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:

		Asya	Konstantinova	Manoylova	University of Chemical Technology and Metallurgy – Sofia
academic position	scientific degree	name	middle name	last name	workplace

Topic of the dissertation:

Sustainable Soil Management through Carbon Farming

Scientific area:

5	Technical Sciences
code	name

Professional area:

5.13	General Engineering
code	name

Scientific specialty:

“Environmental protection systems and devices”

The report was written by:

Associate Professor	PhD	Yana	Koleva	Tzvetanova	Institute of Mineralogy and Crystallography, Bulgarian Academy of Sciences
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.
In accordance with the requirements, a report on compliance with the minimum national requirements for the award of the educational and scientific degree of Doctor (PhD) has been submitted, as stipulated in the Regulations for the Implementation of the Academic Staff Development Act of the Republic of Bulgaria, as well as in the Regulations for the Award of Scientific Degrees and the Occupation of Academic Positions at the University of Chemical Technology and Metallurgy (UCTM). The four submitted publications are thematically related to the dissertation and reflect the main directions of the conducted research. Two of the scientific articles have been published in journals that are refereed and indexed in the international databases Web of Science and Scopus, and two have been published in non-refereed peer-reviewed journals included in the National Reference List. The total number of points in indicator group “G” is **41.66**, exceeding the minimum requirement of **30** points. At the time of submission of the dissertation, one citation had been identified. The doctoral candidate's publication activity can be assessed as sufficient for the procedure leading to the award of the educational and scientific degree of Doctor (PhD).

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	X
B) The topic is relevant and results from other authors are known	6 points	
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 the dissertation is highly relevant and has significant practical importance. Environmental pollution is considered one of the most pressing global environmental challenges, and addressing it has become a priority worldwide. The generation of industrial waste represents a global challenge, and such materials are increasingly being regarded as valuable secondary resources. The utilization of waste materials is fully aligned with contemporary sustainability concepts. In this context, the research presented in the dissertation aims not only to minimize industrial waste generation but also to optimize strategies for the improved use of recycled and organic materials as soil amendments. The integrated approach applied is economically advantageous due to its potential for the simultaneous utilization of several waste streams. The study focuses on the chemical, mineralogical, and structural characteristics of organomineral mixtures produced from sludge generated during the treatment of wastewater from the pulp and paper industry, combined with fly ash or ash-slag mixtures resulting from biomass combustion. In addition, modified compositions were prepared using ash generated from sunflower husk combustion, dry stabilized poultry manure, and zeolitized clinoptilolite tuff from the Beli Plast deposit, as well as their acid-activated variants. The resulting mixtures contain essential plant nutrients such as nitrogen, phosphorus, potassium, calcium, and sulfur, providing considerable potential for agricultural application as soil amendments and for the stabilization of organic carbon. In selecting the components and their proportions, a balance was sought between the organic phase, which provides carbon and nutrients, and the mineral phase, which contributes to the structural stability of the system. This approach has led to the development of novel and unique organomineral systems.

3. 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.

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 main objective of the dissertation is clearly formulated and aligned with the subject of the research. It is focused on the development and characterization of organomineral mixtures based on industrial and agricultural waste materials, with potential applications in sustainable soil management and carbon farming. To achieve this objective, specific research tasks have been defined, encompassing the main stages of the scientific investigation: the selection and characterization of suitable waste materials and mineral components; the development of experimental mixtures with different organomineral compositions; the investigation of the physicochemical, mineralogical, and morphological characteristics of the resulting systems; the assessment of the influence of the individual components on the stabilization of organic matter and the mineral matrix; and the evaluation of the potential of the developed mixtures for application as soil amendments. The scientific hypothesis is based on the assumption that the combination of sewage sludge from wastewater treatment plants with biomass ash fractions, potassium ash, natural zeolite, and organic additives will lead to the formation of stable organomineral systems with improved physicochemical properties and potential application as soil amendments in sustainable soil management and carbon farming. The scientific hypothesis also encompasses the expected results regarding phase transformations and the stabilization of the mineral matrix following acid activation with sulfuric acid. The research objective set forth in the proposed dissertation is entirely realistic and is of both scientific and applied scientific interest, as evidenced by the results achieved.

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.
The main contributions of the candidate are presented in Sections 7 and 8 of the dissertation and may be summarized in the following major areas: **Scientific Contributions** 1. A comprehensive scientific framework for the production and characterization of soil amendments from waste and mineral materials has been developed and experimentally validated. 2. Relationships between the composition of the developed mixtures and their morphology, phase composition, elemental composition, and surface chemistry have been established and scientifically interpreted. 3. Scientific knowledge concerning the behavior, transformation, and stabilization of carbon-containing and nutrient-bearing components during the combined utilization of waste and mineral materials has been expanded. **Scientific and Applied Contributions** 1. A scientifically substantiated approach has been developed for the valorization of waste streams from biomass, industrial sludges, and organic residues through their incorporation into multicomponent formulations for the production of soil amendments. 2. A comprehensive analytical framework has been developed for evaluating the composition, structural characteristics, and agroecological potential of multicomponent soil amendments. 3. A scientific and applied concept, together with a perspective for the use of the developed mixtures in sustainable soil and carbon management, has been formulated. The concept is aimed at improving soil properties, enhancing the utilization of nutrient elements, and reducing the environmental footprint of waste materials. The dissertation contains significant scientific and applied scientific results that deserve a positive evaluation. The reuse of waste materials contributes to reducing the amount of organic and inorganic matter destined for landfilling. Waste and mineral materials have been jointly utilized in the development of organomineral mixtures with potential applications in agriculture as soil amendments and for the stabilization of organic carbon. In this context, the contributions are of both scientific and practical significance.

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
The review of the materials submitted by the doctoral candidate Asya Manoylova, the relevance and significance of the dissertation topic, and the fulfillment and exceeding of the minimum national requirements set out in the Regulations for the Implementation of the Academic Staff Development Act of the Republic of

Bulgaria, as well as in the Regulations for the Award of Scientific Degrees and the Occupation of Academic Positions at the University of Chemical Technology and Metallurgy (UCTM), provide sufficient grounds for me to confidently give a positive evaluation.

10.11.2026	The report was written by:	
date		signature