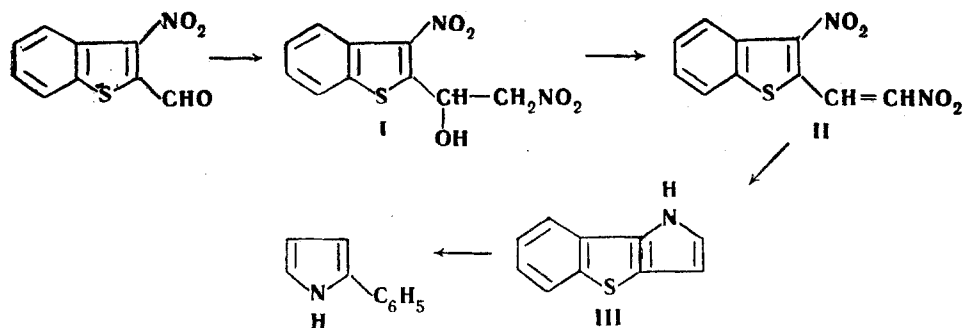


M 173.* Calculated $C_{10}H_7NS$: N 8.08%; M 173. UV spectrum (EtOH), λ_{max} $m\mu$ ($lg \epsilon$): 250 (4.28), 262 (4.33), 286 (4.13). IR spectrum (KBr), ν cm^{-1} : 3410 (indole N-H). The properties of this heterocyclic system closely resemble



those of thieno [3, 2-b] pyrrole [3]. III gives a dark blue color with Erlich's reagent. It decomposes rapidly when stored in the light. It readily sublimes in a vacuum. The structure of III is checked by reductive desulfurization with Raney Ni to 2-phenylpyrrole, identified by mp, IR spectrum, and behavior on chromatographing with an authentic specimen [4].

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*Molecular weight found mass-spectrometrically.

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REACTION OF FURAN AMINES WITH ACROLEIN

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The present work represents a first synthesis of furan derivatives with carbonyl and amino groups at positions 2 and 5. To achieve the goal, a study was made of the reaction of various N-substituted furan amines with acrolein in the presence of AcOH. It was shown that furan amines with a tertiary amino group at position 3 in the side chain react with acrolein to give the corresponding furan 2, 5-substituted aldehydeamines. For example, 24 g (0.4 mole) AcOH was added to a mixture of 25 g (0.121 mole) 2-[3'-(methyl- β -cyanoethylamino) butyl] furan [bp 121°C (3 mm); n_D^{20} 1.4815; d_4^{20} 1.0040. Found: C 69.48, 69.48; H 8.65, 8.49%. Calculated for $C_{12}H_{18}N_2O$: C 69.86; H 8.79%], 16 g (0.286 mole) acrolein, and 0.2 g hydroquinone. After stirring for 2 hr, the products were diluted with water, neutralized with $NaHCO_3$, and extracted with ether. After distilling off the ether, there was obtained 8 g (26%) 2-(3'-oxopropyl)-5-[3'-methyl- β -cyanoethylamino) butyl] furan, bp 124°C (3.5 mm); n_D^{20} 1.4850; d_4^{20} 1.0193. Found: C 68.72, 68.80; H 8.42, 8.51%. Calculated for $C_{15}H_{22}N_2O_2$: C 68.66; H 8.45%.

It was shown that under these conditions, N-substituted furan amines, with the amino group next to the furan ring, does not react with acrolein. For example, N-methyl (β -cyanoethyl) furfurylamine [bp 101°C (3 mm); n_D^{20} 1.4825; d_4^{20} 1.0335. Found: C 65.40, 65.20; H 7.56, 7.35%. Calculated for $C_9H_{12}N_2O$: C 65.82; H 7.36.] is unchanged on treatment with acrolein.

There is complete polymerization of furan amines with a hydrogen atom at the nitrogen atom, e.g., 2-[3'-

(β -cyanoethylamino) butyl] furan [bp 112° (2 mm); n_D^{20} 1.4840; d_4^{20} 1.0150. Found: C 68.46, 68.34; H 8.36, 8.22%. Calculated for $C_{11}H_{16}N_2O$: C 68.71; H 8.39%.], when they are treated with acrolein under the conditions described.

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