,4-ДІАРИЛ-1,2,3,4- ТЕТРАГІДРОПІРИМІДИН-5- КАРБОКСИТІОАМІДІВ

Анотація. Знайдено, що 2-ацетілоацетаміди вступають в реакцію Біджинеллі з ароматичними альдегідами і сечовинами/тіосечовинами з утворенням 2-оксо(тіо)-N,4-діарил-1,2,3,4-тетрагідропіримідин-5-карбокситіоамідів. Встановлено, що при дії на них калію гексаціаноферату (III) в лужному середовищі результатом реакції є дітіонування з утворенням 2-оксо(тіо)-N,4-діарил-1,2,3,4-тетрагідропіримідин-5-карбоксамідів. Утворення очікуваних 2-оксо(тіо)-N,4-діарил-5-(бензотіазол-2'-іл)-1,2,3,4-тетрагідропіримідинів не відбувається.

Ключові слова: реакція Біджинеллі, циклізація, регіо-селективність, гетероцикл, окиснення.