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SYNTHESIS AND REACTIONS OF 2-PYRIDINETELLURENYL CHLORIDE

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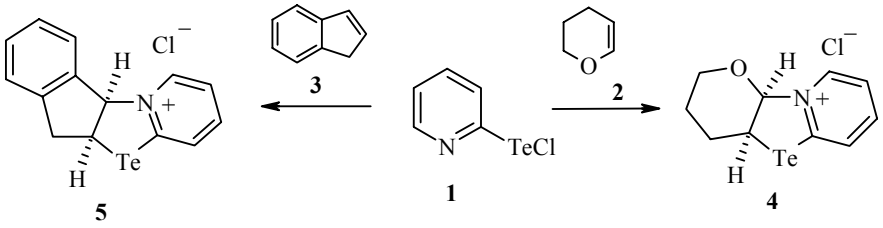
We have already shown that reactions of alkenes with hetarenesulfenyl and hetareneselanyl chlorides containing potentially nucleophilic nitrogen atoms in the hetaryl fragment proceeds as tandem addition-cyclization reactions to give S,N- and Se,N-heterocycles [1-6].

In the present work, in a study of the use of such cyclization reactions in the synthesis of tellurium heterocycles, we obtained 2-pyridinetellurenyl chloride (**1**) and studied its reactions with 3,4-dihydro-2H-pyran (**2**) and indene **3**. The reaction of telllurenyl chloride **1** with unsaturated compounds **2** and **3** in methylene chloride at 20°C gave condensed systems **4** (in 84% yield) and **5** (in 95% yield).



^{1}H NMR spectroscopy was used to show that these reactions are both regiospecific and stereospecific. In light of the data on the stereochemistry of addition to 3,4-dihydro-2H-pyran and indene [7-10] and our previous results [1-6], we may assume that there is *cis*-fusion of the tellurazole ring with the tetrahydropyran and indane units, respectively.

The ^{1}H NMR spectra were taken on a Bruker AM-300 spectrometer at 300 MHz in DMSO-d_6 with TMS as the internal standard. The IR spectra were taken on a Shimadzu IR-Prestige-21 spectrometer.

2-Pyridinetellurenyl Chloride (1). A solution of sulfuryl chloride (0.14 g, 1 mmol) in methylene chloride (10 ml) was added to a solution of di(2-pyridyl) ditelluride (0.41 g, 1 mmol) obtained according to the procedure of Engman and Cava [11]. After 1 h, 0.26 g (54%) chloride **1** was filtered off. The filtrate was

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evaporated in vacuum. Recrystallization of the residue from methylene chloride gave an additional 0.20 g (42%) chloride **1**, mp 195-197°C. IR spectrum (KBr), ν, cm^{-1}: 2360, 1556, 1444, 1413, 1105, 1076, 1039, 983, 750, 696. Found, %: C 24.57; H 1.59; N 5.72. C_5H_4ClNTe. Calculated, %: C 24.90; H 1.67; N 5.81.

Reaction of 2-Pyridinetellurenyl Chloride (1) with Unsaturated Compounds 2 and 3. A solution of unsaturated compound **2** or **3** (1 mmol) in methylene chloride (10 ml) was added to suspension of tellurenyl chloride **1** (0.24 g, 1 mmol) in methylene chloride (10 ml) at 20°C. The tellurenyl chloride dissolves completely after 24 h and the solvent was evaporated off in vacuum. Recrystallization of the residue from methylene chloride gave **4** or **5**.

***cis*-3,4,4a,10a-Tetrahydro-2H-pyrano[2',3':4,5][1,3]tellurazolo[3,2-*a*]pyridinium-10 Chloride (4)** was obtained in 84% yield; mp 185-186°C. IR spectrum (KBr), ν, cm^{-1}: 3419, 2358, 1606, 1558, 1465, 1440, 1284, 1134, 1082, 765. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 8.87 (1H, d, ^3J = 6.0, H-9); 8.37 (2H, m, H-6, H-7); 7.86 (1H, dt, ^3J = 6.0, J = 2.5, H-8); 6.44 (1H, d, ^3J = 4.8, CHO); 4.35 (1H, m, CHTe); 3.94, 3.65 (2H, two m, CH_2O); 2.17, 1.79 (4H, two m, $2CH_2$). Found, %: C 36.62; H 3.68; N 4.23. $C_{10}H_{12}ClNOTe$. Calculated, %: C 36.93; H 3.72; N 4.31.

***cis*-6,10b-Dihydro-5aH-indeno[1',2':4,5][1,3]tellurazolo[3,2-*a*]pyridinium-11 Chloride (5)** was obtained in 95% yield; mp 238-240°C. IR spectrum (neat), ν, cm^{-1}: 3423, 3035, 2360, 1608, 1552, 1481, 1431, 1292, 1170, 765. ^{1}H NMR spectrum, δ, ppm (*J*, Hz): 9.47 (1H, d, ^3J = 6.0, H-1); 8.26 (2H, m, H-3, H-4); 7.87 (1H, dt, ^3J = 5.9, J = 2.9, H-2); 7.45, 7.38 (4H, two m, Ar); 6.91 (1H, d, ^3J = 7.3, CHN^+); 5.32 (1H, t, ^3J = 7.3, CHTe); 3.59 (2H, m, CH_2). Found, %: C 46.81; H 3.31; N 3.83. $C_{14}H_{12}ClNTe$. Calculated, %: C 47.06; H 3.39; N 3.92.

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