

Supervisor's statement

for the doctoral thesis of David Milićević

**"Preparation and Study of Photoprotective and Antimicrobial Properties
of Novel Materials Based on 1,2,3-Triazole"**

David Milićević, born on January 19, 1988 in Ljubljana, Slovenia, graduated from University of Ljubljana, Faculty of Chemistry and Chemical Technology, four-year pre-Bologna programme Chemistry, in 2014. Since October 26, 2015 he was accepted for full-time doctoral study at TBU, Faculty of Technology, in study programme Chemistry and Materials Technology, DS course Technology of Macromolecular Compounds.

During the doctoral study, in the year 2017, he also passed the two-months study stay in the frame of Erasmus+ programme at Comenius University in Bratislava, Faculty of Pharmacy, Department of Pharmaceutical Chemistry under supervision of Prof. PharmDr. Josef Jampílek, Ph.D. He also participated in solving four projects supported by internal grants of Tomas Bata University in Zlín, at one as investigator and at three as principal investigator.

Mr. Milićević successfully passed the partial exams from Organic Chemistry, Macromolecular Chemistry, Theory of Metal Materials, and English Language. In April 2018, he passed the state exam and in April 2019, he successfully got through the internal defence at Department of Chemistry.

Problems, which Mr. Milićević solved in his doctoral thesis, follow the long-time research carried out at Department of Chemistry. The aim of his work was especially preparation of 1,2,3-triazole functionalised quinoline-2,4-diones, namely compounds with two 1,2,3-triazole groupings in molecule and compounds with a functional group bound to the triazole ring. The next objective included, according to possibilities, evaluation of their potential antimicrobial activities and photoprotective properties.

In my opinion, Mr. Milićević managed to fulfil the defined aims. At first, he performed the synthesis of 4-hydroxy-3-phenylquinolin-2-(1*H*)-one and 3-methylanalogue of it. The next steps were chlorination of these compounds and substitution of the chlorine atom in obtained 3-chloroquinoline-2,4-diones with azido group. Hereupon 1,2,3-triazole ring was build from the azido group by click reaction with substituted alkyne catalyzed with a mixture of metallic copper – cupric sulfate pentahydrate. Desirable bis-triazole derivatives were obtained by subsequent introduction of propargyl group to the position N1 of quinolinedione cycle, and incorporation of the propargyl group into 1,2,3-triazole ring by click reaction with three organic azido compounds under the same conditions as applied for the construction of the first one.

Furthermore, Mr. Milićević was concerned with introducing of functional groups of interest for further synthetic use and possible biological effects to position 4 of the first triazole ring. He prepared a series of new hydroxymethyl, acetoxymethyl, formyl and carboxy derivatives.

To evaluate possible photoprotective activities of synthesized compounds, their absorption spectra in near and middle ultraviolet ranges were recorded in acetonitrile that worked best from four tested solvents, which were besides of it ethanol, chloroform and dimethylsulfoxide. Numerous series of prepared compounds have been tested for their activity against seven species of microorganisms including Gram-positive and Gram-negative bacteria, yeasts and fungi.

The results of Mr. Milićević's research work are contained in two published articles in scientific journals, making up a substantial part of one of them, and are the content of one manuscript sent to an scientific journal editorial office. He also presented his results at one international conference and at the Congress of the Czech and Slovak Chemical Societies.

There can be no doubt that the dissertation of David Milićević is not plagiarism.

I am convinced of the fact that the results achieved by Mr. Milićević during his doctoral study contributed to the development of chemistry of 1,2,3-triazole and quinoline-2,4-dione. His remarkable effort and manual skill, as well as thoroughness and precision, enabled him to achieve results that, in my opinion, met all the goals set.

Mr. Milićević is up to standards required and therefore I recommend defence of his doctoral thesis.

In Zlín, May 26, 2019.



Doc. Ing. Stanislav Kafka, CSc.