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SYNTHESIS OF ISOXAZOLIDINES BASED ON [2+3]-DIPOLAR CYCLOADDITION OF NITRONE DERIVATIVES TO VARIOUS α,β-UNSATURATED LACTONES

In recent years, interest in heterocyclic compounds has significantly increased. Among them, the most pronounced representatives are isoxazole derivatives — isoxazolidines. A series of studies have reported that various chemical functional groups linked to pyrrolo-isoxazolidine have properties that inhibit acetylcholinesterase, which underlies the treatment of Alzheimer's disease [1, p. 521]. Prior research has demonstrated that isoxazoline moieties have a variety of biological activities (anti-HIV, anti-cancer, etc.) [2, p. 220]. Additionally, benzoylphenylurea compounds containing isoxazoline and isoxazole groups have been experimentally proven to exhibit larvicidal activity against various insects (mosquitoes, worms, etc.) [3, p. 4851]. The usefulness of such insecticides lies in their action on selective biochemical sites present in certain groups of insects which inhibit the formation of chitin in insects. If molecules with similar properties were to be synthesised, it would greatly facilitate the control of certain species of insect pests for the forestry industry in the Republic of Belarus. Drawing on these and many other biological facts, the full significance of these substances in everyday life, particularly in medicine, can be appreciated.

The purpose of the experiment conducted by our team is to design new heterocyclic compounds, in particular isoxazolidine derivatives, from various α,β-unsaturated lactones with biological activity via 1,3-dipolar cycloaddition of nitrone derivatives to them. At present, a lot of work is being done to elaborate methodologies for the synthesis of these organic molecules. The starting reagents for the synthesis were obtained artificially, with nitrone

having to be obtained immediately a few hours before isoxazolidine is produced. The solvents used were toluene, methanol, chloroform and acetonitrile. Later, various kinds of organometallic compounds, such as scandium (III) triflate, copper (II), and zinc, as well as mineral acids, such as sulphuric acid and hydrochloric acid, were applied as catalysts. All tests were carried out under intensive mixing in the temperature range from 30 °C to 120 °C for 2-3 days. The research has been conducted for a year and several samples of isoxazolidines have been obtained. The molecules possess different moieties which have not yet been fully tested for any bioactive properties.

The findings prove that the developed laboratory methods for the synthesis of isoxazolidine derivatives are justified and, thus, it is possible to obtain new heterocyclic physiologically active substances by selecting appropriate conditions. Therefore, the research will add specific properties of new isoxazolidine derivatives to the biochemical library and might help to solve some vital health issues in the future.

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