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Diels-Alder adduct of levoglucosenone with diene Dane approaches to estrogens

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Abstract

Levoglucosenone has established itself as a good Michael acceptor and a powerful dienophile in Diels-Alder reactions, dipolar cycloaddition and in a number of other transformations. In the Diels-Alder reactions of levoglucosenone with 1,3-dienes, chiral derivatives of cyclohexene are obtained, which are valuable products for the synthesis of natural compounds. We previously studied the reaction of the interaction of levoglucosenone with Dane diene under catalytic, thermal conditions, at ultrahigh pressures and microwave irradiation. It was found that as a result of the reaction, 2 adducts are formed – (1*S*,2*S*,15*S*,17*R*)-9-methoxy-18,20-dioxapentacyclo[15.2.1.02,15.0.5,14.06,11]icosa-4,6,8, 10-tetraen-16-one and its isomer, the product of the double bond migration is (1*S*,2*S*,14*S*,15S,17*R*)-9-methoxy-18,20-dioxapentacyclo[15.2.1.02,15.0.5, 14.06,11] icosa-5(14), 6,8,10-tetraen-16-one. In this work, we have developed methods for the transformation of these Diels-Alder adducts in approaches to compounds with a steroid skeleton. Thus, based on the obtained Diels-Alder adducts, optically active hydrazone was synthesized. An optimal method for deoxygenation of a keto group proceeding by aromatization of cycle ***B*** in (1*S*,2*S*,14*S*,15*S*,17*R*)-9-methoxy-18,20-dioxapenta-cyclo [15.2.1.02,15.0.5,14.06,11]icosa-5(14),6,8,10-tetraen-16-one, converting it to sulfide, followed by boiling in the presence of Raney nickel. The resulting compound, 9-methoxy-18,20-dioxapentacyclo-[15.2.1.02,15.0.5, 14. 06,11]icosa-5(14),6,8,10,12-pentaenone, is a promising synthetic block for use in the synthesis of estrogen – equilenin. The biological activity of the synthesized compounds was predicted using the PASS computer program, which resulted in the identification of derivatives that are promising for the study of antacid, anti-seborrheic, embryotoxic, and anti-cancer properties.

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