

LETTERS
TO THE EDITOR

Synthesis of 2-Amino-4-phenylthiazole-Derived Thiuram Disulfide

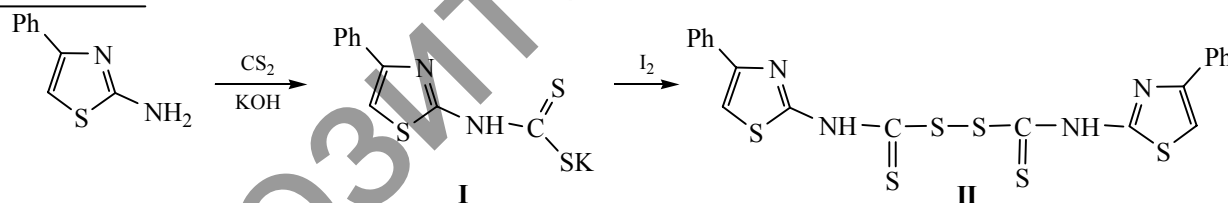
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Thiuram disulfides, many of them revealing various utilitarian properties, are among the most important classes of organic sulfur compounds. For instance, tetraethylthiuram disulfide (Teturam, Disulfiram) is used in medicine to treat chronic alcoholism, and tetramethylthiuram disulfide accelerates rubber cooling and has been intensively applied in the industry [1]. Tetramethylthiuram disulfide is used in preparation of antihypertensive drug clonidine as well. *N,N*-Bis-(vinylxyethyl)thiuram disulfide homopolymer obtained by cationic polymerization is a selective adsorbent of mercury and noble metals [2].



The reaction could be performed in situ without isolation of the intermediate dithiocarbamate *I*. *N*¹,*N*²-bis(4-phenylthiazol-2-yl)thiuram disulfide was light-brown crystalline substance. Its structure was confirmed by IR and ¹H NMR spectra. The reaction progress was monitored by TLC on Silufol plates.

2-Amino-4-phenylthiazole was prepared according to procedure [4].

***N*¹,*N*²-Bis(4-phenylthiazol-2-yl)thiuram disulfide (II).** A solution of 0.02 mol (1.52 g) of carbon disulfide in 10–15 mL of alcohol was slowly added to a vigorously stirred mixture of 0.02 mol (2.96 g) of 2-

Despite the wide range of thiuram disulfides applications, only a limited number of such amine derivatives have been investigated so far. Therefore, it is of potential practical interest to synthesize thiuram disulfide based on 2-amino-4-phenylthiazole; that amine has been selected due to various pharmacological activities of the thiazoles: antiviral, anti-parasitic, and anti-pyretic drugs [3] are among other examples.

Reaction of 2-amino-4-phenylthiazole with carbon disulfide in an alkaline medium resulted in the corresponding salt of dithiocarbamic acid *I*. Further oxidation of the latter with iodine gave *N*¹,*N*²-bis(4-phenylthiazol-2-yl)thiuram disulfide *II*.

amino-4-phenylthiazole and 0.02 mol (1.12 g) of KOH in 3 mL of water. The reaction mixture turned yellow and opaque due to formation of dithiocarbamate *I*. The reaction mixture was stirred during 2–3 h till complete conversion. Then, 0.02 mol (5.08 g) of iodine was added to the reaction mixture. The mixture was stirred until the complete conversion (TLC) at room temperature, and then treated with sodium thiosulfate solution till disappearance of the dark iodine color. The precipitate was filtered off, dried, and recrystallized from ethanol. Yield 7.53 g (75%), mp 228°C. IR spectrum, ν, cm⁻¹: 3300–3100 (NH), 580–685, 1206 (C=S), 1306, 1126, 1089 (NH-CS). ¹H NMR, δ, ppm:

3.9–4.0 (1H, NH), 7.21–7.4 (5H, C₆H₅). Found, %: C 47.52; H 2.48; N 11.31; S 38.76. C₂₀H₁₄N₄S₆. Calculated, %: C 47.81; H 2.79; N 11.15; S 38.25.

IR spectrum was recorded with Nicolet AVATAR-320 Fourier spectrometer (KBr pellets). ¹H NMR spectrum was registered with Varian T-60 (60 MHz, TMS as internal standard).

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