

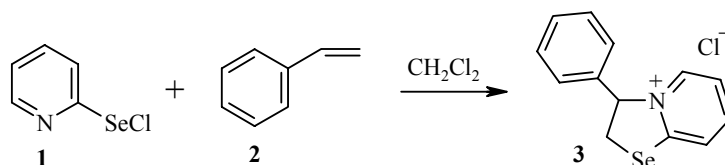
HETEROCYCLIZATION IN THE REACTION OF PYRIDINE-2-SELANYL CHLORIDE WITH STYRENE

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Keywords: pyridine-2-selanyl chloride, styrene, cyclization.

Selanylhalides are widely used inorganic synthesis, for example, in inducing selenating electrophilic cyclization of unsaturated compounds with ring closure involving a nucleophilic active group in the molecule of the substrate [1-3]. However it is possible to bring about an alternative direction of cyclization in which a unit in the initial selenating electrophile may participate as the nucleophilic partner. According to our research this has not been investigated. We have tested this alternative approach for the synthesis of sulfur containing heterocycles based on the reactions of unsaturated compounds with hetarenesulfonyl chlorides with potentially nucleophilic atoms of nitrogen or oxygen in the hetaryl unit [4-6]. Taking into account these results it can be predicted that corresponding selenium reagents are suitable for the preparation of heterocycles containing selenium.

In the present work we have studied the reaction of pyridine-2-selanyl chloride (**1**) with styrene (**2**). As shown previously in the reaction of the analogous electrophile, pyridine-2-selanyl bromide reacted with styrene in methanol to give the solvoadduct – 1-methoxy-1-phenyl-2-(2-pyridylselanyl)ethane – in quantitative yield [7]. We have established that in the reaction of the selanyl chloride **1** with styrene in methylene chloride at 20°C the condensed heterocycle **3**, the product of cyclization with ring closure at the nitrogen atom of the selenium-containing pyridine fragment, was formed in 98% yield.



By monitoring with ¹H NMR spectroscopy, it was shown that the initial product of the reaction is 1-chloro-1-phenyl-2-(2-pyridylselanyl)ethane, which undergoes intramolecular cyclization.

¹H NMR spectra were recorded on a Bruker AM-300 (300 MHz) machine.

3-Phenyl-2,3-dihydro[1,3]selenazolo[3,2-*a*]pyridinium-4 chloride (3). A solution of alkene **2** (0.52 g, 5 mmol) in methylene chloride (20 ml) was added with stirring at 20°C to a suspension of the selanyl chloride **1** (0.96 g, 5 mmol) in methylene chloride (20 ml). After 48 h when the selanyl chloride had dissolved completely,

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the solvent was removed in vacuum. The residue was recrystallized from methylene chloride to give compound **3** (1.41 g, 95%); mp 205-207°C. IR spectrum, ν , cm^{-1} : 3016, 1605, 1551, 1465, 1431, 1273, 1159, 763, 702. ^1H NMR spectrum (DMSO-d_6): 8.54 (1H, d, $^3J = 5.9$, Het); 8.44 (1H, d, $^3J = 8.3$, Het); 8.33 (1H, ddd, $J = 8.3$, $J = 7.3$, $J = 1.2$, Het); 7.74 (1H, ddd, $J = 7.3$, $J = 5.9$, $J = 1.3$, Het); 7.49 m and 7.40 m (5H, C_6H_5); 6.64 (1H, t, $^3J = 7.4$, CHN^+); 4.29 dd and 3.80 dd (2H, $^2J = 11.0$, CH_2Se). Found, %: C 52.35; H 4.01; N 4.62. $\text{C}_{13}\text{H}_{12}\text{ClNSe}$. Calculated, %: C 52.64; H 4.08; N 4.72.

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