

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:

		MARGARITA	MARINOVA	KOLEVA	UCTM - Sofia
academic position	scientific degree	name	middle name	last name	workplace

Topic of the dissertation:

New ecological methods for the processing of leather sheepskins

Scientific area:

5	Technical Sciences
code	name

Professional area:

5.10.	Chemical Technologies
code	name

Scientific specialty:

Leather and Fur Products and Tanning Technology

The report was written by:

Associate Professor	PhD	Anna	Lubenova	Georgieva	UCTM - Sofia
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.

A list of five publications is presented in which parts of the PhD-thesis are covered. Two of them are printed in English magazines, one in Romanian and two in Bulgarian magazines. I am familiar with the PhD student's

research and know that these are not her only publications on the subject. On the topic of PhD-thesis there are 8 citations which are two publications in which the PhD student is respectively on the first and second place as author. There has been interest in the publication "Synthesis of two peptide mimetics as markers for chemical changes in wool keratin during the unhairing process". This is one of the five publications in the thesis. It is cited respectively in a book published in the USA, the second in an English magazine and in Germany and Netherlands too. The interest shown abroad is an indicator of the importance of this study.

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

Environmental protection requirements are constantly increasing. One way to prevent undesirable phenomena related to our lives and existence is to introduce environmental technologies, especially when it comes to chemical treatments. For this reason, the specific goals set out in this dissertation and their realization make the topic particularly relevant. The use of enzyme preparations in leather technology has been around for a long time, but the use of the Bulgarian enzyme preparation Protozin and establishing the parameters for its application for postsoaking, unhairing and degreasing in one bath is an important fact. The use of Protozin can achieve process co-ordination, leading to reduced water, energy and time costs, which is currently relevant. Preparation for the first time of tanning preparations based on extract of a sumac of Bulgarian origin and various metal ions is especially relevant as it is a new method of tanning of skins which combines the action of a vegetable tanning agents with that of the metal ions Al^{3+} , Mn^{2+} and Ti^{4+} , known as tanning agents by themselves, but not as complexes. This eliminates the use of chromium compounds and avoids toxic chromium in wastewater, as is the case with conventional technology.

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 conducted investigations specify the parameters of the studied processes. Optimization methods are used. Complete environmental technologies have been developed for processing sheepskins that can find their application.

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 aim of the PhD thesis is to develop methods and technologies for the treatment of sheepskins, in accordance with the new environmental requirements. Specifically: Investigation of the possibility of replacing the classic lime-sulphide technology in pretanning processes with enzyme treatment; Apply pre-alkaline treatment of the wool keratin by examining the process parameters and optimizing them. Comparison of the most suitable variants of unhairing by enzymatic treatment and alkaline pre-treatment with regard to the quality of the separated wool and the pollution of the wastewater; Preparation of new tanning preparations based on sumac Bulgarian origin and various metal ions (Al^{3+} , Mn^{2+} and Ti^{4+}), as well as mineral chrome-free tanning preparations based on Zr^{4+} , Al^{3+} , Ti^{4+} and citric acid, and after analysing the obtained tanning products investigate the possibility of replacing classic chrome tanning technology with tanning products obtained in complete technologies for the treatment of enzymatically treated sheepskins. The goals set are realistic and of applied interest.

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	
C) They are of scientific and / or applied interest	12 points	x
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.

In the PhD thesis, the Bulgarian enzyme preparation Protozin is investigated and the parameters for enzyme postsoaking, unhairing and degreasing in one bath with it is specified. By using it, it reduces the duration of the processes and the consumption of water and energy. By these methods a wool with good quality is obtained that can be used in other branches of the industry. For the first time, tanning preparations based

on Bulgarian sumac and various metal ions are obtained, while at the same time the skin is tanned and dyed. Chromium-free technologies have been developed to avoid the introduction of chromium into wastewater, which is known to be toxic. The implementation and application of these technologies, which combine enzymatic processing and chromium-free tanning of the skins, can lead to a certain economic and social effect.

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

My opinion on the individual indicators, as well as the achieved total point asset of 50 points (over 40), convinced me to propose my positive assessment of the results achieved in the PhD-thesis.

27.01.2020	The report was written by: Assoc. Professor PhD Eng. Anna Lubenova Georgieva	
date		signature