5. Peng H., Cai R., Xu C., Chen H., Shi X. Nucleophile promoted gold redox catalysis with diazonium salts: C–Br, C–S and C–P bond formation through catalytic Sandmeyer coupling. *Chemical science*. 2016. Vol. *7*(9). P. 6190–6196.

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2-S-IMINOTHIOCARBONATO-3-ARYLPROPANAMIDES AS BIFUNCTIONAL SYNTHONS FOR THE PREPARATION OF THIAZOLE DERIVATIVES

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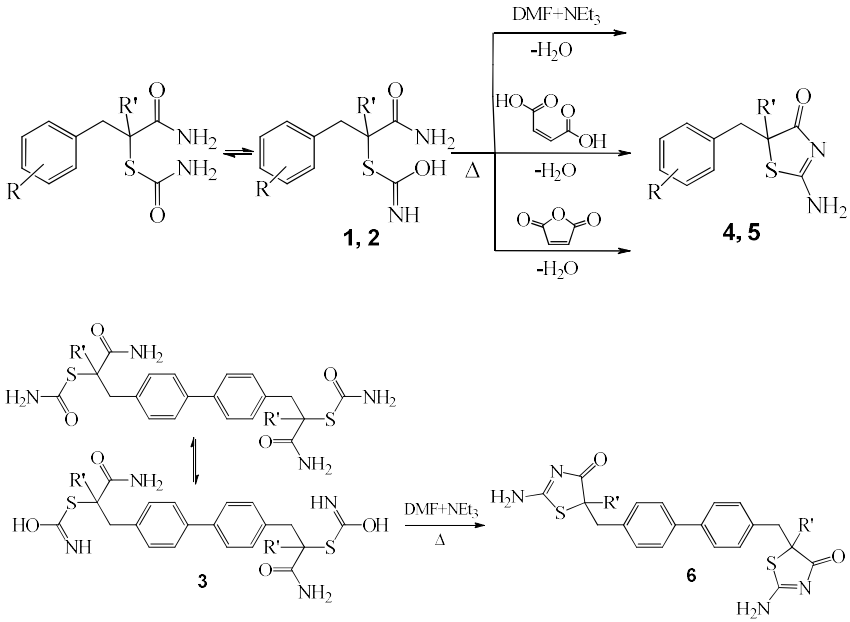
It is known that α-functionalized thiocyanates are available and convenient bicenter reagents for various cyclizations. The thiocyanate group is hydrolyzed to the thiocarbamate group in an acidic solutions and the presence of additional functional group in the molecular structure allows to obtaining heterocyclic compounds during the hydrolysis process [1]. An example of such cyclizations is the direct cyclization of 3-aryl-2-thiocyanatopropanamides, which occurs with the formation of 5-arylsubstituted 2-aminothiazol-4(5*H*)-ones. These thiazole derivatives are converted into acetamide derivatives when boiled in acetic anhydride medium [2, 3].

The previously synthesized 2-S-iminothiocarbonato-3-arylpropanoic acids derivatives [4] can also be used as bifunctional synthons for the construction of the thiazole cycle. In order to confirm this conclusion, we investigated the cyclization of 2-(S-iminothiocarbonato)-(2-methyl)-3-arylpropanic acid amides **1-3** with the formation of 2-aminothiazol-4(5*H*)-one derivatives **4-6**.



1-6 : R = H (**1, 4**), 4-C(O)Me (**2, 5**); R′ = H (**a**), Me (**b**)

Cyclization of iminothiocarbonates **1-3** occurs during boiling in a mixture of dimethylformamide and triethylamine (20:1) for 6 hours or fused with maleic acid (maleic anhydride) in a quantitative ratio of 1:1.2 for 10-20 minutes.

The obtained experimental data show that the cyclization of 2-(S-iminothiocarbonato)-(2-methyl)-3-arylpropanamides and 3-aryl-2-thiocyanatopropanamides occurs similarly to the formation of 2-amino-5-benzyl-(5-methyl)thiazol-4(5*H*)-ones. However, the yields of 2-aminothiazol-4(5*H*)-one derivatives in the case of iminothiocarbonates are several percent higher and the process of their production takes place under slightly milder conditions.

These facts confirm the previously proposed mechanism of 3-aryl-2-thiocyanatopropanamides cyclization, which is initiated by protonation of the nitrogen atom of the SCN group. Activation of this group can also be carried out due to the formation of a hydrogen bond between the acid catalyst and the nitrogen atom and, in both cases,

leads to increase in the positive charge on the carbon atom. As a result, the electrostatic attraction of the electrophilic carbon of the SCN group and the free electron pair of the nitrogen atom of the amide group increases, which contribute to the formation of a new C–N bond and completes the formation of the thiazole cycle.

2-(S-Iminothiocarbonato)-(2-methyl)-3-arylpropanamides were proposed as acyclic synthons for the construction of thiazole systems. They have certain advantages due to the presence of two electron-withdrawing groups near the carbon atom – imino and hydroxyl, which additionally increases its electrophilicity and promotes cyclization process.

References

6. Erian A. W., Sherif S. M. The chemistry of thiocyanic esters. *Tetrahedron*. 1999. N. 55. P. 7957–8024.
7. Baranovskii V. S., Simchak R. V., Grishchuk B. D. Synthesis and heterocyclization of 3-aryl-2-methyl-2-thiocyanatopropanamides. *Russian Journal of General Chemistry.* 2009. Vol. 79 (2). P. 269–273.
8. Grishchuk B. D., Baranovskii V. S. Synthesis of 5-Arylsubstituted Thiazol-4-one Acetyl and Amino Derivatives by the Heterocyclization of the Products of Acrylamide Thiocyanatoarylation. *Russian Journal of General Chemistry*. 2011. Vol. 81 (9). P. 1896–1899.
9. Grishchuk B. D., Symchak R. V., Baranovskyi V. S., Yatsiuk V. M., Brovarets V. S. Synthesis and antitumor activity of 2-acetamido-5-benzylthiazol-4-yl acetates. *Ukrainica Bioorganica Acta*. 2015. Vol. 13 (2). P. 54-59.