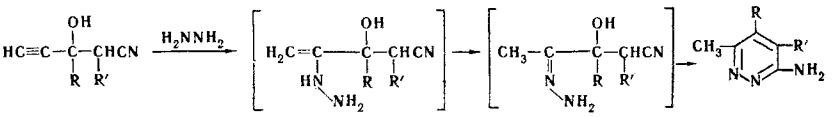
REACTION OF ACETYLENIC HYDROXYNITRILES WITH HYDRAZINE – NEW METHOD FOR THE SYNTHESIS OF 3-AMINOPYRIDAZINES

K. G. Golodova, S. I. Yakimovich, and F. Ya. Perveev

UDC 547.339.2+547.362+547.852.2

We have established that the reaction of acetylenic hydroxynitriles (I) [1-3] with hydrazine at 80°C leads to the formation of substituted 3-aminopyridazines (IV). The structure of the latter was proved by means of IR and PMR spectroscopy and comparison with the data in [4, 5]. The reaction commences with the addition of hydrazine to the C ≡ C bond with subsequent tautomeric conversion of enehydrazine II to hydrazone III and cyclization of the latter at the nitrile group. Initial dehydration of the hydroxynitriles to the corresponding enyne nitriles should be excluded, since we have previously demonstrated that the reaction of such compounds with hydrazines gives cyano derivatives of 2-pyrazolines [6].



I II III IV

a R=R′=H; b R=CH$_3$, R′=H; c R=R′=CH$_3$

A mixture of 9.5 g of 1-cyano-3-butyn-2-ol (Ia) and 5 g (a 50% excess) of hydrazine was heated in an ampul at 80°C for 25 h. The resulting crystals were removed by filtration and recrystallized from alcohol to give 7.2 g (66%) of 3-amino-6-methylpyridazine (IVa) with mp 225-226°. Found: C 54.9; H 6.6; N 38.7%. $C_5H_7N_3$. Calculated: C 55.0; H 6.5; N 38.5%. IR spectrum (thin layer in mineral oil, cm^{-1}): 725 weak (w), 780 w, 845 strong (s), 990 w, 1045 medium (m), 1100 m, 1135 m, 1180 m, 1345 m, 1380 s, 1485 s, 1560 w, 1620 s, 1650 s, 3150 s, 3265 s, and 3330 s. PMR spectrum (10% solution in D_2O and dimethyl sulfoxide, 60 MHz, δ): 2.76 ($CH_3C=N$), 6.57 (NH_2), 7.30 and 7.67 (doublets) (HC = CH). When the reaction was prolonged (50 h), the yield of aminopyridazine IVa was quantitative.

Under similar conditions (reaction with Ib and hydrazine at 80° for 38 h), hydroxynitrile Ib gave 3-amino-5,6-dimethylpyridazine IVb with mp 220-221° in 50% yield. Found: C 58.5; H 7.4; N 34.3%. $C_6H_9N_3$. Calculated: C 58.5; H 7.4; N 34.1%.

Under these conditions (heating for 75 h), hydroxynitrile Ic gave 3-amino-4,5,6-trimethylpyridine (IVc) with mp 186-187°. Found: C 61.2; H 8.2; N 30.8%. $C_7H_{11}N_3$. Calculated: C 61.3; H 8.0; N 30.7%.

LITERATURE CITED

1. F. Ya. Perveev and K. G. Golodova, Zh. Obshch. Khim., 32, 2092 (1962).
2. F. Ya. Perveev, K. G. Golodova, and N. V. Koshmina, Vestnik LGU, No. 4, 143 (1965).
3. K. G. Golodova and S. I. Yakimovich, Zh. Organ. Khim., (1972, in press).
4. T. Nakagome, Chem. Pharm. Bull. (Tokyo), 11, 726 (1963).
5. H. Becker and H. Boettcher, Tetrahedron, 24, 2687 (1968).
6. F. Ya. Perveev, K. G. Golodova, and M. Mikhailov-Makarychev, Zh. Organ. Khim., 7, 847 (1971).

A. A. Zhdanov Leningrad State University. Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 1, p. 131, January, 1972. Original article submitted June 14, 1971.