Appendix 12b

REPORT

of dissertation for the acquisition of:

educational and scientific degree " **doctor** "	X
scientific degree **"Doctor of Science"**	
	the true is indicated by the sign "X"

Author of the dissertation:

		Maria	Tsvetanova	Mondashka	
academic position	scientific degree	name	middle name	last name	workplace

Topic of the dissertation:

Combined methods for separation and concentration of extracts from natural raw materials using biosolvents.

Scientific area:

5	“Technical Sciences”
code	name

Professional area:

5.10	“Chemical Technologies”
code	name

Scientific specialty:

“Processes and Equipment in Chemical and Biochemical Technology”

The report was written by:

Assoc. Prof.	PhD	Yordanka	Georgieva	Karakirova	Institute of Catalysis - BAS
academic position	scientific degree	name	middle name	last name	workplace

1. The relevance of the topic of the dissertation:

A) The topic is relevant and new (there are no known results on the topic by other authors)	8 points	
B) The topic is relevant and results from other authors are known	6 points	X
C) The topic is not relevant, but results from other authors are known	2 points	
D) The topic is not relevant and no results from other authors are known	1 point	
E) The topic does not correspond to the level of dissertation	0 points	

		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the dissertation must be substantiated
The dissertation topic is interesting and relevant, despite the existence of a significant number of scientific studies related to medicinal plants and the methods for extracting biologically active substances from them. Existing research covers both traditional and modern extraction techniques, but the possibilities for their optimization and improvement have not been fully exhausted. The issue of using environmentally friendly ("green") solvents, which can replace conventional organic solvents with adverse effects on human health and the environment, remains particularly relevant. In addition, the need to increase the efficiency and cost-effectiveness of extraction processes continues to be the subject of intensive scientific research. Interest in medicinal plants as a source of new products further emphasizes the importance of studies in this field. In this sense, the topic retains its scientific and practical significance. The relevance of the present topic is further enhanced by the interest in well-known medicinal plants such as Hypericum perforatum, which possesses a wide range of biological activities and significant potential for the development of new products. The study of efficient and environmentally friendly methods for extracting its active components is of essential importance for both science and practice.

2. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	
C) Theoretical with application elements	4 points	X
D) It does not correspond to the level of dissertation	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.
The presented work formulates scientific and applied scientific contributions that can be distinguished by their nature. Part of the results have a fundamental character, as they are related to the development of theoretical approaches and the establishment of general relationships. These include the developed computational protocol based on Hansen three-dimensional solubility parameters for evaluating intermolecular interactions, the established dependencies in the kinetics of the extraction process, as well as the application of a two-step kinetic model for describing extraction from polydisperse systems. However, the predominant part of the contributions is of an applied nature, as they are aimed at solving specific practical tasks and optimizing technological processes. These include studies related to the search and selection of alternative plant-based solvents, the determination of suitable extraction media for different groups of compounds, the experimental establishment of effective extraction conditions (including the use of ultrasound), as well as the assessment of the stability and safety of the obtained extracts. In summary, the contributions of the dissertation work can be defined as predominantly applied, with the presence of significant fundamental elements that enrich the theoretical basis of the studied processes and support their practical application.

3. Objectives of the research:

A) Realistic and of scientific and / or applied interest	8 points	X
B) Realistic, but not of scientific and / or applied interest	3 points	
C) Unattainable (unrealistic)	0 points	

		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified.
The stated objective of expanding the methodology through the introduction of alternative plant-based solvents, as well as the inclusion of environmental, quality, and safety indicators, is realistic and achievable within the scope of the dissertation. The formulated tasks are specific, consistent, and well selected, covering both theoretical and experimental aspects of the research. They enable the achievement of the stated objective and are methodologically well structured. In conclusion, the defined objectives and tasks can be assessed as realistic, scientifically grounded, and possessing clearly expressed scientific and applied contributions.

4. Contributions of the dissertation:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	X
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	
C) They are of scientific and / or applied interest	12 points	
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

Contributions must be specified. The type of results achieved must be justified.
The presented contributions of the dissertation have a clearly defined scientific and applied character, combining elements of methodological development and practical orientation. The developed methodology for solvent evaluation, based on the combination of Hansen solubility parameters with (eco)toxicological indicators, represents an original approach for integrated selection that simultaneously considers the efficiency and safety of extraction media. This enables a shift from an empirical to a predictive approach in the development of extraction processes and significantly reduces the need for extensive experimental studies. Through the application of the methodology, alternative plant-based solvents to tetrahydrofuran are identified, as well as optimal solvents with proven selectivity toward biologically active substances, creating real prerequisites for practical implementation. The identified limitations of the Hansen model in binary and multicomponent systems define clear boundaries of its applicability and provide a basis for its future development and combination with other approaches. The established relationships between the composition of the plant raw material, process parameters, and extraction efficiency, as well as the proposed scheme for comprehensive utilization of the raw material, are of direct importance for the optimization and scaling-up of technological processes. In this context, the results find application in the development of technologies for obtaining standardized plant extracts, natural cosmetic products, and phytopharmaceuticals, while also laying the groundwork for future research aimed at an in-depth analysis of the composition, safety, and therapeutic potential of the obtained products. In conclusion, the contributions can be assessed as having significant scientific and applied value, with elements of lasting impact and the potential to serve as a basis for further research and development.

6. Conclusion

A) The evaluation of the dissertation is **POSITIVE**	This evaluation is assigned to a total number of at least 20 points	X
B) The evaluation of the dissertation is **NEGATIVE**	This evaluation is assigned to a total number below 20 points	
		one of the answers given is marked with the sign "X"

To be filled in at the request of the member of the scientific jury
The dissertation contains scientific and applied scientific results that represent an original contribution to science and meet the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria. The dissertation demonstrates that the PhD candidate, Eng. Maria Mondashka, possesses in-depth theoretical knowledge and professional skills, and shows the ability and competence to independently conduct scientific research. Based on the above, I confidently give my **positive** evaluation of the conducted research presented in the reviewed dissertation, abstract, achieved results, and contributions, and I propose to the esteemed scientific jury to award the educational and scientific degree “Doctor” to Eng. Maria Mondashka in the field of higher education: 5. Technical Sciences, 5.10. Chemical Technologies, scientific specialty “Processes and Equipment in Chemical and Biochemical Technology.”

March 27, 2026	The report was written by:	
date	**Assoc. Prof. PhD Y. Karakirova**	signature