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Levoglucosenone as a source of chiral glycerol derivatives

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Abstract

γ-Amino acids, such as GABA, GABOB and carnitine, attract considerable attention as biologically active compounds in the central nervous system (CNS). γ-Amino-β-hydroxybutyric acid (GABA or GABA) is an unusual amino acid present in the family of marine cyclic peptides and has antitumor and antifungal activity. γ-Amino-β-hydroxybutyric acid (GABOB), also known as β-hydroxy-γ-aminobutyric acid (β-hydroxy-GABA), hamibetal or buxamine is part of anticonvulsants and is used to treat epilepsy in Europe, Japan, Mexico. GABOB is also included in the preparations of Gamalate B_6, Elkar, which have a neuro-regulatory effect on processes in the brain, and also cause mild sedative and cerebrotonic effects.

GABOB has two enantiomers, with (*R*)-GABOB being found to have a higher biological activity than its (*S*)-enantiomer. The research interest in the synthesis of GABOB grows every year due to its biological and pharmacological indicators. Several methods for its synthesis based on ascorbic acid, *D*- and *L*-arabinose, *D*-glucose have been described in the literature. The key stage of the transition from carbohydrates to the optical derivatives of glycerin is the synthesis of glycidol or glycerol acetonide.

Levoglucosenone (1,6-anhydro-3,4-dideoxy-β-*D*-glycero-hex-4-enopyranose-2-ulose)-sugar enon, which combines the 6,8-dioxabicyclo[3.2.1]octane framework, enon system, strongly activated keto group and acetal center. Levoglucosenone is available from fiber of any origin, thanks to its unique structure and solubility is a convenient material for the synthesis of various classes of organic compounds. It has found application in stereocontrolled syntheses of complex compounds and their analogues. Along with this, it should be noted that the prospect of synthesis on its basis of simpler but no less important chiral derivatives of glycerin has been little studied. Thus, for the first time we have developed a short approach to glycidol, the main stage in which is the ozonolysis of the double bond in the dioxolane derivative of levoglucosenone and the reduction of the ozonides $NaBH_4$.

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