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This communication reports on the investigation of a new recyclization conversion of a pyrimidine ring, which can be referred to as C-C recyclization. In this reaction the nucleophile cleaves the pyrimidine ring at the N(3)-C(4) bond, and following rotation around the single C(5)-C(6) bond the new cyclization takes place. This type of recyclization has general applicability, and takes place upon alkali treatment of substituted 4-methyl-5-ethoxycarbonyl- and 4-amino-5-ethoxycarbonyl-pyrimidines (**1**) which are transformed respectively to 4-hydroxy-5-acetyl- and 4-hydroxy-5-carbamoylpyrimidines (**2**). The obtained pyrimidyl-ketones can be readily converted to their hydrazones **7**-**12**.

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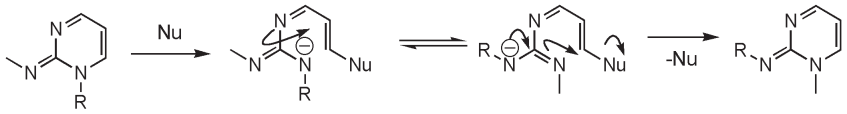
Reactions accompanied by opening of a heterocyclic ring and subsequent ring closure comprise a significant reaction in the chemistry of pyrimidines. Such transformations which may be viewed as "recyclizations", generally proceed under the action of nucleophilic agents and can be accompanied either by introduction of a nucleophilic fragment into the newly formed cycle, or simply may aid in the ring opening/ring closure process. In the latter case, formation of a new reaction product is the result of the isomerization/recyclization. Among isomerization/recyclization reactions of pyrimidines, the most studied are the Dimroth rearrangements [1], proceeding at the expense of a nitrogen exocyclic atom introduction (being in the α-position of pyrimidine) into a newly formed pyrimidine ring (Scheme A). Actually, in this rearrangement substitution of a ring nitrogen atom by an exocyclic nitrogen atom takes place.



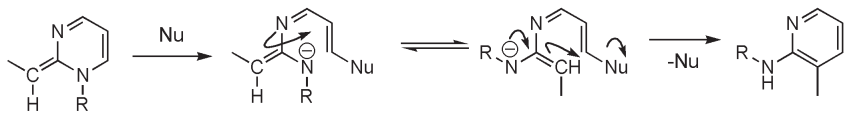
Scheme A. (N-N recyclizations)

Transformations of pyrimidine derivatives into pyridine derivatives [2], generally referred to as the Kost-Sagitullin rearrangement [3-6], are mechanistically close to the Dimroth rearrangement, and have been studied in some detail recently [7-13]. The principle distinction of these transformations from the Dimroth rearrangement is the substitution of the endocyclic nitrogen atom of a pyrimidine ring in the α-position by an exocyclic carbon atom (such reactions can be figuratively called N-C recyclizations) (Scheme B).

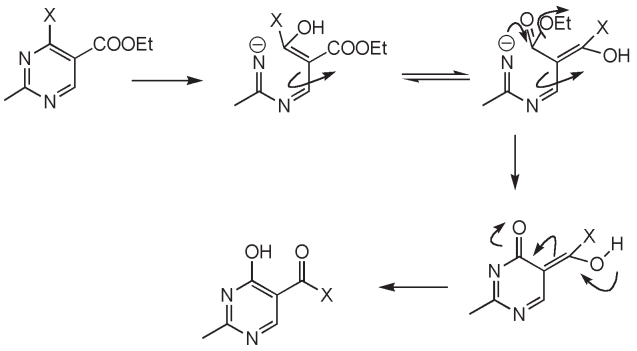
This communication is devoted to an investigation of an additional recyclization conversion of a pyrimidine ring, which is based on an atom substitution proceeding in the heterocycle, and which can be referred to as C-C recyclization (Scheme C).

Vardanyan *et al*. made the first observation of this type of rearrangement in 1982 [14].

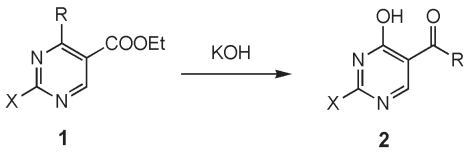
Here we show that that this type of recyclization has general applicability, and takes place upon alkali treatment of substituted 4-methyl-5-ethoxycarbonyl- and 4-amino-5-ethoxycarbonyl-pyrimidines (**1**) which are transformed respectively to 4-hydroxy-5-acetyl- and 4-hydroxy-5-carbamoylpyrimidines (**2**) as shown on the next page.



Scheme B. N-C recyclizations



Scheme C. (C-C recyclizations)

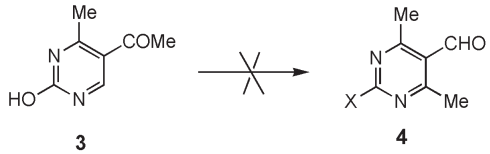


1 **2**

a) R = CH_3 , X = OH; **b**) R = CH_3 , X = SH; **c**) R = CH_3 , X = NH_2
d) R = NH_2 , X = OH; **e**) R = NH_2 , X = SH; **f**) R = NH_2 , X = Bn.

In this reaction the nucleophile cleaves the pyrimidine ring at the N(3)-C(4) bond, and following rotation around the single C(5)-C(6) bond, the new cyclization takes place. As a result, the carbon atom of the ester group is included in the newly formed pyrimidine ring, whereas the pyrimidine carbon atom C-4 appears outside the heterocycle ring, and leads to obtaining a thermodynamically more advantageous structure, the 5-carbamoylpyrimidine derivative.

With the aim of clarifying the possibility of the nucleophilic attack at position 6 of a pyrimidine ring and obtaining the corresponding 5-formyl derivative (**4**), we have synthesized one more model - 2-hydroxy-4-methyl-5-acetylpyrimidine (**3**). However, we failed to obtain the transformation product which would result from attack on atom C-6, namely, the 2-hydroxy-4,6-dimethyl-5-formylpyrimidine; only the initial pyrimidine was isolated.

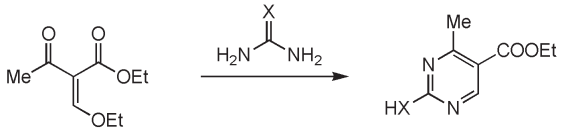


3 **4**

Thus, isomerization of 5-ethoxycarbonyl-pyrimidines respectively to 4-hydroxy-5-acetyl- and 4-hydroxy-5-carbamoylpyrimidines, and particularly of keto-pyrimidines has enough general character and could be considered as a convenient method for the synthesis of new starting materials for medicinal chemistry.

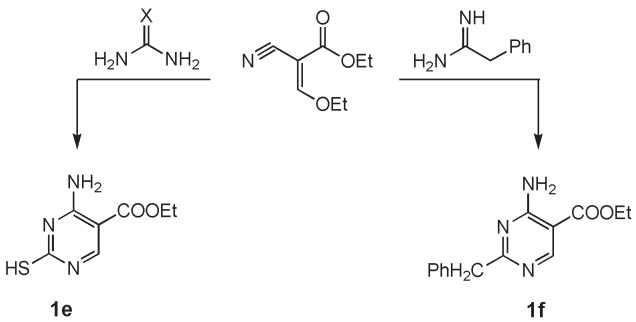
Of principle importance is that as distinct from the above-mentioned isomerizational recyclizations of pyrimidines - this reaction (Scheme C) does not require additional activation by quaternization of a pyrimidine nitrogen atom. Probably, the latter is connected with the availability in position 5 of the ring of an electron-acceptor ethoxycarbonyl group that increases the electron deficiency of a pyrimidine nucleus, and hence provides the opportunity for a nucleophilic attack and cleavage of the cyclic compound.

Synthesis of the 2-substituted-4-amino-5-ethoxycarbonyl-pyrimidines (**1a-c**) was carried out by heterocyclization of ethoxymethyleneacetoacetic acid ethyl ester with urea, thiourea or guanidine [14,15].



1 a-c

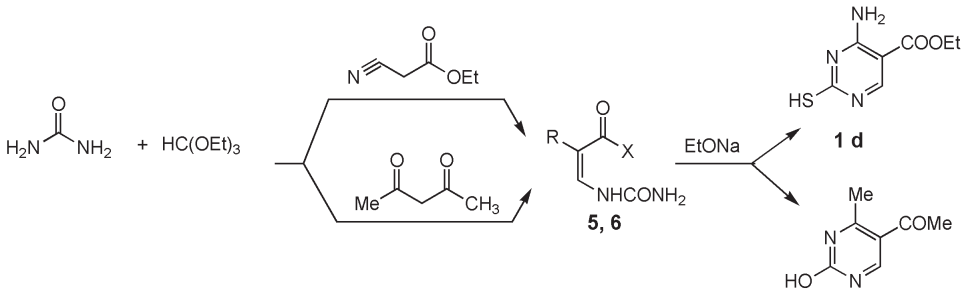
Synthesis of 2-substituted-4-amino-5-ethoxycarbonyl-pyrimidines (**1e**) and (**1f**) was carried out by the reaction of a thiourea or phenylacetic amidine with the ethyl ester of ethoxymethylenecyanoacetate.



1e **1f**

The corresponding 2-hydroxyderivatives **1d** and **3** were synthesized by heterocyclization of cyanoacetic ester and acetylacetone ureidomethylene derivatives **5** and **6** in ethanol in the presence of sodium ethoxide. The

latter are obtained by the interaction of urea and ethyl orthoformate, and correspondingly with cyanoacetic ester and acetylacetone.



5. R = CN, X = OEt. **6**. R =MeCO, X = M

Taking into account the interesting biological behavior of hydrazones and their metal complexes as antitumor [17-19], antiviral [20] and antibacterial and antifungal compounds [21,22], keto-pyrimidines - 5-acetyluracil (**2a**) and 2-hydroxy-4-methyl-5-acetylpyrimidine (**3**) were transformed to their hydrazones **(7-12)** by reactions with substituted hydrazines and isonicotinic hydrazide.

The hydrazones have been submitted for biological testings.

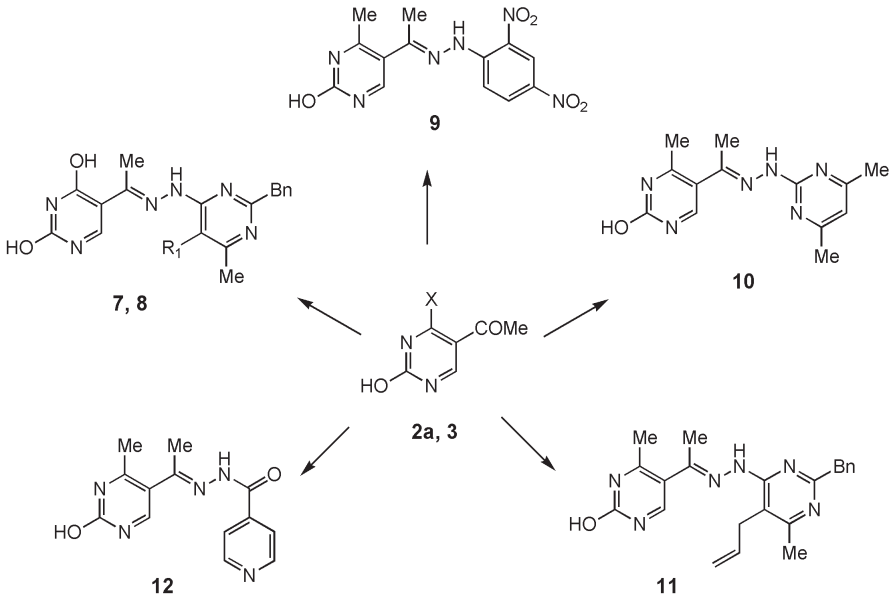
EXPERIMENTAL

NMR spectra were obtained on a Varian «Mercury 300» with a resonance frequency of 300.077 MHz for the hydrogen nucleus and 75.46 MHz for the ^{13}C nucleus. DMSO-d_6 was used as solvent. The sample temperature was 303 K. Mass-spectra were registered on a MK-1321 spectrometer with direct sample introduction into the ion source and an ionization energy of 70 eV. TLC was performed on Silufol UV-254 platelets, developed by iodine vapors and Erlich reagent.

2-Substituted-4-Methyl-5-ethoxycarbonyl-pyrimidines (**1a-c**), were prepared according to methods described in the literature [14,15].

2-Mercapto-4-methyl-5-ethoxycarbonyl-pyrimidine (**1b**).

A mixture of 7.6 g (0.1 mol) of thiourea and sodium alcoholate (prepared from 3.45 g of sodium and 130 mL of absolute ethyl alcohol) was heated until complete dissolution of thiourea, and 18.6 g (0.1 mol) of ethyl ethoxymethyleneacetoacetic ester was added dropwise. The solution was heated for 8 h, alcohol was evaporated *in vacuo*, the residue was dissolved in a minimal quantity of water and acidified with acetic acid (pH ≈ 6). The precipitate formed was collected by filtration, washed with water, alcohol and acetone. Obtained was 17 g (86%) of 2-mercapto-4-



X = OH, Me. R = Aryl, Het, COHet. R^I = H, Allyl.

methyl-5-ethoxycarbonyl-pyrimidine (**1b**), mp 188-189°, R_f 0.75 (acetone-toluene, 3:1). Corresponded to the authentic sample obtained by the mentioned route [14]. ^{1}H nmr: δ ppm (*J*, Hz): 1.37 (3H, t, 7,1, CH_3), 2.57 (3H, s, 4-CH_3), 4.27 (2H, q, 7.1, CH_2O), 3.1-3.3 (1H, br s, SH), 8.54 (1H, s, 6-H).

Anal. Calcd. for $C_8H_{10}N_2O_2S$: C 48.47; H 5.08; N 14.13; S 16,18. Found: C 48.29; H 4.76; N 13.89; S 16,07.

2-Hydroxy-4-amino-5-ethoxycarbonyl-pyrimidine (**1d**).

To a solution of sodium ethoxide prepared from 3.7 g (0.16 mol) of sodium and 200 mL of absolute ethanol, 27.5 g (0.15 mol) of ethyl-ureidomethylenecyanacetate (**5**) was added and the mixture was boiled for 2 h. The formed precipitate was collected by filtration, dissolved in 800 mL of water and acidified with acetic acid (12 mL). The precipitated crystals were collected by filtration, washed with acetone, and dried. There was obtained 23 g (84%) of 2-hydroxy-4-amino-5-ethoxycarbonyl-pyrimidine (**1d**), mp 274-276–, lit. 278-282– [15]. ^{1}H nmr: δ ppm (*J*, Hz): 1.30 (3H, t, CH_3), 4.23 (2H, q, CH_2O), 7.6 (1H, br s, NH), 7.74 (1H, br s, NH), 8.18 (1H, s, 6-H), 11.23 (1H, br s, OH).

Anal. Calcd. for $C_7H_9N_3O_3$: C 45.90; H 4.95; N 22.94. Found: C 45.59; H 4.71; N 22.55.

2-Mercapto-4-amino-5-ethoxycarbonyl-pyrimidine (**1e**).

To a solution of sodium ethoxide, prepared from 0.8 g (0.035 mol) of sodium and 35 mL of absolute alcohol, was added 2.3 g (0.03 mol) of thiourea and the mixture was heated until complete dissolution. To the stirred solution was added dropwise a solution of 5.1 g (0.03 mol) of ethoxymethylene-cyanoacetic acid ethyl ether in 10 mL of ethanol. The reaction mixture was boiled for 8 h, and alcohol was evaporated *in vacuo*. The dry residue was dissolved in water and acidified with 3.5 mL of acetic acid. The precipitate formed was collected by filtration, washed with water, alcohol, and ether, and dried to obtain 5.2 g (87%) of pyrimidine (**1e**), mp 260-262º [16]. ^{1}H nmr: δ ppm (*J*, Hz): 1.35 (3H, t, 7.1, CH_3), 3.05-3.50 (1H, br s, SH), 4.25 (2H, q, 7.1, CH_2O), 7.85 (1H, br s, NH), 8.04(1H, s, 6-H), 8.61 (1H, s, NH).

Anal. Calcd. for $C_7H_9N_3O_2S$: C 45.20; H 4.55; N 21.09; S 16,09. Found: C 45.39; H 4.56; N 21.39; S 16,36.

2-Benzyl-4-amino-5-ethoxycarbonyl-pyrimidine (**1f**).

To a solution of sodium ethoxide, prepared from 0.8 g (0.035 mol) of sodium and 40 mL of absolute ethanol, was added 6 g (0.035 mol) of phenylacetamidine hydrochloride. The mixture was stirred for a short time and cooled to 0°. The formed precipitate was rapidly filtered. The filtrate was mixed with a hot solution of 5.8 g (0.034 mol) of ethoxy-methylenecyanoacetic acid ethyl ester in 10 mL of ethanol. The mixture was boiled with stirring for 5 h. After partial removal of the alcohol, the residue was collected by filtration and washed with acetone and ethylacetate to afford 4.2 g (48%) of pyrimidine **1f**, mp 148-150° , R_f 0.7 (ethanol). ^{1}H nmr: δ ppm (*J*, Hz): 1.38 (3H, t, J = 7.1, CH_3), 3.95 (2G, s, CH_2), 4.33 (2H, q, J = 7.1, CH_2), 7.13-7.31 (5H, m, C_6H_5), 7.55 (2H, br s, NH_2), 8.64 (1H, s, 6-H).

Anal. Calcd. for $C_{14}H_{15}N_3O_2$: C 65.35; H 5.88; N 16.33. Found: C 65.19; H 4.86; N 15.98.

2-Hydroxy-4-methyl-5-acetylpyrimidine (**3**).

To a hot solution of 42.5 g (0.25 mol) of ureidomethyleneacetylacetone (**6**) in 350 mL of absolute ethyl alcohol was added dropwise a solution of sodium ethoxide prepared from 6.5 g of sodium and 150 mL of absolute alcohol. The mixture was boiled for 1 h and the solvent was evaporated *in vacuo*. The residue was dissolved in water and acidified with 20 mL of acetic acid. The precipitate that formed was collected filtration, washed with acetone and dried to afford 29.8 g (78%) of 2-hydroxy-4-methyl-5-acetylpyrimidine (**3**) as yellow crystals, mp 211-212°, R_f 0.64 (ethanol). ^{1}H nmr: δ ppm (*J*, Hz): 2.44 (3H, s, 4-CH_3), 2.55 (3H, s, CH_3CO), 5.20-5.50 (1H, s, OH), 8.78 (1H, s, 6-H).

Anal. Calcd. for $C_7H_8N_2O_2$: C 55.26; H 5.30; N 18.41. Found: C 55.00; H 5.03; N 18.23.

Ethyl Ureidomethylenecyanacetate (**5**).

A mixture of 28.25 g (26.6 mL, 0.25 mol) of cyanoacetic acid ethyl ester, 59.2 g (66.4 mL, 0.4 mol) of ethyl ortho-formate and 15 g (0.25 mol) of urea was boiled with stirring under reflux for 10 h. The mixture was then cooled, the precipitate collected by filtration, washed with acetone and dried. The yield of ethyl ureidomethylenecyanoacetate (**5**) was 28.8 g (63%), mp 215-216°, R_f 0.58 (CCl_4-C_6H_6-CH_3COOH, 1:2:1). ^{1}H nmr: δ ppm (*J*, Hz): 1.35 (3H, d, J=7.2, CH_3), 4.25 (2H, q, J=7.2, CH_2O), 7.65 (1H, , NH), 7.83 (1H,br s, NH), 8.19 (1H, s, CH), 11.5 (1H, br s, NH(OH). ^{13}C nmr; δ ppm: 14.027 (CH_3), 30.642 (CH_3), 59.003 (CH_2), 103.996 (=C), 149.514 (CH=), 152.645 (NC(0)-N), 165.450 (COO), 197.994 (CO).

Anal. Calcd. for $C_6H_6N_2O_3$: C 45.90; H 4.95; N 22.94. Found: C 45.69; H 4.76; N 22.59.

Ureidomethyleneacetone (**6**).

A mixture of 30 g (0.5 mol) of urea, 81.4 g (91 mL, 0.55 mol) of orthoformate and 3 mL (50 g, 0.51 mol) of acetylacetone was boiled with stirring under reflux for 8 h. The mixture was then cooled and the precipitate collected by filtration. The crystals were washed with acetone and dried. Obtained was 47.5 g (56%) of ureidomethyleneacetylacetone (**6**), mp 201-203°, R_f 0.67 (CCl_4-C_6H_6-CH_3COOH, 1:2:1) ^{1}H nmr: δ ppm (*J*, Hz): 2.32 (3H, s, CH_3), 2.38 (3H, s, CH_3), 6.91-7.12 (1H, br s, NH), 7.50-7.73 (1H, br s, NH), 8.35 (1H, d, CH), 11.31 (1H, d, NH).

Rearrangement of 2-Hydroxy-4-methyl-5-ethoxycarbonyl-pyrimidine (**1a**) to **5**-Acetyluracil (**2a**).

To a solution prepared from 10 g (0.178 mol) of potassium hydroxide and 90 mL of water was added 4.5 g (0.025 mol) of 2-hydroxy-4-methyl-5-ethoxycarbonyl-pyrimidine (**1a**) [16] and the mixture was boiled for 1 h. The mixture was then acidified with 25 mL of conc. hydrochloric acid and the solution was evaporated to dryness. To the residue was added 20 mL of water. The crystals formed were collected by filtration to afford 1.9 g (49%) of 5-acetyluracil (**2a**), mp 290-291 °C, R_f 0.59 (acetone-toluene, 3:1). mp 294-295° [15]. ^{1}H nmr: δ ppm (*J*, Hz): 2.85 (3H, s, CH_3) 8.03 (1H, s, 6-H), 10.81-11.80 (2H, br s, OH); ms: m/z (I_{rel}, %): 154 (85), 139 (100), 96 (18.6), 69 (31.4), 43 (29.50), 28 (40).

Anal. Calcd. for $C_6H_6N_2O_3$: C 46.76; H 3.92; N 18.18.Found: C 46.49; H 3.75; N 18.31.

Rearrangement of 2-Mercapto-4-methyl-5-ethoxycarbonyl-pyrimidine (**1b**) to 2-Mercapto-4-hydroxy-5-acetylpyrimidine (**2b**).

To 100 g of 10% water solution of potassium hydroxide was added 4.95 g (0.025 mol) of 2-mercapto-4-methyl-5-ethoxycarbonyl-pyrimidine (**1b**). The mixture was boiled for 10 min, acid-

ified with 25 mL of conc. hydrochloric acid and the water was removed under reduced pressure to the volume of 20 mL. The mixture was then cooled, the crystals that precipitated were collected by filtration and dried in the air. The yield of 2-mercapto-4-hydroxy-5-acetylpyrimidine (**2b**), was 3.3 g (77%); mp 320-322°, corresponded to the authentic sample obtained by the other route [14]. ^{1}H nmr: δ ppm (*J*, Hz): 2.55 (3H, s, $COCH_3$), 3.05-3.17 (1H, br s, SH), 3.4-4.8 (1H, br s, OH), 8.65 (1H, s, 6-H).

Anal. Calcd. for $C_6H_6N_2O_2S$: C 42.34; H 3.55; N 16.46; S 18,84.Found: C 42.09; H 3.75; N 18.31; S 18,46.

Rearrangement of 2-Amino-4-methyl-5-ethoxycarbonyl-pyrimidine (**1c**) into 2-Amino-4-hydroxy-5-acetylpyrimidine (**2c**).

To water-ethanol (1:1) potassium hydroxide solution, obtained by dissolution of 1 g of potassium hydroxide 20 mL of solvent was added 1.8 g (0.1 mol) of 2-amino-4-methyl-5-ethoxycarbonyl-pyrimidine (**1c**). The mixture was boiled for 30 min, the alcohol was evaporated *in vacuo*, and 1.2 mL of acetic ester was added. The precipitated residue was collected by filtration, washed with water and dried to afford 1.2 g (80%) of product (**2c**), mp 301-302°, corresponded to the authentic sample obtained by the other route [14].

Rearrangement of 2-Substituted-4-amino-5-ethoxycarbonyl-pyrimidines (**1d** and **1e**) into 2-Substituted-4-hydroxy-5-carbamoylpyrimidines (**2d** and **2e**).

5-Ethoxycarbonyl-pyrimidine (**1d)** or (**1e**) (0.025 mol) of was boiled in 100 g of 10% potassium hydroxide solution. Ten minutes later, after the crystals had dissolved, the solution was acidified with 25 mL of conc. hydrochloric acid after which the water was completely evaporated off. The residue was poured into 20 mL of cold water and stirred for several minutes. The precipitate was collected by filtration and dried in the air. There was obtained, correspondingly, 2.3 g (59.4%) of 5-carbamoyluracil (**2d**), mp > 300°, R_f 0.54 (acetone-toluene, 2:1) and 2.25 g (52.6%) of 2-mercapto-4-hydroxy-5-carbamoylpyrimidine (**2e**), mp > 300°, R_f 0.48 (acetone-toluene, 2:1); ^{1}H nmr: δ ppm of compound (**2d**): 7.53 (1H, br s, NH), 8.03 (1H, s, 6-H), 8.38 (1H, br s, NH), 10.7–11.2 [2H, s, OH (NH)]. *Anal*. Calc. for $C_5H_5N_3O_3$: N 27.09. Found: N 27.34. ^{1}H nmr: δ ppm of compound (**2e**): 2.9-3.5 (1H, br s, SH), 8.0 (1H, s, 6-H), 8.02 (1H, s, NH), 8.53 (1H, s, NH), 11.8-13.2 (1H, br s, OH); ms: m/z (I_{rel}, %): 171 (100), 127 (42), 113 (12), 95 (14), 85 (20), 71 (10), 70 (21), 69 (28), 68 (28), 67 (14), 53 (13), 52 (11), 44 (18).

Anal. Calc. for $C_5H_5N_3O_2S$: N 24.55; S 18.73. Found: N 24.78; S 18.89.

2-Benzyl-4-hydroxy-5-carbamoylpyrimidine (**2f**).

2-Benzyl-4-amino-5-ethoxycarbonyl-pyrimidine (**1f**) (0.5 g, 2 mmol) was boiled in 60 mL of 5% solution of potassium hydroxide for 1 h. The mixture was then acidified with 10% solution of hydrochloric acid until the pH 6 and the water was evaporated off to a volume of 20 mL. The mixture was cooled with stirring for several minutes, the precipitate was collected by filtration and dried in the air to give 0.28 g (62.4%) of compound (**2f**), mp 240-241°, R_f 0.54 (i-PrOH-ammonia-water 7:0.5:1). ^{1}H nmr: δ ppm of compound (**2f**): 3.95 (2H, s, CH_2), 7.1-7.35 (5H, m, C_6H_5), 7.43 (1H, br s, NH), 7.71 (1H, br s, NG), 8.64 (1H, s, 6-H), 10.6 – 12.4 (1H, br s, OH).

Anal. Calcd. for $C_{12}H_{11}N_3O_2$: N 18.33. Found N 18.57.

Interaction of 2-Hydroxy-4-methyl-5-acetylpyrimidine (**3**) with Alkali.

Similar to the previous experiments, 1.52 g (0.01 mol) of 2-hydroxy-4-methyl-5-acetyl-pyrimidine (**3**) was boiled in a solution prepared from 5 g (0.089 mol) of potassium hydroxide and 45 mL of water for 1 h. Then the mixture was acidified with 32% hydrochloric acid and the solution was evaporated to 20 mL and extracted with ether. The initial substance remained without changes. Chromatographic examination did not reveal formation of a new product.

2,4-Dihydroxy-5-{1-[(2-benzyl-4-methylpyrimidin-6-yl)-hydrazono]ethyl}pyrimidine (**7**).

A mixture of 1.54 g (0.01 mol) of 2,4-dihydroxy-5-acetylpyrimidine (**2a**) and 2.15 g (0.01 mol) of 2-benzyl-4-methyl-6-hydrazinopyrimidine [23] in 20 mL (0.35 mol) of absolute ethanol was boiled during 12 h. The mixture was cooled, the residue was collected by filtration, washed with alcohol, acetone and dried to afford 2.5 g (71%) of product (**7**), mp 228-230°, R_f 0.43 (CCl_4-acetone, 1:1). ^{1}H nmr: δ ppm (*J*, Hz): 2.18 (3H, s, CH_3CN), 2.30 (3H, s, 4-CH_3), 3.94 (2H, s, CH_2), 6.80 (1H, s, 5-H), 7.15-7.30 (5H, m, C_6H_5), 7.49 (1H, d, J= 6.0 Hz, 6-H), 9.95 (1H, s, 4-OH), 11.04 (1H, d, J=6.0 br s, 1-NH), 11.11 (1H, s, NH); ms: m/z (I_{rel}, %): 350 (6.3), 335 (6.6), 334 (23), 333 (100), 332 (63.6), 306 (6), 292 (6.7), 291 (8), 182 (22), 171 (17), 117 (8.9), 116 (8.9), 91 (39.8).

Anal. Calcd. for $C_{18}H_{18}N_6O_2$: C 61.70; H 5.18; N 23.99. Found C 61.43; H 4.85; N 24.27.

2,4-Dihydroxy-5-{1-[(2-benzyl-4-methyl-5-allylpyrimidin-6-yl)hydrazono]ethyl}-pyrimidine (**8**).

To a solution of 0.25 g (0.9 mmol) of 2-benzyl-4-methyl-5-allyl-6-hydrazinopyrimidine [22] in 20 mL of ethanol was added 0.14 g (0.9 mmol) of 5-acetyluracil (**2a**) and 2-3 drops of hydrochloric acid, and the mixture was boiled for 5 h. The yellow crystals were collected by filtration, washed with acetone and ether, and recrystallized from alcohol to give 0.19 g (54%) of product (**8**), mp 267-270°, R_f 0.61 (ethanol). ^{1}H nmr: δ ppm (*J*, Hz): 2.3 (3H, s, CH_3-C=N), 2.45 (3H, s, 4-CH_3), 3.43 (2H, d, CH_2-CH=CH_2), 3.95 (2H, s, CH_2), 4.98 (1H, d, J = 10.0, CH=CH_2), 5.08 (1H, d, J = 16.8, CH=CH_2), 5.81 (1H, ddm, J = 5.5, J = 10.0, J = 16.8), 7.15-7.25 (5H, m, C_6H_5), 7.57 (1H, d, J = 5.8, 6-H), 8.45 (1H, s, 2-OH), 11.04-11.1 (1H, br s, N).

Anal. Calcd. for $C_{21}H_{22}N_6O_2$: C 64.60; H 5.68; N 21.52. Found: C 64.34; H 5.35; N 21.31.

2-Hydroxy-4-methyl-5-{1-[(2,4-dinitrophenyl)hydrazono]-ethyl}pyrimidine (**9**).

A mixture of 1.5 g (0.01 mol) of 2-hydroxy-4-methyl-5-acetylpyrimidine (**3**), 1.94 g (0.01 mol) of 2,4-dinitrophenylhydrazine and 2-3 drops of hydrochloric acid was heated for 8 h in 30 mL of absolute ethanol. The precipitated crystals were collected by filtration and washed with alcohol to give 2.65 g (81%) of 2-hydroxy-4-methyl-5-{1-[(2,4-dinitrophenyl)hydrazono]-ethyl}pyrimidine (**9**), mp 192-193°, R_f 0.66 (CCl_4-acetone, 1:1); ^{1}H nmr: δ ppm (*J*, Hz): 2.43 (3H, c, 4-CH_3), 2.58 (3H, c, CH_3C=N), 7.95 (1H, d, 6`-H), 8.35 (1H, d, 5`-H), 8.45 (1H, br s, NH), 8.95 (1H, c, 6-CH), 11.13 (1H, s, 3`H), 11,31-12,27 (1H, br s, OH).

Anal. Calcd. for $C_{13}H_{12}N_6O_5$: C 46.99; H 3.64; N 25.29. Found: C 46.64; H 3.45; N 25.58.

2-Hydroxy-4-methyl-5-{1-[(4,6-dimethylpyrimidin-2-yl)-hydrazono]ethyl}pyrimidine **(10)**.

To a solution of 1 g (7.2 mmol) of 2-hydrazino-4,6-dimethylpyrimidine [17] in 40 mL of ethanol, was added 1.1 g (7.2 mmol) of 2-hydroxy-4-methyl-5-acetylpyrimidine (**3**) and 3-4 mL of hydrochloric acid, and the mixture was heated under reflux for 10-12 h. On completion the mixture was cooled and the precipitate of the unreacted acetylpyrimidine was filtered off. After removal of the solvent from the alcoholic solution the solid residue was recrystallized from the mixture benzene-acetone (1:1). Obtained was 1.4 g (71%) of product (**10**) as white crystals, mp 226-228–, Rf 0.58 (CCl_4-acetone, 1:1). ^{1}H nmr δ ppm (*J*, Hz):2.43(3H, s, 4-CH_3), 2.46 (3H, s, CH_3), 2.55 (6H, s, 4^1- and 6^1-CH_3), 7.11 (1H, s, 5^1-H), 8.98 (1H, s, 6-H).

Anal. Calcd. for $C_{13}H_{16}N_6O$: C 57.34; H 5.92; N 30.86. Found: C 57.61; H 5.86; N 30.59.

2-Hydroxy-4-methyl-5-{1-[(2-benzyl-4-methyl-5-allylpyrimidin-6-yl)-hydrazono]ethyl} pyrimidine (**11**).

A mixture of 1.52 g (0.01 mol) of 5-acetylpyrimidine (**3)** and 2.55 g (0.01 mol) of 2-benzyl-4-methyl-5-allyl-6-hydrazinopyrimidine [23] was boiled in 20 mL of absolute ethanol for 15 h. On completion the mixture was cooled and the precipitated crystals were filtered off, washed with alcohol and acetone and dried. Obtained was 2.49 g (64%) of product (**11)**, mp 243-245–, R_f 0.7 (ethanol). ^{1}H nmr: δ, ppm (*J*, Hz): 2.07 (3H, d, J = 2.2), 2.19 (3H, s, CH_3), 2.37 (3H, s, CH_3), 3.55-3.70 (2H, m, CH_2-CH=CH_2), 3.97 and 4.01 (2H, dd, J = 13.8, CH_2-CH=), 4.90-4.97 (2H, m, =CH_2), 5.81 (1H, br s, NH), 5.89 (1H, m, CH=), 6.18 (1H, s, NH), 7.13-7.33 (5H, m, C_6H_5), 9.23 (1H, d, 6-H).

Anal. Calcd. for $C_{22}H_{24}N_6O$: C 68.02; H 6.23; N 21.63. Found: C 68.31; H 6.53; N 21.47.

Isonicotinic Acid [1-(2-Hydroxy-4-methylpyrimidin-5-yl)-ethylidene]hydrazide (**12**).

To a solution of 1.52 g (0.01 mol) of 2-hydroxy-4-methyl-5-acetylpyrimidine (**3**) was added 1.37 g (0.01 mol) of pyridyl-4-carboxylic acid hydrazide, 25 mL of ethyl alcohol and 3-4 drops of conc. hydrochloric acid, and the mixture was heated for 2 h. The residue was collected by filtration, washed with ether and acetone, and dried to obtain 2.1 g (77%) of hydrazone (**12**), mp 270-271°, R_f 0.62 (ethanol). ^{1}H nmr: δ ppm (*J*, Hz): 2.13 (3H, s, 4-CH_3), 2.23 (3H, s, CH_3-C=N), 6.0 (1H, br s, NH), 6.57 (1H, d, J = 6.0 Hz, NH), 7.75 (2H, d, J = 6,8 Hz, 2^1-H 6^1-H), 8.65 (2H, d, J =6,8 Hz , 3^1-H and 5^1-H), 9.47 (1H, d, J = 6.0 Hz, NH); ms: m/z (I_{rel}, %): 271 (11.4), 270 (7.7), 257 (6), 256 (39.3), 230 (11.6), 228 (31), 227 (7.5), 151 (69.4), 138 (8), 137 (100), 122 (10.4), 106 (56.7), 96 (42), 94 (15), 79 (10), 78 (45), 60 (17).

Anal. Calcd. for $C_{13}H_{13}N_5O_2$: C 57.56; H 4.83; N 25.82. Found: C 57.31; H 4.50; N 26.07.

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