regard to gram-negative bacteria - intestinal *(E. coli*), pseudomonas (*P. aeruginosa*) rods and gram-positive bacteria (*S. aureus*), the most effective were compounds 6a,b whose MIC was 62.5-125.0 μg/ml, and compounds 4a,b, 5a,b showed low antimicrobial activity (MIC 125.0-500.0 μg/ml).

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2-HALOGENO(THIOCYANATO, O-ETHYLDITHIOCARBONATO)BENZO[d]THIAZOLES. SYNTHESIS AND ANTIMICROBIAL ACTIVITY

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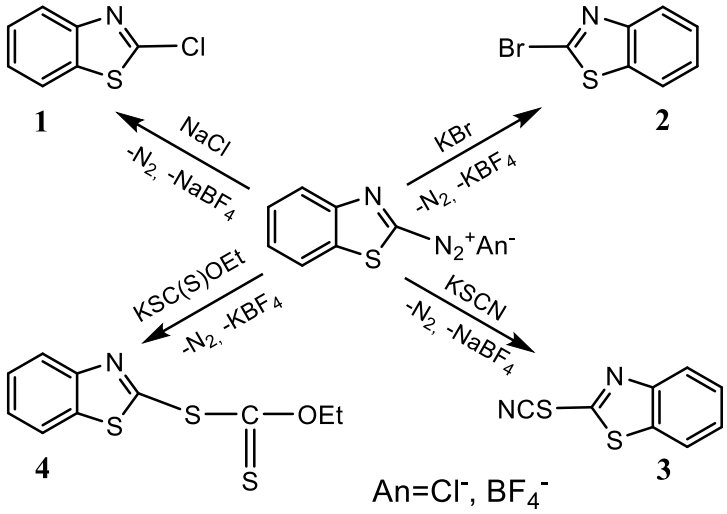
In recent decades, a number of studies have been conducted on the introduction of various arylating reagents into anionarylation reactions – aryldiazonium salts with specific functional groups, bisdiazonium salts based on aromatic diamines, aromatic triazenes, which resulted in the development of methods for the regioselective modification of unsaturated compounds with the formation of functionalized mono- and bisanionarylated derivatives. At the same time, the synthesis of a similar type of compounds can be carried out using heteryl(hetaryl)diazonium salts as arylating reagents, in particular based on 2-aminobenzothiazole. Such arylating reagents, due to the

presence of a diazo group, can interact with unsaturated substrates under the conditions of dediazonation reactions, forming products of anionarylation, arylation and substitution of the diazo group by an anion-nucleophile [1].

In this regard, the study of dediazonation of heteroyldiazonium salts, in which a more significant interaction between the diazo group and the heterocyclic fragment is observed, was of considerable interest [2]. Therefore, we studied benzothiazole-2-diazonium chloride and tetrafluoroborate in the Gattermann-Sandmeyer reaction, which are quite easily obtained by diazotization of 2-aminobenzothiazole with sodium nitrite in a medium of hydrochloric or tetrafluoroboronic acid, acidified with concentrated sulfuric acid.

It was established that the dediazonation of 1,3-benzothiazole-2-diazonium chloride (tetrafluoroborate) in the presence of chloride, bromide, rhodanide and O-ethyldithiocarbonate anions occurs with the elimination of the nitrogen of the diazo group and the formation of 2-halogeno(thiocyanato, O-ethyldithiocarbonato) benzothiazoles **1-4** according to the scheme:



2-Chlorobenzothiazole **1** was isolated from the reaction mixture by extraction with diethyl ether and subsequent fractional distillation in vacuum of the residue after evaporation of the ether. A fraction with a

boiling point of 90-95^{0}C (2 mmHg) was selected, which was cooled to room temperature until complete crystallization. The formation of colorless crystals with a melting point of 21-24^{0}C (recrystallization from chloroform) was observed.

2-Bromobenzothiazole **2** was isolated in a similar manner, by selecting a fraction with a boiling point of 138-144^{0}C during vacuum distillation, as a result of which crystallization yielded colorless crystals with a melting point of 39-43^{0}C (recrystallization from ethanol).

Compounds **3** and **4** were isolated from the reaction medium by extraction with diethyl ether, after evaporation of which the residue was kept at –25^{0}C until almost complete crystallization. The obtained solid phase in the case of compound **3** was recrystallized from ethanol, and compound **4** – from benzene. The structure of the obtained compounds was confirmed by IR, ^{1}H NMR and mass spectroscopy data.

Thus, 1,3-benzothiazole-2 diazonium chloride (tetrafluoroborate) interacts with inorganic and organic nucleophiles under the conditions of the Gattermann-Sandmeyer reaction with the participation of a diazo group, and the high nucleophilicity of the anionoid reagent determines a sufficiently effective course of the process under non-catalytic conditions.

Derivatives of 2-substituted benzothiazole occupy one of the leading places in modern medicinal chemistry and pharmacology due to their extremely wide spectrum of biological activity. The benzothiazole fragment is a key (privileged) pharmacophore in the structure of many drugs and exhibits pronounced antibacterial, antifungal, antiviral, antituberculosis and antitumor activity [3]. Due to the ability of the benzothiazole nucleus to easily penetrate cell membranes and interact with various biological targets, the introduction of new functional substituents (in particular halogens, thiocyanate and dithiocarbonate residues) in position 2 of the heterocycle is a promising direction for the targeted search for new highly effective antimicrobial agents.

We have investigated the antimicrobial properties of 2-halogeno(thiocyanato, O-ethyldithiocarbonato)benzo[d]thiazoles 1-4 against test cultures of bacteria (*S. aureus* ATCC 6538, *B. subtilis* ATCC 6633, *E. coli* ATCC 25922, *P. aeruginosa* ATCC 9027), and

yeast fungi (*C. albicans* ATCC 885-653).

The conducted studies showed that compounds 1-4 exhibit weak antimicrobial activity against the tested test microorganisms. gram-negative bacteria *E. coli* were insensitive to the studied substances. Almost all compounds showed bactericidal action at a minimum concentration of 125-500 μg/ml. The most resistant culture was the spore-forming gram-positive bacilli *B. subtilis*. Only the compound 2-thiocyanato-1,3-benzothiazole 4 was characterized by minimal antimicrobial effect on it. It was found that the most sensitive culture of *S. aureus* was to compounds 2 and 4 (MIC was 62.5-125 μg/ml). Regarding the test strains of gram-negative bacilli *P. aeruginosa*, the effectiveness of the compounds was different. The sensitivity of the culture of *Pseudomonas aeruginosa* was within the concentration range of 62.5-250 μg/ml. However, it should be noted that compounds 1, 2 and 3 were ineffective against *E. coli*, while all of these compounds were moderately active against *P. aeruginosa*. All of the tested substances had a slight antifungal effect and were effective at concentrations of 125-250 μg/ml.

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