

OPINION

by Assoc. Prof. Dr. Eng. Marin Neykov Marinov,

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on a dissertation for the award of the educational and scientific degree „**Doctor**“

in: field of higher education 4. Natural Sciences, Mathematics and Informatics

professional field 4.2. Chemical Sciences

doctoral program Organic Chemistry

Author: Yordanka Dimitrova Sapundzhieva

Subject: Synthesis of quinoline derivatives with potential antibacterial activity

Scientific supervisor: Assoc. Prof. Dr. Plamen Angelov, Plovdiv University “Paisii Hilendarski”

1. General presentation of the procedure and the doctoral student

By order No. RD-22-265 / 04.02.2025 of the Rector of Plovdiv University "Paisii Hilendarski" (PU), I have been appointed as a member of the scientific jury for ensuring a procedure for dissertation defense on "Synthesis of quinoline derivatives with potential antibacterial activity" for the acquisition of the educational and scientific degree "Doctor" in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.2. Chemical Sciences, doctoral program Organic Chemistry, with author Yordanka Dimitrova Sapundzhieva.

Yordanka Sapundzhieva obtained her higher education at the Faculty of Chemistry of PU, as follows: Chemistry, Food Chemistry, Pedagogy (1996-1999, full-time study) and Medical Chemistry (2019-2020, part-time study).

She was enrolled in full-time doctoral studies (order No. RZZ-436 / 08.02.2021), which was subsequently transformed into a part-time form of study (order No. RD-21-230 / 26.01.2024) at the Department of Organic Chemistry with the scientific supervisor Assoc. Prof. Dr. Plamen Angelov (PU).

The set of materials presented by Yordanka Sapundzhieva, related to the procedure for defending a dissertation for awarding the educational and scientific degree "Doctor", is in accordance with Art. 36 (1) of the Regulations for the Development of the Academic Staff of PU (PRASPU), as it fully covers the set criteria and contains all necessary documents, which have been submitted on time and are duly completed.

2. Relevance of the topic

The interest in quinoline derivatives is determined by their broad spectrum of biological activity. Undoubtedly, the topic of the dissertation is extremely relevant and important, as the presented work is aimed at obtaining such types of compounds as potential antibacterial agents.

3. Knowledge of the subject

The dissertation quotes 155 literature sources, over 20% of which were published in the last 5 years. Detailed information is presented on the classical and modern methods of synthesis, as well as the biological activity of 2- and 4-quinolones. The good construction of the literature review clearly shows that the doctoral student has a thorough knowledge of the current state of research, as well as the problems related to the topic of the dissertation.

4. Research methodology

The dissertation work is aimed at developing new methods for the synthesis of quinoline derivatives, in particular of the 2- and 4-quinolone type, as well as studying their antibacterial activity. To achieve the goal set, appropriately selected experimental techniques have been used, and the results obtained have been described and discussed clearly and correctly.

5. Characteristics and evaluation of the dissertation work and contributions

The dissertation is written at a high scientific level with a volume of 144 pages, and contains the following main sections: Introduction (2 pages), Literature review (40 pages), Results and discussion (35 pages), Experimental part (36 pages), Summary results and conclusions (1 page), Publications (1 page) and Literature (11 pages). The text is illustrated with 45 figures, 100 schemes and 12 tables.

The main contributions of the dissertation work can be systematized as follows:

- 1) Various options for the synthesis of quinoline derivatives from the corresponding β -ketoamides have been studied.
- 2) A new method leading to the preparation of 2-alkyl-4-quinolones, 2-alkyl-4-quinolone-3-carboxamides and their N-hydroxy derivatives has been presented.
- 3) A method for the synthesis of 1,2-dialkyl-4-quinolone-3-carboxamides has been presented.
- 4) 6 natural compounds, representatives of 4-quinolones, which are metabolites of *Pseudomonas aeruginosa* or plant alkaloids, as well as 37 of their analogues, for which there is no data in the specialized literature, have been obtained.
- 5) The behavior of γ -aminophenyl-functionalized β -ketoamides under Knorr-cyclization conditions in polyphosphoric acid has been studied.
- 6) As a result of the antibacterial tests conducted, it was found that some of the obtained 4-quinolones are highly active against *Staphylococcus aureus*, and one of the compounds exhibits activity against Gram-positive and Gram-negative bacteria.

6. Assessment of the publications and personal contribution of the doctoral student

Part of the results obtained during the development of the dissertation have been summarized in 5 publications in journals, referenced and indexed in global databases of scientific information (Scopus and Web of Science), namely: 1 issue in Q1, 1 issue in Q2 and 3 issues in Q4. Additionally, 1 publication has been submitted, which is in the process of being reviewed. The personal participation of the doctoral student in the indicated articles is as follows: first author – 3 issues, second author – 3 issues.

Yordanka Sapundzhieva has participated in 3 scientific conferences, at which she has delivered 2 reports and presented 2 posters.

7. Abstract

The presented abstract has been prepared in accordance by the requirements and fully corresponds to the structure, content and results described in the dissertation.

8. Recommendations for future use of the dissertation contributions and results

Important results were obtained during the development of the dissertation, which determines the need to continue research in this direction.

CONCLUSION

The dissertation contains original scientific and applied scientific results that meet all the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Regulations for the Implementation of the ADASRB and the PRASPU. A declaration is attached by the doctoral student that the results and contributions presented in the dissertation are original and have not been borrowed from research and publications without her participation. There is no evidence of plagiarism.

The presented work shows that doctoral student Yordanka Sapundzhieva possesses in-depth theoretical knowledge and professional skills in the scientific specialty "Organic Chemistry", demonstrating qualities and skills for independent conduct of scientific research.

The minimum required points by groups of indicators for acquiring the educational and scientific degree "Doctor", as well as Yordanka Sapundzhieva's scientometric indicators are summarized in the table below. The results achieved by the doctoral student significantly exceed the requirements of the PU, according to the ADASRB.

Indicator Group	Contents	Minimum required points from the PU for acquiring the educational and scientific degree "Doctor", Professional field 4.2. Chemical Sciences	Scientometric indicators of Yordanka Sapundzhieva
A	Indicator 1	50	50
G	Sum of indicators 5 to 10	30	81

Due to the above, I confidently give my positive assessment of the conducted research, presented by the above-reviewed dissertation, abstract, achieved results and contributions, and I propose to the esteemed scientific jury to award the educational and scientific degree "Doctor" to Yordanka Dimitrova Sapundzhieva in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.2. Chemical Sciences, doctoral program Organic Chemistry.

Date: 19.03.2025

Preparer of the opinion:

/ Assoc. Prof. Dr. Eng. Marin Marinov /