DESIGN AND SYNTHESIS OF 2,3-DITHIOPHENE-SUBSTITUTED PYRROLES

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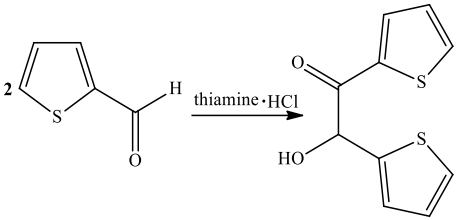
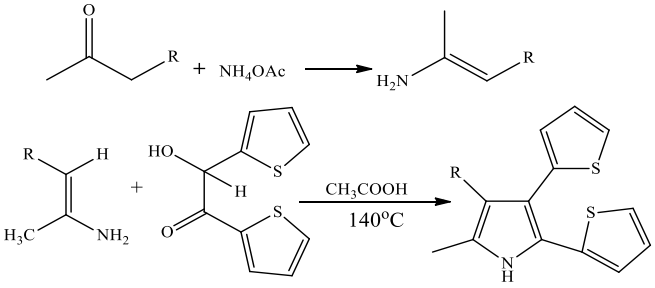
Compounds synthesized on the basis of pyrrole and containing porphyrin, phthalocyanine, and BDP (boron dipyrromethene dyes) fragments are indispensable special materials for the development of sensors and photostabilizers used in optoelectronics and the electrical industry.

For the synthesis of 2,3-dithiophene-substituted pyrrole derivatives, the condensation of 2,2′-thionine with various enamines was performed under high-temperature conditions. Initially, 2,2′-thionine was obtained via the reaction of thiophene-2-carbaldehyde in the presence of thiamine hydrochloride as a catalytic agent.



Pyrrole-2,3-dithiophene derivatives were synthesized via the condensation of enamines with 2,2′-thionine in an acetic acid medium at 140 °C, following the reaction pathway outlined below.



R= Ac; $CO_2C_2H_5$; CN.

As can be seen, the experiment was carried out based on the synthesis of pyrroles via the Paal-Knorr reaction of 2,2′-thionine with various amines. According to the literature, the synthesis of *N*-substituted 2,5-di(2-thienyl)-1H-pyrroles is typically conducted under acidic conditions, which facilitate protonation of the amino group. The choice of solvent depends on both the pH balance of the acidic medium and the nature of the amine employed. In reactions involving predo-minantly aliphatic amines, acetic or propionic acid is commonly used as the reaction medium.

Taking these factors into account, ammonium acetate was employed in our study, and the condensation reaction was performed at 140 °C. The reaction proceeded for two hours, after which the resulting products were washed with water and dried over anhydrous $MgSO_4$.

The progress of the reaction was monitored by thin-layer chromatography (TLC) using Silufol UV-254 plates with a hexane-ethyl acetate (4:1) eluent system. The reaction products were isolated by column chromatography on silica gel (0–70 μm) employing a hexane-ethyl acetate (4:1) solvent system. The structures of the obtained compounds were confirmed by ^1H and ^{13}C NMR spectroscopy.