4,6-DIARYL-3-THIOCARBAMOYL-3,4-DIHYDROPYRIDIN-2(1H)-ONES

A. A. Krauze, E. E. Liepin'sh, and G. Ya. Dubur

UDC 547.824.07:543.422.25

We have previously shown that the condensation of chalcones with malondiamide in the presence of bases initially gives δ -oxodiamides [1], and the condensation of chalcones with cyanothioacetamide affords 6-hydroxy-3-cyano-1,4,5,6-tetrahydropyridine-2-thiolates [2].

The condensation of chalcones with monothiomalondiamide in the presence of bases (piperdine or sodium methoxide, 20°C) followed by neutralization has given 6-hydroxy-4,6-diary1-3thiocarbamoylpiperidin-2-ones (I), which in acid solution lose a molecule of water to form the more stable 4,6-diary1-3-thiocarbamoy1-3,4-dihydropyridin-2(1H)-ones (II).

 $C_{6}H_{4}R$ $C_{6}H_{4}R$ $C_{6}H_{5}$ $C_{6}H_{4}R$ $C_{6}H_{5}$ $C_{6}H_{5}$

aR = H, $bR = p \cdot Cl$, $cR = p \cdot NO_2$

The IR spectra of (I) and (II) show absorption for stretching vibrations at 1676-1688 (C=O) and 3158-3406 cm⁻¹ (NH). In the PMR spectra of the piperidin-2-ones (I), signals are present for the protons of NH at 8.18-8.15, NH₂ at 9.34-9.31 and 9.20-9.18, OH at 6.13-6.27, and 3-H, 4-H, and 5-CH₂ at 3.90-3.87, 4.30-4.27, and 2.14-2.09, and 1.91 ppm, respectively. Ring coupling constants: ${}^{3}J_{34} = 11.0$, ${}^{3}J_{45} = 11.0$ and 3.4, ${}^{2}J_{5}$ -CH₂ = 12.4 Hz. In the PMR spectra of the 3,4-dihydropyridin-2(1H)-ones (II), in addition to the signals for the NH, NH₂, C₆H₅, and C₆H₄R protons, signals were present for 3-H, 4-H, and 5-H at 3.98-3.95, 4.68-4.60, and 5.33-5.25 ppm, with ${}^{3}J_{34} = 11.8$ -12.0 Hz and ${}^{3}J_{45} = 3.0-3.1$ Hz, indicating the transpseudoequatorial orientation of the 3-CSNH₂ and 4-C₆H₄R substituents. The presence in the UV spectra of (II) of a long-wavelength maximum at 273-276 nm confirms the 3,4-dihydropyridin-2(1H)-one structure, since the alternative structure (the corresponding 3,4-dihydropyridin-2(1H)-thiones) have a long wavelength absorption maximum at 325-328 nm [2].

Hence, in monothiomalonamide, under these conditions the amide NH₂ is more nucleophilic than the thioamide NH₂, resulting in the exclusive formation of the 2-oxo-derivatives of the hydrogenated pyridines [compound (I) or (II)]. This finding is in marked contrast to the intramolecular cyclization of unsaturated δ -oxomonothiodiamides, which results in the formation of 2-thioxo-derivatives of pyridine [3].

Compound (Ia), yield 78%, mp 178-180°C; (Ib), yield 75%, mp 190-193°C; (IIa), yield 50%, mp 198-200°C; (IIb), yield 49%, mp 223-225°C; (IIc), yield 42%, mp 234-236°C.

The elemental analyses of the compounds obtained agreed with the calculated values.

LITERATURE CITED

- 1. Z. A. Bomika, Yu. E. Pelcher, G. Ya. Dubur, A. A. Krauze, and E. E. Liepin'sh, Khim. Geterotsikl. Soedin., No. 10, 1377 (1979).
- A. A. Krauze, Z. A. Kalme, Yu. E. Pelcher, E. E. Liepin'sh, I. V. Dipan, and G. Ya. Dubur, Khim. Geterotsikl. Soedin., No. 11, 1515 (1983).
- 3. W. Schaper, Synthesis, No. 5, 861 (1985).

Institute of Organic Symthesis, Academy of Sciences of the Latvian SSR, Riga 226006. Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 7, p. 994, July, 1987. Original article submitted September 15, 1986.