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	DMI Development Ltd.
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 WITH BIOSOLVENTS

Scientific area:

5	**Technical Sciences**
code	name

Professional area:

10	**Chemical Technologies**
code	name

Scientific specialty:

Unit Operations in the Chemical Technology and Biotechnology

The report was written by:

prof	**Dr**	**Iren**	**Hernani**	**Tzibranska-Tzvetkova**	**IChE-BAS retired**
academic position	scientific degree	name	middle name	last name	workplace

1. Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requirements	20 points	X
B) The candidate doesn't meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

It is mandatory to fill in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.

Answer A) in this case is according to the rules in force at the start of the dissertation in 2016.

2. 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 topic of choosing the potential solvents for effective and selective extraction of groups of bioactive compounds with a positive environmental assessment is undoubtedly relevant. The scientific literature in recent decades offers a great number of studies on the extraction of valuable components from natural raw materials. This work performs a different and in-depth look at the overall extraction process, in which several, each relevant in itself, problems are considered: theoretical assessment of potential solvents for solid-liquid extraction of certain groups of compounds, including solvents from natural sources; comparative analysis of the effectiveness of different methods for conducting the process and the quality of the obtained extracts; possibilities for intensification of the process; analysis of the stability and harmlessness of the obtained extracts. It is in this comprehensive investigation of the extraction process, systematized in a methodology and tested in practice with a specific significant object (the herb St. John's wort) that I find the importance of the present study. The practical application allows a final scheme for obtaining various hypericin-containing extracts to be proposed. The dissertation demonstrates a very good knowledge of the solid-liquid extraction process and is distinguished by the depth and completeness of the research.

3. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	X
C) Theoretical with application elements	4 points	
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 study is mainly of an applied nature, because it uses known objects and research methods, if considered separately. At the same time, it offers a methodology for initial assessment of the applicability of solvents for solid-liquid extraction of biologically active substances from plant raw materials through Hansen solubility parameters, as well as an analysis of the limitations of the approach in applications to binary and multicomponent systems in a wide range of polarity.. This supports the scientific-applied nature of the research.

Every detail of the proposed approach is excellently explained, supported by a rich analysis of the published literature (173 references) and is practically demonstrated on the extraction of biologically active substances (hypericin, total phenols and flavonoids) from the herb Hipericum perforatum. Aqueous solutions of ethanol, glycerol, and oil extracts in 9 vegetable oils are studied: from olive (Olea europaea), sesame seed (Sesamumindicum), almond (Amygdalus communis), avocado pulp (Persea americana), grape seed (Vitis vinifera), flax seed (Linum usitatissimum), white mustard (Sinapis alba), wheat germ (Wheat germ), jojoba (Simmondsia Chinensis), and black seed (Nigella Sativa, NG). This justifies the applied nature of the research and represents a valuable contribution to the practice of solid-liquid extraction.

4. 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 objectives of the study are very clearly defined and represent scientific and applied interest because they offer a thorough, theoretically based approach with multifaceted and numerous possibilities for practical application. These objectives are realistic because they imply a comprehensive study, starting from the choice of solvent through the study of the solid-liquid extraction process in its entirety (factors influencing the equilibrium and kinetics, modeling of the process), comparative analysis of the known methods for conducting the extraction, intensification in an ultrasonic field and ending by characterization of the stability and harmlessness of the obtained extracts.

The set goals have been achieved in the presented dissertation work on the example of the herb Hipericum perforatum.

5. Contributions of the dissertation:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	X

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.
I accept the presented contributions. They are scientific and applied in nature and present a coherent methodology for assessing the applicability of solvents for solid-liquid extraction of bioactive compounds from plant materials by combining Hansen solubility parameters and (eco)toxicological indicators. This methodology is analyzed in detail and explained theoretically, as well as applied in depth to a comprehensive study of the extraction of BAC from the herb St. John's wort, including the comparison of different extraction methods and intensification approaches (using ultrasound).

6. Conclusion

A) The evaluation of the dissertation is **POSITIVE**	This evaluation is assigned to a total number of at least 40 points	X
B) The evaluation of the dissertation is **NEGATIVE**	This evaluation is assigned to a total number below 40 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
According to the presented assessment system, this dissertation has 54 points, which is a convincing basis for a positive evaluation. I appreciate the volume of work performed (illustrated in 23 tables and 55 figures, three appendices) and the quality of the presented text - with a clear formulation of the objectives, a thorough analysis of the theoretical basis and the results obtained. I believe that the candidate has mastered a large amount of new knowledge. The results of the dissertation could find a more worthy presentation in terms of number and type of publications on the topic (one publication in a journal with IF/SJR, Q4). Despite this remark, I support the qualities of the presented dissertation work and the candidacy of Maria Mondashka for the award of the educational and scientific degree "doctor".

26.03 2026	The report was written by:	
date		signature