



OPINION

by Nadezhda Traycheva Petkova-Ognyanova, associate professor, Ph.D. Eng. - Associate Professor at the University of Food Technology – Plovdiv of Mihai Petrov's dissertation work on the topic: "Thermodynamic study of the temperature depending on the concentrations of some pollutants of the atmospheric air and the global ecosystem" for awarding an educational and scientific degree "PhD" in doctoral program: "Ecology and environmental protection", professional direction: 4.2. Chemical Sciences

According to order No.UD 271/27.07.2024 of the Rector of the University "Prof. Dr. Asen Zlatarov" - the city of Burgas, I am designated as a member of the scientific jury, and according to the first meeting of Scientific Jury, I am designated to prepare an opinion. For this purpose, I have received the entire set of materials for the procedure, presented by the candidate, as a digital version.

General presentation of the procedure and the candidate

Assistant Mihai Petrov has been working since 2021 at the Faculty of Natural Sciences (Department of Mathematics, Informatics and Physics) of the University "Prof. Dr. Asen Zlatarov" - Burgas. The doctoral student has completed two master's degrees - one in physics in 1995 at the Moldovan State University, Faculty of Physics, Chisinau, Moldova and the other in pharmacy (master pharmacist) in 2009 in Moldovan State University of Medicine and Pharmacy "Nicolai Testemcianu", Faculty of Pharmacy, Chisinau, Moldova. He has accumulated extensive experience as a teacher (lecturer, assistant) in Moldova and Bulgaria. He also worked as a pharmacist. The presented biographical data, together with the list of participations in scientific forums, show the active participation of assistant Petrov in teaching in higher schools and in scientific forums.

Relevance of the problem developed in the dissertation in scientific and scientific-applied terms

The PhD thesis presented to me by doctoral student Mihai Petrov is dissertable and is on a current topic. The problems with the accumulation of various pollutants and gases in the atmosphere, as well as their impact, is an important problem that is significant not only from an ecological point of view, but is of interest in other fields of science such as biology, chemistry, medicine and physics. Therefore, the goal and tasks of the dissertation are focused on the development of a qualitative and quantitative description of the influence of pollutants on the temperature of the atmosphere with the development of natural cataclysms.

Characterization of the PhD thesis

The dissertation is designed in accordance with the regulations of "Prof. Dr. Asen Zlatarov" - Burgas. It is written on 164 pages and contains 28 tables and 97 figures. The dissertation is composed of title page 1 page, table of contents - 2 pages, introduction - 2 pages,

overview - 41, Purpose and tasks of the dissertation work - 1 page, Research methods - 13 pages, two chapters 4 (70 pages) and 5 (14 pages) presenting results -84 pages, Summary conclusions - 1 page, Contributions - 1 page, References -16 pages, Declaration of originality - 1 page and scientific publications , related to the dissertation - 1 page.

The literature review is comprehensive, very well systematized and is directly related to the dissertation work. A good impression is made by having conclusions in the overview and in each part of the results. The methods are well described. A large volume of experimental work was carried out with modern analytical methods and equipment, which is a prerequisite for the reliability of the obtained results. The obtained results were processed, formulas and equations were derived. There are some passages in chapter 4 that I think would be better placed in the literature review. The list of cited literature includes 333 references (6 are in Cyrillic and 327 in Latin), which shows a very thorough search and knowledge of the PhD student on the issues under consideration. All this allows him to accurately formulate the purpose and tasks of the dissertation work.

Assessment of dissertation publications

In connection with the PhD thesis, the PhD student presented six scientific publications and participated in two international and national conferences. This shows the activity and competence of the PhD student to set and analyze certain tasks in the direction in which he works. It should be noted that in all six publications the PhD student is the first author, which shows his active participation in writing and preparing the publications. Three of the presented publications were published in a journal, Oxidation Communications, referenced and indexed in the Scopus global database and in the fourth quartile (Q4). The remaining three publications are in international journals (two in Industrial technologies and one in the International Journal of Multidisciplinary and Current Research, which are not indexed in Scopus or Web of Science. The total number of points from publications is (3×12 items) 36 items. , which covers the minimum requirements (30 points) for the Scientific and educational degree "Doctor". It is not clear why publication 7.4 is given 6 points, since it is counted as participation in scientific conferences and not as a publication in the presented list of the dissertation No information on open citations is presented. A good impression is made by the participation of a doctoral student in a scientific project - NIH 451/2021.

Abstract and author reference

The presented abstract is well-formed with a total volume of 57 pages, and there is a discrepancy with the structure of the dissertation work, which is not fatal and does not diminish the value of the dissertation. In general, the abstract includes an introduction, purpose and tasks, two chapters, chapter 1 experimental part and chapter 2 results and discussion, which reflects correctly and in detail the results obtained from the PhD thesis, general conclusions, formulated scientific-applied and applied contributions and a list of scientific publications on the topic of the

dissertation. References are missing, but they are not necessary in this case. The numbering of the figures and tables in the abstract does not follow and does not correspond to that in the dissertation. From the presented declaration of originality (page 147 of the dissertation) and the published articles, it can be judged that the described results are the main and personal work of the doctoral student.

Contributions to the Ph.D student

In the presented dissertation, in the SCIENTIFIC AND SCIENTIFICLY APPLIED CONTRIBUTIONS section, 4 contributions are presented:

- 1) The adiabatic method developed by us allows to compare the actually measured values in the temperature change, which are of the same order as those calculated by this method.
- 2) The calorimetric method we developed allows the explanation of natural phenomena, e.g. the intensification of natural cataclysms from sudden changes in atmospheric temperature, which is a consequence of changes in the specific heat capacities of the atmosphere, influenced by pollutants.
- 3) The study of the Albedo values of the unified Earth-Atmosphere system allows to explain the changes in the physicochemical properties of the components of the Biosphere, which are of important importance for the formation of the microclimate of the respective ecosystem. E.g. increasing the Albedo values of soils leads to their compaction. At the same time, a decrease in their specific heat capacity is observed.
- 4) The spontaneous natural fires that have become more frequent recently are exacerbated by the presence of combustible pollutant gases and particles in the atmosphere. The developed empirical expression for the flame temperature, based on the laws of thermodynamics, allows to emphasize the following aspect that when there are no combustible gases, the flame temperature reaches the minimum possible values with the possibility of limiting the fire.

Overall, the contributions are substantial, but could have been framed better, especially contribution 4, which sounds more like a conclusion than a contribution. I think it would be good to highlight which of the contributions are scientific. Arguably contributions 1,2 and 3 are applied science, while contribution 3 is more likely to be classified as scientific. In general, the developed methods have a significant scientific-applied aspect, of great importance for science and offer a solution to current problems related to ecology and environmental protection.

Critical remarks and recommendations

I have no critical notes or remarks about the candidate. I recommend that Prof. Petrov in his future scientific work, try to publish his results in journals with a higher quartile than Q4.

Final comprehensive assessment

The documents and the dissertation, presented by assistant Mihai Petrov, meet all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the Implementation of the LDASRB, as well as the Regulations on the Specific Conditions for Acquiring Scientific Degrees and Holding academic positions at the University "Prof. Dr. Asen Zlatarov" - Burgas.

The doctoral student has fulfilled the requirements regarding the educational goals, acquired new knowledge and practical skills in the scientific specialty, can independently conduct scientific experiments, analyze and interpret and summarize the obtained results and formulate conclusions.

Based on the above, I give my positive assessment of the developed dissertation work on the topic: "Thermodynamic study of the temperature depending on the concentrations of some pollutants of the atmospheric air and the global ecosystem" and I consider it reasonable to propose to the respected Scientific Jury Mihai Petrov to acquire an educational and scientific degree "Doctor" in a scientific field of higher education: 4. Natural sciences, mathematics and informatics, professional field: 4.2. Chemical sciences, in the doctoral program "Ecology and environmental protection".

16.09. 2024

Prepared the opinion:

Подписе заличен
Чл.2 от ЗЗЛД

(Assoc. Prof. Eng. Nadezhda Petkova-Ognyanova)