

REPORT
to occupy the academic position:

"Professor"	
"Associate Professor"	X
	one of the academic positions indicated shall be marked with the sign "X"

Candidates to occupy the position:

1	Chief assistant professor	PhD	Temenuzhka	Hristova	Radoykova	University of Chemical Technology and Metallurgy, Department of analytical chemistry
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

4	Natural sciences, mathematics and informatics

Professional area:

4.2	Chemical sciences

Scientific specialty:

Analytical chemistry

The competition has been announced:

.64	05.08.2025 r.	Department of analytical chemistry	Faculty of chemical technology
in SG issue	date	for the needs of the Department	Faculty

The report was written by:

Prof.	PhD	Irina	Bogdanova	Karadjova	retired
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academic position	scientific degree	name	middle name	last name	workplace
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1. Report for the candidate:

Chief assistant professor	PhD	Temenuzhka	Hristova	Radoykova
academic position	scientific degree	name	middle name	last name

1.1. 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 must be filled in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.

The participant presents 28 scientific papers, excluding papers used for the PhD thesis. Nineteen papers are published in journal with impact factor, 4 papers in journals with impact rang, 3 papers in Conference proceedings (Scopus и Web of Science) and 2 papers in Conference proceedings with ISSN номер. The calculations presented showed that the candidate meets the minimum requirements.

1.2. Relevance of scientific and / or applied research:

A) The research is relevant. Part of the research is pioneering (no results are known on the topic by other authors)	8 points	
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	6 points	X
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	4 points	
D) The smaller part of the research is relevant	2 points	
E) Research is not relevant	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the research must be substantiated.
<p>There is no doubt about the relevance of the conducted research. The main focus is the development and application of modern analytical methods for sample characterization. The characterized samples align with the requirements of the contemporary economic strategy—maximizing the utilization of raw materials, including waste products. The following directions can be outlined:</p> <ul style="list-style-type: none"> ➤ Characterization and utilization of waste products from lignocellulosic materials (low-molecular phenolic compounds) with potential application as oxidation inhibitors. Identification and quantification using gas chromatography (GC-MS; GC-FID). ➤ Characterization for the utilization of waste products from biomass (hydrolyzed lignocellulosic materials, bark, agricultural waste) with potential application as absorbents. ➤ Characterization of waste and secondary products from metallurgical production (tailings, blast furnace slag). ➤ Characterization of waste products from coal-fired power plants (fly ash).

1.3. 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	4 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
<p>The candidate demonstrates a consistent and sustainable progression in her scientific career, maintaining as a future objective the continuation and further development of research building upon the achievements of their doctoral dissertation. Moreover, the thematic scope of the work is enriched through the introduction of new and innovative ideas.</p> <p>The stated research goals, which align with contemporary technological trends, exhibit clear practical applicability. The candidate further deepens their expertise in the processing of lignin through various procedures aimed at obtaining compounds with significant application potential. The research objectives related to low-molecular-weight phenolic compounds and their utilization as antioxidants are notably expanded.</p> <p>Realistic and well-founded aims have been established for optimizing the synthesis and maximizing the utilization of compounds such as 2-methoxyphenol, 2,6-dimethoxyphenol, vanillin, and 1-(4-hydroxy-3-methoxyphenyl)ethanone, all of which may serve as valuable additives for enhancing the chemical stability of automotive gasoline.</p> <p>The synthesis and characterization of adsorbents obtained from waste materials is of considerable importance, as this approach simultaneously addresses two major challenges: reducing the environmental burden associated with industrial waste, and enabling their practical application in subsequent purification processes. The objective of</p>

valorizing waste from metallurgical industries and coal-fired power plants holds substantial potential, given the structure and needs of Bulgarian industrial enterprises.

1.4. Candidate research contributions:

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.

The contributions can be classified as new scientific results with potential practical application. By fulfilling the stated objectives, the candidate has achieved results that can be directly implemented in industrial practice. A particularly strong impression is made by the fact that each study is planned and carried out with the clear intention of achieving practical, applicable outcomes. The innovations arise as solutions to problems originating from real industrial needs.

In accordance with the stated objectives, the contributions can be grouped into several directions.

1. Chemical processing of wood into cellulose and monosaccharides, and the production of bioethanol, generate lignocellulosic material as waste. Effective procedures have been developed for the hydrolysis of this waste with the aim of obtaining valuable organic compounds with potential applications:

- Production of monomeric phenolic compounds with inhibitory effects on the oxidation of hydrocarbons, obtained from bark; technical hydrolysis lignin; kraft lignin; agricultural waste from bioethanol production (straw, corn cobs) after various treatments.
- Demonstrated results regarding the mechanism and kinetics of lignin hydrolysis aimed at obtaining low-molecular-weight phenols, as well as optimization of the process for industrial application.
- Production, under optimized conditions, of compounds such as 2-methoxyphenol, 2,6-dimethoxyphenol, vanillin, and 1-(4-hydroxy-3-methoxyphenyl)ethanone, which may be used as additives to improve the chemical stability of automotive gasoline.
- Studies on the production and characterization of products obtained after various types of wood treatment.

2. Optimization and increased efficiency of enzymatic hydrolysis using peracetic acid. Positive results were obtained in the treatment of agricultural lignocellulosic cellulose. The efficiency of the process was monitored using liquid chromatography.
3. Research results on waste hydrolysis lignin obtained from bioethanol production, demonstrating its potential as an adsorbent for chemical elements. Contributions include a systematic investigation of the adsorption mechanism, characterization of the functional groups on the adsorbent surface (XPS, IR spectroscopy, EPR, and TG-DSC analyses), and evaluation of the extraction efficiency of Mn(II), Cu(II), and Ag(I). Additionally, it was shown that waste lignocellulosic materials modified with silver possess antimicrobial properties against pathogenic microorganisms.
4. Evaluation of the characteristics and demonstration of the high adsorption capacity of activated carbon obtained through an optimized procedure from waste hydrolysis lignin.
5. Evaluation of lignin pyrolysis products using Py-GC-MS and DSC, demonstrating the practical feasibility of using waste hydrolyzed lignocellulosic materials from monosaccharide production as fuel.
6. Promising results have been obtained showing that waste metallurgical slag can be used as an effective catalyst for purification of waste gases. A combination of methods was used—inductively coupled plasma optical emission spectrometry (ICP-OES), differential thermal analysis (DTA), thermogravimetric analysis (TGA), X-ray diffraction (XRD), and Fourier-transform infrared spectroscopy (FTIR)—to assess the composition and structure of the obtained catalysts and the processes of phase formation. Textural properties and surface chemical composition were investigated using scanning electron microscopy (SEM), low-temperature nitrogen adsorption (BET analysis), and X-ray photoelectron spectroscopy (XPS). The relationship between synthesis conditions, chemical composition, and the structure of the obtained catalysts was established. The practical applicability of the developed catalysts has been demonstrated.
7. A procedure has been developed and validated for the characterization of mining waste (tailings) and fly ash from thermal power plants. The practical feasibility of using these materials as precursors for the production of geopolymers has been evaluated.

1.5. Participation of the candidate in the achievement of the presented results:

A) The candidate has at least an equal participation in the submitted papers	8 points	
B) The candidate has at least an equal participation in most of the submitted papers	7 points	X
C) The candidate has a secondary participation in most of the submitted papers	4 points	
D) The candidate participation is unnoticeable	0 points	
		one of the answers given is marked with the sign "X"

The candidate is the first author of 43% of the publications and the second author of 28% of them, which clearly demonstrates his significant contribution. At the same time, the

presented publications are multidisciplinary in nature, and the candidate's leading role is evident in the application of modern analytical methods and the critical evaluation of the obtained results. It is highly likely that the candidate has been an active participant in assessing the achievements and scientific conclusions arising from the conducted research.

1.6 Pedagogical activity:

A) The candidate has effective and sufficient pedagogical activity at the university. The textbooks issued are modern and useful (they meet the requirements of the Regulations). The work with undergraduate and doctoral students is at a high professional level.	8 points	X
B) The candidate has sufficient pedagogical activity at the university. The textbooks issued satisfy the requirements of the Regulations.	6 points	
C) The pedagogical activity and / or textbooks issued are insufficient (do not meet the requirements of the Regulations)	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items B or C is marked.

1.7. Critical notes:

A) Lack of critical notes	8 points	X
B) Critical notes of a technical nature	7 points	
C) Critical notes that would partially improve the results achieved in a small part of the research	5 points	
D) Critical notes that would partially improve the results achieved in most of the research	3 points	
E) Significant critical notes	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the answers C, D or E is marked.

1.8. Conclusion

A) The evaluation of the candidate's activity is POSITIVE	This evaluation is assigned to a total number of at least 50 points	X
B) The evaluation of the candidate's activity is NEGATIVE	This evaluation is assigned to a total number below 50 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the member of the scientific jury
<p>The obtained results are of interest both from the perspective of local production and for all industries focused on the utilization of secondary raw materials and waste products. It is evident that the successful development of any new application requires reliable characterization of the materials. Despite the relatively routine nature of the applied methods, there is a clear need for precise optimization of analytical procedures and instrumental parameters to ensure the reliability of the results.</p> <p>A very positive impression is made by the candidate's involvement in defining the objectives of multidisciplinary studies and by his critical perspective on the results obtained.</p>

1.12.2025	The report was written by:	
date		signature