

Information on dissertation submitted for the PhD degree of National research Tomsk State University

Name of applicant: Boudebouz Imene

Title of the thesis: Synthesis and Study of New Glycoluril Derivatives

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Supervised by: Abdigali Bakibaev, doctor of chemical sciences, professor, leading researcher laboratory catalytic research, Tomsk State University, TSU.

official Opponents

- 1) Salkeeva Lyazat, doctor of chemical sciences, professor, head of the department of technology of organic substances, Karaganlin State University.
- 2) Pavlovsky Viktor Ivanovich, doctor of chemical sciences, professor, leading researcher at "innovative pharmacological developments" company, Tomsk Polytechnic University, TPU.

Chair PhD Committee

Irina Aleksandrovna Kurzina, doctor of Physical and Mathematical sciences, Associate Professor, Professor at department of physical and colloid chemistry, deputy head of laboratory of translational cell and molecular biomedicine, Tomsk State University, TSU.

ABSTRACT OF DISSERTATION

Glycoluril is a simple heterobicyclic compound, which was prepared for the first time in the 19th century. Since then, glycoluril and its derivatives have found to be of great importance for pharmaceutical production, biochemistry, technology, agriculture, clinical and experimental medicine. Some glycoluril derivatives occupied an important place as intermediates for the synthesis of detergents, surface active substances. Also noteworthy is the pharmacological significance of compounds of the glycoluril series, which are widely used in medicine as psychotropic, nootropic substances and tranquilizers of a new generation.

The synthesis and properties of glycoluril thio-analogs are still poorly studied, although, both from scientific and applied points of view, these compounds are no less interesting, as confirmed by the PASS program data: the probability of detecting various types of pharmacological activities in mebicar thio-analogs is very high (0.785 - 0.958). It is well known that the replacement of the oxygen atom by sulfur leads to an increase in biological activity or change in the type of activity of compounds (for example, thiopyracetam is more active than pyracetam).

The introduction of new fragments to the nitrogen atoms of glycoluril or sulfur atom of thioglycoluril could lead to the expansion of the spectrum of pharmacological action. In this regard the synthesis of new derivatives of this latter is an important and urgent task.

The purpose of this study is to synthesize and study new compounds of the glycoluril and thioglycoluril series.

To accomplish this goal, the work is supposed to solve the following main tasks:

1. Based on the literature, to investigate informations about glycoluril derivatives and their applications.

2. Synthesis and study of some glycoluril derivatives.
3. Synthesis of TAMGU as new derivative compound.
4. Acetylation of some cyclic amines using TAMGU as new acetylating agent.
5. Application of TAMGU as new precursor for the preparation of cucurbit[6]uril and new trimer.
6. Prepare some new diphenylthioglycoluril derivatives via alkylation reaction.
7. Investigate the antioxidant activity of the new synthesized diphenylthioglycoluril derivatives.
8. The application of diphenylthioglycoluril as catalyst in the synthesis of betulin 3, 28 di-O-formate.

The previous cited tasks have been accomplished successfully:

- The synthesis of tetraethoxy glycoluril and 1,4 diphenyl 2,3 dimethylol glycoluril have been achieved, as well as a modified method for the preparation of tetramethoxy methyl glycoluril has been developed.
- For the first time, a new glycoluril derivative tetracetoxymethyl glycoluril has been synthesized, and applied as acetylating agent for the introduction of acyl fragments into primary amines.
- A new method for the synthesis of cucurbit[6]uril and new acyclic trimer that contains three glycoluril units has been developed using tetracetoxymethyl glycoluril as new precursor.
- A new S-alkylated series of diphenylthioglycoluril has been obtained by applying S-alkylation reaction. The reaction mechanism of these derivatives has been proposed.

- The S-alkylation of diphenyl thioglycoluril yielded a highly antioxidant derivatives that surpass the antioxidant of ascorbic acid.
- For the first time, an efficient method for the synthesis of betulin diformate using diphenyl thioglycoluril as catalyst. In addition, allobetulin formate has been synthesized successfully from the reaction of betulin diformate with TFA.