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LETTERS TO THE EDITOR

Reactions of Chlorodinitro- and Dichlorodinitrobenzofuroxans with 4-[(4-Aminophenyl)sulfonyl]aniline

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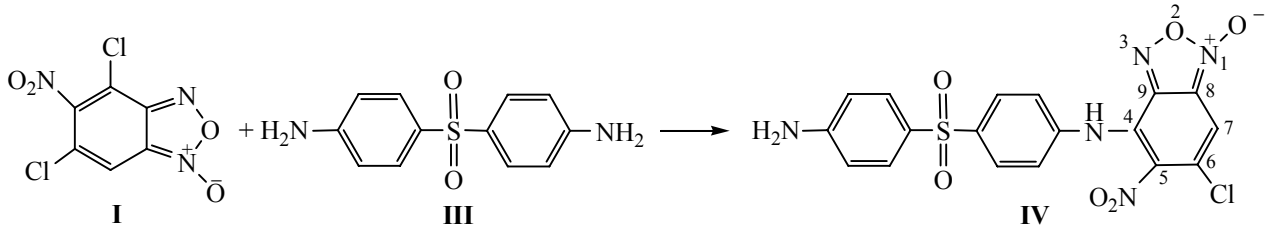
Aiming to synthesize compounds possessing biological activity, we studied the reaction of 4,6-dichloro-5-nitrobenzofuroxan **I** and 5,7-dichloro-4,6-dinitrobenzofuroxan **II** with 4-[(4-aminophenyl)sulfonyl]aniline **III**. Both benzofuroxan derivatives and diamine **III** (known as dapsone) have antibacterial and antifungal activity [1, 2]. We presumed that the combination of the structural fragments of these two classes of compounds in a single molecule may lead to the materials with high biological activity.

Depending on the solvent nature and the reactants ratio, the reaction of furoxan **I** with the aromatic diamine like 4,4'-methylenedianiline or 4,4'-ethylenedianiline can lead to the formation of the products of 1:1 and 1:2 composition [3]. We isolated only the product **IV** of 1:1 composition in the reaction of benzofuroxan **I** and diamine **III**.

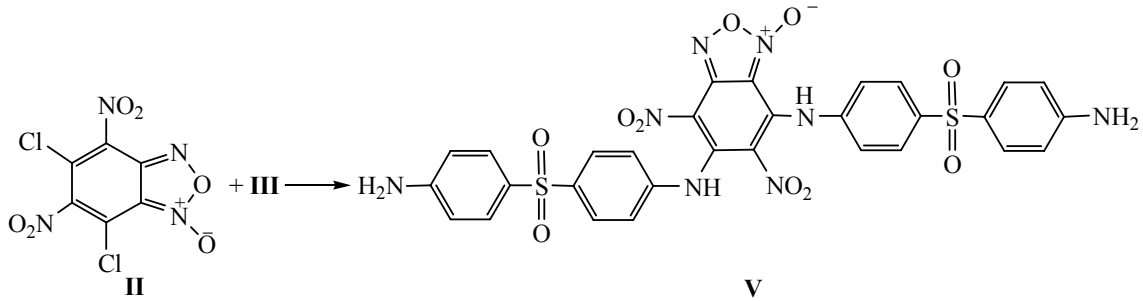
The reaction of benzofuroxan **II** with diamine **III** occurs including both the chlorine atoms of the benzofuroxan ring to give compound **V**.

The structure of the compounds was confirmed by the ^{1}H NMR and IR spectra, the composition, by the elemental analysis data.

The obtained compounds **IV** and **V** were found to possess the bacteriostatic action at concentrations of



I **III** **IV**



II **V**

500–15.6 mg l^{-1}. The activity of compound **IV** is much higher than that of compound **V**.

4-[4-(4-Aminophenyl)sulfonylphenyl]amino-6-chloro-5-nitrobenzo[*c*]-1,2,5-oxadiazole-1-oxide (IV). To a solution of 0.125 g of benzofuroxan **I** in 5 ml of DMSO was added dropwise 0.21 g of diamine **III** in 5 ml of DMSO at 20°C. The reaction mixture was kept for 30 min and then poured into the distilled water. The precipitate was separated, washed with water, and dried in a vacuum at 40°C to the constant weight. Yield 0.18 g (78 %), mp 116–117°C (hexane). IR spectrum, ν, cm^{-1}: 1146 (SO_2), 1359 (NO_2, s), 1561 (NO_2, as), 1612 (furoxan), 3096 (ArH), 3306 (NH). ^{1}H NMR spectrum (acetone-d_6), δ, ppm (*J*, Hz): 5.92 s (2H, NH_2), 7.14 s (1H, CH^7), 7.17 d (2H, Ar, $^3J_{HH}$ 8.5), 7.32 d (2H, Ar, $^3J_{HH}$ 8.5), 8.05 d (2H, Ar, $^3J_{HH}$ 8.5), 8.14 d (2H, Ar, $^3J_{HH}$ 8.5), 8.40 s (1H, NH). Found, %: C 46.56; H 2.42; Cl 7.08; N 15.31; S 7.05. $C_{18}H_{12}ClN_5O_6S$. Calculated, %: C 46.81; H 2.62; Cl 7.68; N 15.16; S 6.94.

5,7-Bis{[4-(4-aminophenyl)sulfonylphenyl]amino}-4,6-dinitrobenzo[*c*]-1,2,5-oxadiazol-1-oxide (V) was obtained similarly from 0.125 g of compound **II** and 0.42 g of diamine **III**. Yield 0.32 g (89%), mp 90–92°C (hexane). IR spectrum, ν, cm^{-1}: 1148 (SO_2), 1360 (NO_2, s), 1559 (NO_2, as), 1636 (furoxan), 3315 (NH). ^{1}H NMR spectrum (DMSO-d_6), δ, ppm (*J*, Hz): 5.94 br. s (2H, NH_2), 6.07 s (2H, NH_2), 6.56–6.63 m (4H, Ar), 6.92–6.98 m (2H, Ar), 7.27–7.35 m (2H, Ar), 7.41–7.48 m (2H, Ar), 7.51–7.57 m (2H, Ar), 7.64–7.67 m (2H, Ar), 7.74–7.77 m (2H, Ar), 11.32 s (1H, NH), 11.36 s (1H, NH). Found, %: C 50.35; H 2.99; N 15.62; S 9.02. $C_{30}H_{22}N_8O_{10}S_2$. Calculated, %: C 50.14; H 3.09; N 15.59; S 8.92.

The IR spectra were registered on a Vector 22 Bruker spectrometer in the range of 400–3600 cm^{-1}. The ^{1}H NMR spectra were recorded on an Avance-600 instrument operating at 600.13 MHz and reported relative to the residual protons of the deuterated solvents (acetone-d_6, DMSO-d_6).

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