ISSN 1070-3632, Russian Journal of General Chemistry, 2008, Vol. 78, No. 4, pp. 680–681. © Pleiades Publishing, Ltd., 2008.
Original Russian Text © S.G. Kon'kova, S.S. Ayotsyan, A.A. Khachatryan, A.E. Badasyan, M.S. Sargsyan, 2008, published in Zhurnal Obshchei Khimii, 2008, Vol. 78, No. 4, pp. 698–699.

LETTERS TO THE EDITOR

A New Synthesis of Ethanol and Propanol *N*-(Cyclohex-1-enyl)amino Derivatives on the Basis of Enamines from Acetylacetone and Ethyl Acetoacetate

S. G. Kon'kova, S. S. Ayotsyan, A. A. Khachatryan, A. E. Badasyan, and M. S. Sargsyan

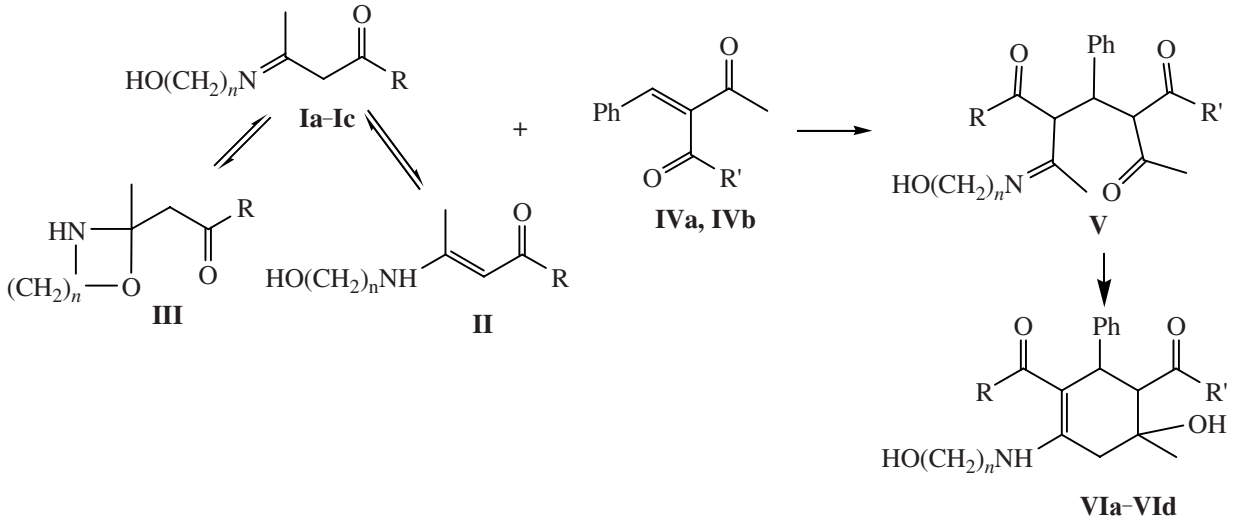
Institute of Organic Chemistry, National Academy of Sciences of Armenia, ul. Zakharia Kanakertsi 167A, Erevan, 375091 Armenia

Received October 15, 2007

DOI: 10.1134/S1070363208040282

Imines containing a hydroxy group β, γ, or δ to the nitrogen atom can undergo ring–chain tautomerization, along with imine–enamine and imine–imine tautomerizations [1, 2]. This property of imino alcohols forms the basis of one of available methods for preparing 1,3-oxazolidine, tetrahydro-1,3-oxazine, and perhydro-1,3-oxazepine. The key step of the process is the reaction of imino alcohols with electrophiles.

In the present work we showed that imino alcohols **I** prepared from acetylacetone or ethyl acetoacetate and existing mainly in enamine form **II** react with electrophilic olefins **IV** to form, instead of alkylation products of cyclic tautomers **III**, substituted [*N*-(cyclohex-1-enyl)amino]alcohols **VI** in 60–70% yields. The latter products are formed evidently through C-alkylation of enamines and subsequent cyclization of adducts **V** according to the following scheme.



VIa, R = R' = CH_3, *n* = 2; **VIb**, R = R' = OC_2H_5, *n* = 2; **VIc**, R = CH_3, R' = OC_2H_5, *n* = 3; **VId**, R = OC_2H_5, R' = CH_3, *n* = 2.

Structurally similar (cyclohex-1-enyl)amines were previously prepared by the reaction of corresponding hydroxycyclohexanones with amines [3, 4].

2-[(2,3-Diacetyl-5-hydroxy-5-methyl-3-phenylcyclohex-1-enyl)amino]ethanol (VIa). A solution of 1.82 g of the imino alcohol **Ia** in 10 ml of absolute ethanol was treated with 2.4 g of olefin **IVa**, stirred, and left at room temperature for 2–3 days. The crystals that formed were filtered off and washed with a little ether to obtain 2.82 g (68.5%) of compound **VIa**, mp 156–157°C. IR spectrum, ν, cm^{-1}: 1590 (C=C), 1690 (CO), 3100–3200 (OH), 3340 (NH). ^{1}H NMR spectrum (DMSO-d_6), δ, ppm: 1.17 s (3H, 5-CH_3), 1.53 s (3H, 2-Ac), 1.86 s (3H, 4-Ac), 2.45 d (1H) and 2.58 d (1H, 6-CH_2), 2.61 d (1H, 4-CH_3), 3.30 d.q (1H) and 3.34 d.q (1H, NCH_2), 3.60 t.d (2H, OCH_2), 4.10 s (1H, 5-OH), 4.12 d (1H, 3-CH), 4.63 t (1H, CH_2O*H*), 7.06–7.13 m (3H) and 7.21 m (2H, Ph), 11.44 t (1H, NH).

Diethyl 6-hydroxy-[(2-hydroxyethyl)amino]-6-methyl-2-phenylcyclohex-3-ene-1,3-dicarboxylate (VIb) was prepared analogously from 1.73 g of compound **Ib** and 2.18 g of olefin **IVb** in 10 ml of absolute ethanol. Yield 1.3 g (59.3%), mp 94–95°C. IR spectrum, ν, cm^{-1}: 1620 (C=C), 1700–1720 (COO), 3100–3200 (OH), 3310 (NH). ^{1}H NMR spectrum, δ, ppm: 0.65 t (3H, 2C*H*$_3$CH$_2$), 1.05 t (3H, 4-C*H*$_3$CH$_2$), 1.20 s (3H, 5-CH_3), 2.35 d (1H) and 2.42 d (1H, 6-CH_2), 2.58 d (1H, 4-CH), 3.30 m (2H, NCH_2), 3.59 m (2H, OCH_2 and 1H, 2-CH_3C*H*$_2$), 3.75 m (1H, CH_3C*H*$_2$), 3.89 s (1H, 5-OH), 3.95 q (2H, 4-CH_3C*H*$_2$), 4.04 d (1H, 3-CH), 4.58 t (1H, CH_2O*H*), 7.0–7.16 m (5H, Ph), 9.02 t (1H, NH). In the range δ 3.51–3.65 ppm of the ^{1}H NMR spectrum, overlap of the following signals is observed: 3.57 m (2H, OC*H*$_2$CH$_2$N) and 3.59 d.q (1H^A) of one of the other 2-CH_2CH_3 protons. The 2-CH_2CH_3 proton signal is observed at δ 3.75 ppm, d.q (1H^B).

Ethyl 3-acetyl-6-hydroxy-[3-(hydroxypropyl)amino]-6-methyl-2-phenylcyclohex-3-enecarboxylate (VIc) was prepared analogously from 1.57 g of enamine **Ib** and 2.18 g of olefin **IVb** in 10 ml of absolute ethanol. Yield 2.39 g (63.7%), mp 145–146°C. IR spectrum, ν, cm^{-1}: 1640 (C=C), 1690 (CO), 1720 (COO), 3100–3200 (OH), 3350 (NH). ^{1}H NMR spectrum, δ, ppm: 1.08 t (3H, C*H*$_3$CH$_2$O), 1.2 s (3H, 5-CH_3), 1.57 s (3H, 2-Ac), 1.75 m (2H, CH_2C*H*$_2$CH$_2$), 2.35 d (1H) and 2.45 d (1H, 6-CH_2), 2.65 d (1H, 4-CH), 3.34 m (2H, NCH_2), 3.55 m (2H, OCH_2), 3.95 q (2H, 2-CH_3C*H*$_2$O), 4.01 s (1H, 5-OH), 4.19 d (1H, 3-CH); 4.24 t (1H, CH_2O*H*), 7.06–7.13 m (3H) and 7.20 m (2H, Ph), 11.41 t (1H, NH).

Diethyl 6-hydroxy-[(3-hydroxypropyl)amino]-6-methyl-2-phenylcyclohex-3-ene-1,3-dicarboxylate (VId) was prepared analogously from 0.65 g of enamine **Ib** and 0.7 g of olefin **IVa** in 5 ml of absolute ethanol. Yield 0.64 g (60.7%), mp 151–152°C. IR spectrum, ν, cm^{-1}: 1580 (C=C), 1690 (CO), 1710 (COO), 3100–3200 (OH), 3320 (NH). ^{1}H NMR spectrum, δ, ppm: 0.68 t (3H, 2-C*H*$_3$CH$_2$), 1.18 s (3H, 5-CH_3), 1.81 (3H, 4-Ac), 2.42 d (1H) and 2.55 d (1H, 6-CH_2), 2.60 d (1H, 4-CH), 3.30 m (2H, NCH_2), 3.58 m (2H, OCH_2 and 1H, 2-CH_3C*H*$_2$), 3.75 m (1H, 2-CH_3C*H*$_2$), 3.95 d (1H, 3-CH), 4.02 s (1H, 5-OH), 4.58 t (1H, CH_2O*H*), 7.05–7.10 m (2H, Ph), 9.05 t (1H, NH).

The IR spectra were measured on a Specord IR-75 spectrometer in mineral oil. The ^{1}H NMR spectra were taken on a Varian Mercury-300 spectrometer (300 MHz) in DMSO-d_6 against internal TMS.

REFERENCES

1. Sargsyan, M.S. and Kon'kova, S.G., *Khim. Zh. Arm.,* 2005, vol. 58, no. 3, p. 45.
2. Bergmann, E.D. and Kaluszyner, A., *Recl. Trav. Chim. Pays-Bas*, 1959, vol. 78, p. 331.
3. Rabe, P. and Else, F., *Justus Liebigs Ann. Chem*., 1902, vol. 323, p. 83.
4. Sorokin, V.V., Kuz'min, M.V., Smirnova, N.S., Kozhevnikova, N.I., and Kriven'ko, A.P., *Zh. Org. Khim.,* 1994, vol. 30, no. 4, p. 528.