2. L. N. Bereznegovskaya and T. P. Antsupova, Biol. Nauki, No. 4 188 (1966).
3. T. P. Antsupova, Rast. Res., No. 3, 337 (1968).
4. W. Poethke and W. Kerstan, Pharm. Zentralhalle, 99, 331 (1960).
5. A. L. Shinkarenko and N. V. Bondarenko, Rast. Res., No. 2, 45 (1966).
6. N. V. Bondarenko, A. L. Shinkarenko, and G. I. Gerashenko, Vitebskogo Tekhnologicheskogo Instituta Legkoi Prom'shlennosti, 1, 120 (1970).
7. N. V. Bondarenko, Zh. Obshch. Khim., 37, 332 (1967).
8. A. Stoll and E. Seebek, Helv. Chim. Acta, 36, 718 (1953).
9. N. V. Bondarenko, A. L. Shinkarenko, and G. I. Gerashchenko, Khim. Prir. Soedin., 854 (1971).
10. O. Jeger and V. Prelog, "Steroid alkaloids. Veratrum group," in: The Alkaloids: Chemistry and Physiology, R. H. Manske and H. L. Holmes (ed.), Academic Press, New York, Vol. 7 (1960), p. 363.
11. N. V. Bondarenko, Khim. Prir. Soedin., 810 (1972).
12. N. V. Bondarenko, in: A Phytochemical Study of the Flora of the Belorussian SSR and a Biopharmaceutical Investigation of Medicinal Preparations [in Russian], Leningrad (1975), p. 84.

PREPARATION OF OPTICALLY ACTIVE PROLINE

SYNTHESIS AND RESOLUTION OF CYCLO(N-PANTOYL-DL-PROLINE)

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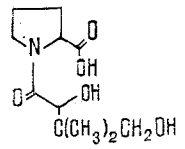
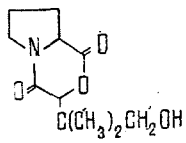
UDC 547.466+547.164.14

In spite of the fact that a whole series of chemical and fermentation methods has been proposed for the resolution of DL-proline [1, 2], the search for new simpler and cheaper methods is of undoubted interest because of the importance of L-proline for the pharmaceutical and foodstuffs industries. Recently, a convenient method has been proposed for resolving some DL-α-amino acids into optical antipodes by their conversion into N-D- and N-L-pantoyl derivatives [3]; however, the resolution of DL-proline has not been reported. In studying the reaction of D-pantolactone with L-proline we have found that, in addition to the formation of the oily N-D-pantoyl-L-proline (I), a well-crystallizing compound is formed, which has been identified as cyclo(N-D-pantoyl-L-proline) (II). In this connection, by using the difference in the solubilities of the enantiomers of (II) we have studied the possibility of the preparative separation of racemic proline by means of the reaction with D-pantolactone.



I



II

Condensation of the sodium salt of DL-proline with D-pantolactone in boiling methanol with subsequent chromatography on KU-2 cation-exchange resin (H^+ form) and extraction of the aqueous eluates with chloroform yielded a mixture of diastereomeric cyclo(N-D-pantoyl-L- and -D-proline)s. Crystallization of this mixture from ether led to the isolation in optically pure form of cyclo(N-D-pantoyl-L-proline) with mp 118-120°C, $[\alpha]_D^{20}$ −68° (c 2; MeOH) (identical with the substance obtained by the reaction of D-pantolactone with L-proline) in a yield of ~10%. The enantiomer of (II) is readily hydrolyzed by boiling with 5 N hydrochloric acid giving L-proline with $[\alpha]_D^{20}$ −55° (c 0.6; 5 N HCl) [1]. Thus, we have succeeded in performing the resolution of DL-proline into antipodes by using D-pantolactone as resolving agent.

LITERATURE CITED

1. J. Greenstein and M. Winitz, in: Chemistry of the Amino Acids, Wiley, New York (1961).
2. K. Vogler and P. Lanz, Helv. Chim. Acta, 49, 1348 (1966).
3. Japanese Patent No. 30,285 (1968); Chem. Abst., 70, 106, 871 (1969).

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