SYNTHESIS OF AZIRIDINE DERIVATIVE FROM α-SILYL CARBANION AND THEIR MUTAGENICITY

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Reaction of 2-(trimethylsilylmethyl)pyridine (1a) with p-substituted benzaldoxime O-methyl ether (2) in LDA/THF medium gave trans-2-aryl-3-(2-pyridyl)-aziridine (3a) together with (Z)-1-amino-1-aryl-2-(2-pyridyl)ethene (4a) as a by-product. When the THF solution of 2 was added to the α-silyl carbanion of 1a (Method A), yield of 3a was low, and it varied from 7 to 38% with the reaction conditions. Furthermore, considerable amounts of 4a (31 - 11%) was obtained. The reverse addition (Method B), however, gave selectively 3a (Ar, yield % of 3a and 4a; C_6H_5, 80, 6; p-ClC_6H_4, 85, 2; p-$CH_3C_6H_4$, 60, 9; p-$CH_3OC_6H_4$, 58, 12; p-$(CH_3)_2NC_6H_4$, 74, trace, respectively).

At room temperature, the ^{1}H-NMR spectrum of 3a(Ar = C_6H_5) shows singlets at δ 3.2 and 2.99, assignable to the aziridine-ring CH protons, and a broad signal at δ 2.46 assignable to the imino proton. The signals for the aziridine-ring CH protons at first broaden with decreasing temperature and ultimately spilit into AB quartets. This temperature dependence of the ^{1}H-NMR spectrum is explained by the inversion of the imino nitrogen, and ΔF^* was estimated to be about 14 kcal/mol at the coalescence temperature (Tc = 0 °C).

Three aziridines 3a(Ar = C_6H_5, p-$CH_3C_6H_4$, p-ClC_6H_4) were examined in mutagenicity for *Salmonella typhimurium TA100* and *TA98* by Ames' method. The chloro derivative of 3a showed no mutagenicity for *TA100* and *TA98* while the unsubstituted derivative showed quasi-mutagenisity for *TA100* in the presence of S-9_{mix}, which was prepared from S-9, magnecium chloride, potassium chloride, glucose 6-phasphate, NADPH, NADH, and phosphate buffer. The S-9 was isolated from the liver of a male rat given a PCB (KC-500) injection. The methyl derivative of 3a showed mutagenicity for *TA100* in spite of the presence or the absence of S-9_{mix}. Each of the aziridines 3a used, was toxicant for *TA100* and *TA98*. The starting materials 1a and 2 showed no mutagenicity for either *TA100* or *TA98*.