Chemistry of Heterocyclic Compounds, Vol. 36, No. 8, 2000

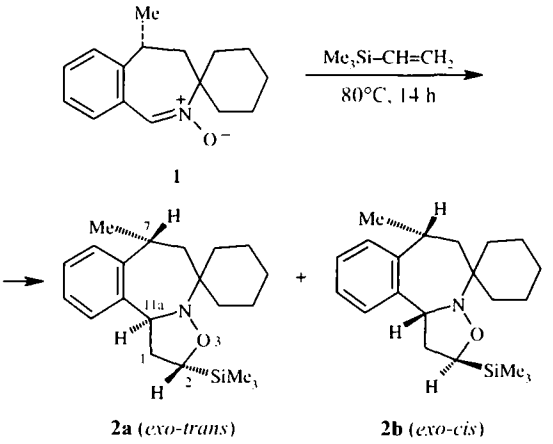
REGIOSELECTIVE [3+2]-CYCLOADDITION OF TRIMETHYLVINYLSILANE TO 4,5-DIHYDRO-5-METHYL-3H-[2-BENZAZEPINE-3'-SPIRO-CYCLOHEXANE] N-OXIDE

A. V. Varlamov[1], F. I. Zubkov[1], K. F. Turchin[2], A. I. Chernyshev[1], and A. N. Levov[1]

Keywords: 2-benzazepines, isoxazolidines, cyclic nitrones, [3+2]-cycloaddition.

1,3-Dipolar cycloaddition of acrylonitrile [1] and methyl- and ethyl acrylates [2] to nitrone **1** does not occur regiospecifically or stereospecifically, but the addition of styrene [3] occurs regioselectively with formation of a 5-phenyl-substituted isoxazolidine ring.

We have established that when nitrone **1** is boiled in benzene with excess trimethylvinylsilane, [3+2]-cycloaddition occurs regioselectively with formation of two stereoisomeric 2-trimethylsilyl-substituted isoxazolidines **2a** and **2b** (76% yield) in the ratio ~1:0.6.



2a (*exo-trans*) **2b** (*exo-cis*)

Compound **2a** was isolated chromatographically in pure form.

Compounds **2a** and **2b** are formed from an *exo*-transition state as a result of approach of the trimethylvinylsilane molecule in respectively the *trans* or *cis* position to the methyl group at the $C_{(5)}$ atoms of nitrone **1**.

[1] Russian People's Friendship University, Moscow 117419; e-mail: avarlamov@sci.pfu.edu.ru. [2] Drug Chemistry Center/All-Russian Scientific-Research Pharmaceutical Chemistry Institute, Moscow 119815; e-mail: turchin@drug.org.ru. Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 8, pp. 1144-1145, August, 2000. Original article submitted May 12, 2000.

0009-3122/00/3608-1005$25.00©2000 KluwerAcademic/Plenum Publishers

The spatial structure of adducts **2a** and **2b** was established by ^{1}H NMR spectra, using data on homonuclear Overhauser effects of the 7-H, 11a-H, 1-HA, 1-HB, and 2-H protons. The established regioselectivity is the second example of such [3+2]-cycloaddition among cyclic nitrones of the 2-benzazepine series.

7-Methyl-2-trimethylsilyl-1,2,4,6,7,11a-hexahydro-5H-[isoxazolo[3,2-*a*]-2-benzazepine-5-spirocyclohexanes] (2a,b). Found, %: C 73.15; H 9.55; N 3.91. $C_{21}H_{33}NOSi$. Calculated, %: C 73.45; H 9.62; N 4.08.

Compound **2a:** white crystals; mp 103-105.5°C (hexane), R_f 0.55 (Silufol UV-254, ethyl acetate–hexane, 1:20). ^{1}H NMR spectrum (C_6D_6, 400 MHz), δ, ppm: 4.43 (1H, dd, 11a-H); 3.75 (1H, m, 7-H); 3.57 (1H, t, 2-H); 2.55 (1H, m, 1-HA); 2.43 (1H, m, 1-HB); 2.00 (1H, d, 6-HA); 1.22 (3H, d, 7-Me); 1.18 (1H, dd, 6-HB). IR spectrum (KBr), ν, cm^{-1}: 856, 1258 ($SiMe_3$).

Compound **2b:** (in a mixture with **2a, 2a/2b**, 1:0.6): white crystals; mp 101-103°C (hexane), R_f 0.34 (Silufol UV-254, ethyl acetate–hexane, 1:20). ^{1}H NMR spectrum (C_6D_6, 400 MHz), δ, ppm: 4.47 (1H, dd, 11a-H); 3.62 (1H, dd, 2-H); 3.09 (1H, m, 7-H); 2.72 (1H, m, 1-HA); 2.05 (1H, m, 1-HB); 1.97 (1H, d, 6-HA); 1.25 (3H, d, 7-Me); 1.22 (1H, dd, 6-HB). Mass spectrum, *m/z* (I_{rel}, %): 343 (M^+, 13), 227 (31), 226 (61), 212 (27), 198 (28), 184 (19), 172 (21), 156 (16), 144 (21), 132 (16), 131 (100), 130 (69), 129 (35), 115 (41), 101 (36), 98 (19), 91 (16), 77 (21), 73 (29), 55 (11), 41 (17). IR spectrum (KBr), cm^{-1}: 856, 1258 ($SiMe_3$).

This research was done with the financial support of the Russian Foundation for Basic Research, grant 99-03-32942a.

REFERENCES

1. A. V. Varlamov, F. I. Zubkov, K. F. Turchin, A. I. Chernyshev, and R. S. Borisov, *Khim. Geterotsikl. Soedin.*, in press.
2. A. V. Varlamov, F. I. Zubkov, A. I. Chernyshev, and N. M. Mikhailova, in: *Abstracts, Third All-Russian Congress on Man and Medicine* [in Russian], Farmmedinfo, Moscow (1996), p. 13.
3. A. V. Varlamov, K. F. Turchin, A. I. Chernyshev, F. I. Zubkov, and T. N. Borisova, *Khim. Geterotsikl. Soedin.*, No. 5, 703 (2000).