

REVIEW

by Assoc. Prof. Dr. Yulian Dimitrov Zagranyski

Sofia University "St. Kliment Ohridski", Faculty of Chemistry and Pharmacy, member of the scientific jury, according to order № RD-09-06/19.01.2024 of the Director of IOCCP-BAS, of a dissertation paper to award the academic and scientific degree Doctor in the field of higher education 4. Natural sciences, mathematics and informatics professional field 4.2. Chemical sciences, professional field "Organic Chemistry"

Author: assistant Maya Trifonova Tavlinova-Kirilova

Topic: "CHIRAL AMINOBENZYL-NAPHTHOLS AND -QUINOLINOLS AND DIHYDRO-1,3-NAPHTHOXAZINES - SYNTHESIS AND CATALYTIC APPLICATIONS"

Thesis supervisor: Assoc. Prof. Kalina Kostova, PhD

Assist. Prof. Mariana Kamenova-Nacheva, PhD

The dissertation, the abstract and the paper and electronic documents presented by the assistant Maya Trifonova Tavlinova-Kirilova meet the requirements of the Academic Staff Development Act in the Republic of Bulgaria, and the Regulations on the Terms and Conditions for Acquiring Scientific Degrees and Holding Academic Positions at IOCCP-BAS and include the following documents: an application for admission to defense; an autobiography; a copy of the diploma for completed master's degree; protocols from successfully passed exams according to an individual training plan; dissertation work; an abstract in Bulgarian and English; a list and copies of scientific publications on the dissertation topic; a list of noticed citations; a list of participations in scientific forums; a list of participations in projects. The documents are well designed and systematized.

Maya Trifonova Tavlinova-Kirilova graduated from the Faculty of Chemistry and Pharmacy of Sofia University "St. Kl. In the period 2000-2005 she worked as a chemist-specialist in the laboratory "Organic Synthesis and Stereochemistry" at IOCCP-BAS, in the period 2005-2011 she was appointed as a research assistant III degree in the same laboratory. From 2011 she was appointed as an assistant professor, and in 2021 she was appointed as a PhD student.

Assistant Professor Maya Tavlinova-Kirilova is fluent in English and Russian, works in the field of organic synthesis, asymmetric catalysis, synthesis of biologically active substances, chromatographic and spectral methods for the analysis of organic molecules.

Characteristics and evaluation of the thesis and contributions

The dissertation is written concisely and clearly and contains an introduction, aims and objectives, literature review, results and discussion, conclusions, experimental section, literature cited, and a list of abbreviations and terms used. The dissertation (with a total length of 220 pages) includes 34 figures, 116 diagrams and 11 tables, and the bibliography comprises 187 titles.

An in-depth analysis of the published studies on the subject related to the *Mannich* reaction is made - general classification of components, *Mannich* aminomethylation of phenols and naphthols, methods for the synthesis of dihydro-1,3-oxazines, preparation of bis-dihydro-1,3-benzoxazines and bis-dihydro-1,3-oxazinoquinolines, *Mannich* reaction using diamines, condensation by *Betti*, etc. On the basis of the conclusions drawn from the literature review, the aim and objectives of the thesis are clearly formulated.

The research in this dissertation is in the field of asymmetric organic synthesis and aims to develop efficient approaches for the preparation of chiral compounds with potential applications as ligands and catalysts to achieve high stereoselectivity in various chemical transformations, as well as to create a series of compounds with potential biological activity. The Ph.D. student focused on the development of methods for the synthesis of dihydro-1,3-naphthoxazines by *Mannich* condensation of 2-naphthol, formaldehyde and chiral amines and their reduction to produce aminomethylnaphthols using derivatives of natural amino acids, as well as the preparation of chiral, non-racemic bis-dihydro-1,3-naphthoxazines using enantiomerically pure (R,R)- or (S,S)-cyclohexane-1,2-diamine, *Mannich* condensation of quinolin-6-ol, formaldehyde and chiral amines and subsequent reduction.

Good knowledge of interpretation of results obtained from one and two-dimensional NMR spectroscopy is demonstrated. All new chiral compounds have been structurally characterized using NMR spectroscopy, specific angle of rotation mass spectrometry and elemental analysis. A large amount of synthetic and analytical work has been carried out, which is clearly and systematically described and supported by evidence and illustrations.

Assessment of publications and personal contribution of the PhD student

The dissertation is built on three scientific papers published in 2016, 2017 and 2023 in specialized and peer-reviewed scientific journals such as *Bulgarian Chemical Communications* (ranked in quartile Q4) and *Crystals* (quartile Q2). So far, two independent citations have been spotted on the research papers of the thesis. Some of the results of the thesis have been presented at seven scientific forums. During his work on the dissertation and as an asst. Tavlinova-Kirillova has participated in the working teams of 24 scientific research projects funded by the National Research Fund and the Ministry of Education and Science, as well as with companies.

These facts give me reason to assume that the dissertation and the contributions in it are sufficiently the personal work of the doctoral candidate. The reference made reveals that the PhD student fulfils the minimum national requirements for the acquisition of the scientific and educational degree "Doctor" in the field of "Natural Sciences, Mathematics and Informatics", the field of Chemical Sciences, specified in the Law on the Development of Academic Staff in the

Republic of Bulgaria and the Regulations on the Conditions and Procedure for the Acquisition of Scientific Degrees and the Occupation of Academic Positions at the IOHCF-BAS.

Abstract

The abstract of the dissertation is 42 pages in length, accurately and correctly reflecting the content of the dissertation and written in accordance with the established rules.

CONCLUSION:

Maya Tavlinova-Kirillova's dissertation fully meets the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for its application (LDASRB) and the Regulations for the conditions and procedures for acquiring scientific degrees and holding academic positions at BAS and IOCCP-BAS.

Assistant Tavlinova-Kirillova 's dissertation is a continuation of the traditional research of the group of Organic Synthesis and Stereochemistry. As part of the dissertation, Assistant Tavlinova-Kirillova has performed a large amount of experimental work in the current scientific field of synthesis and transformation of organic compounds.

The knowledge and skills acquired by doctoral student Maya Tavlinova-Kirillova during the elaboration of the dissertation and the achieved scientific results allow me to recommend to the esteemed Scientific Jury to award assistant Maya Tavlinova-Kirillova the academic and scientific degree "Doctor" in higher education: 4. Natural sciences, mathematics and informatics professional field 4.2. Chemical sciences, specialty "Organic chemistry".

29.02.2024
Sofia

Reviewer:
Assoc. Prof. Dr. Yulian Zaganyarski