

OPINION

by Assoc. Prof. PhD eng. Blagovesta Nikolaeva Midyurova

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For the award of the educational and scientific degree "**Doctor**"

Scientific field: **4. Natural Sciences, Mathematics and Informatics**

Professional field: **4.2 Chemical sciences**

Scientific specialty: **Ecology and Environmental Protection**

Author of a dissertation: **Stela Ivanova Naydenova**, independent preparation doctoral program at the Department of Ecology and Environmental Protection, University "Prof. Dr. Asen Zlatarov" - Burgas

Scientific supervisors: Assoc. prof. PhD Lenia Gonsalvesh and Assoc. prof. PhD Alexander Dimitrov

Dissertation topic: "**Study of the content of polycyclic aromatic hydrocarbons in atmospheric aerosol**"

Reason: member of the scientific jury in the dissertation defense procedure for the award of PhD, according to the Order No. UD-503/16.12.2024 of the Rector of the University "Prof. Dr. Asen Zlatarov" - Burgas

1. Actuality of the dissertation topic

The thesis deals with a very important aspect of air pollution and its cleanliness. Deteriorated air quality continues to cause serious problems, often related to the presence of fine particulate matter (PM) and this continues to be a major challenge. The main threat with regard to this pollutant is not only related to the aerodynamic diameter of the particles, but also to their chemical composition. In this dissertation, the content of 17 PAHs, in PM_{2.5} and PM₁₀, in the Municipality of Burgas, at seven sites, in different seasons for the period 2020-2023, was investigated. Important results have been achieved and the concentrations of combustion PAHs in all samples have been estimated - on average 58.97%. The correlation of the concentration of PM_{2.5}, associated PAHs with different numbers of nuclei, NO₂, O₃, SO₂ and meteorological parameters was investigated by correlation analysis to determine the conditions that contribute to the self-cleaning capacity of the atmosphere.

I believe that the topic is extremely topical and the set goals and objectives have been fulfilled to the required extent.

2. Overview of the cited literature

The dissertation contains a total of 3 chapters developed in 141 pages and includes 66 figures, 49 tables and a total of 202 references cited. The references are directly related to the research topic and show that eng. Stela Naydenova has an excellent knowledge of the nature of the problem, both theoretically and practically. Based on the literature review, the unsolved problems are clearly identified, the aim and objectives are clearly formulated and the research approach of the dissertation is defined.

3. Research methodology

The experimental studies conducted by the author have been carried out with different approaches. The method of continuous monitoring of atmospheric aerosol (PM_{2.5}) for different seasons and meteorological conditions in the city was applied. The concentrations of PAHs in the collected PM_{2.5} samples were determined by gas chromatographic analysis with mass spectral detection for qualitative and quantitative analysis. Statistical relationships and correlations of PM_{2.5} levels and PAHs concentration in PM_{2.5} with meteorological elements and other pollutants were evaluated. The carcinogen equivalent concentration of all PAHs analysed was calculated and the distribution of PAHs in the investigated PM_{2.5} samples was investigated.

The above is a proof of the author's good theoretical background and good research skills in the choice of methods and tools for the study.

4. Dissertation Contributions

I evaluate the contributions in the dissertation as scientific and applied. The author has formulated them as follows:

- The first detailed study of the concentrations of PAHs in different fractions of particulate matter for Burgas Municipality. The study provides a unique analysis of the concentrations and distribution of 17 PAH compounds in atmospheric aerosols, including both PM_{2.5} and the coarser fraction PM₁₀.

- Revealing the relationship between PAHs, meteorological factors and other atmospheric pollutants. This study investigates and analyses the correlation between the concentrations of the investigated PAH- associated PM, key meteorological parameters and other atmospheric pollutants, and provides new insights into the complex interactions in the atmosphere. Assessment of health risks associated with exposure to PAHs. The study assesses the impact of PAHs on human health by applying a quantitative health risk assessment.
- Improving air quality management and regulatory policies. The results of the study provide a valuable basis for developing regulatory policies aimed at limiting pollution in urban areas with high concentrations of PAHs and improving environmental quality and associated health status of the population.
- The methodology implemented, including advanced sampling and analysis techniques, is applicable to other environmental monitoring studies and programmes. It can be used to assess air pollution levels in different regions and conditions, identify the likely sources of emissions, their impact on air quality according to the specificity of the region, and assess their health impacts.

5. Publications for the dissertation work

The author submitted a total of three scientific publications refereed in WoS and Scopus. The results of the research work have been reported and discussed at various international and national forums and conferences in the country and abroad.

6. Authorship of the obtained results

The applied results in the dissertation, both theoretical and applied, give me reason to believe that they are the personal work of the doctoral candidate.

7. Abstract and author reference

After reading the abstract, I believe that the most essential part of the thesis is sufficiently presented in its limited volume, which allows to assess the relevance, problems, as well as the proposed methods for the study of the content of polycyclic aromatic hydrocarbons in atmospheric aerosol.

8. Dissertation notes

I have no substantive comments to make on the dissertation.

I would recommend the author to continue his work in the field of methods for the assessment of ambient air pollution by PMs, where he shows a thorough knowledge and a sincere scientific interest.

9. Conclusion

My assessment of the presented dissertation work is categorically positive. I believe that the dissertation meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its Implementation, as well as the Regulations for the Terms and Conditions for Acquiring Scientific Degrees and Holding Academic Positions at the University "Prof. Dr. Asen Zlatarov " – Burgas.

The achieved results give me reason to propose that the educational and scientific degree be acquired "Doctor" from the **mag. eng. Stela Ivanova Naydenova** in the scientific field - 4. Natural sciences, mathematics and informatics, Professional field - 4.2 Chemical sciences, specialty - "Ecology and environmental protection".

Burgas
06.02.2025

Подпис задичен
Чл.2 от ЗЗЛД
Signature: _____
/ assoc. prof. PhD eng. B. Midyurova /