

OPINION

Regarding: PhD thesis for obtaining educational and scientific degree Doctor (PhD)

Professional Field: 5.10. Chemical Technology

Field of Higher Education: 5. Technical Sciences

Author of the PhD Thesis: Svetlin Petrov Vasilev, PhD student in the "Technology of Natural and Synthetic Fuels" doctoral program at Prof. Dr. A. Zlatarov University, Burgas.

Dissertation Title: Modeling the Properties of Petroleum Fluids and Processes in Petroleum Refining

Reviewer: Assoc. Prof. Dr. Eng. Kamelia Georgieva Ruskova – Technical University of Sofia

This opinion has been prepared in my capacity as a member of the academic committee, Order No.UD- 309 Burgas, 27.07.2026 of the Rector of Prof. Dr. Asen Zlatarov University, Burgas.

1. Relevance of the Dissertation Topic in Scientific and Applied Research Context.

Dissertation Topic:

The thesis "Modeling the Properties of Petroleum Fluids and Processes in Petroleum Refining," addresses a topical and practically significant issue concerning the modeling and prediction of petroleum fluid properties and the processes involved in their refining. Thesis combines traditional analytical approaches with modern mathematical modeling methods and artificial neural networks. This makes it possible not only to evaluate the capabilities and limitations of existing correlations but also to seek more reliable methods for predicting the properties of petroleum fluids across a wide range of compositions and operating conditions, as well as for optimizing technological processes in oil refining.

2. Goal and Objectives of the Dissertation.

The primary aim of the dissertation is to investigate and evaluate existing analytical approaches, correlations for calculating key physical properties, and methods for modeling the molecular composition of petroleum fluids and the associated processing operations.

3. Scientific and Applied Scientific Contributions of the Dissertation.

Scientific Contributions:

1.New correlation relationships have been developed to predict the molecular mass, critical temperature, and critical pressure of petroleum fractions and individual

hydrocarbons by applying nonlinear regression methods and artificial neural network models.

2. New relationships have been derived for modeling the viscosity of mixtures comprising heavy petroleum fractions and lighter fractions at various temperatures, thereby expanding the capabilities for modeling the rheological properties of heavy petroleum fractions.

3. A systematized analysis of methods for the molecular reconstruction of petroleum and petroleum fractions has been conducted, and the key factors influencing the accuracy of the obtained results have been identified.

Scientific and Applied Contributions:

1. The practical applicability of gas chromatographic simulated distillation methods for the characterization and modeling of petroleum fluids has been demonstrated.

2. Correlation relationships for molecular mass and critical properties have been proposed; these can be used as input data for the simulation and modeling of petroleum fluids and petroleum refining processes.

3. Relationships have been developed for the viscosity of mixtures comprising heavy fractions and lighter fractions (used as lower-cost diluents); these enable the optimization of mixture composition and more accurate prediction of the transport properties of the resulting blends.

4. Recommendations have been formulated regarding the selection of input data for molecular reconstruction; these can be utilized in the development and refinement of molecular databases aimed at improving the accuracy of results and expanding the scope of application for molecular reconstruction.

4. Opinion on the Publications Related to the Topic of the Dissertation.

According to the submitted report, PhD candidate Svetlin Petrov Vasilev has **50 points** in **Group A**. In **Group G** a total of **82.68 points**, comprising 13 publications refereed and indexed in world-renowned databases (Scopus, Web of Science) and 3 publications in non-refereed, peer-reviewed scientific journals. The total score is **132.68 points**. The PhD candidate holds one patent for an invention and has an **h-index of 7** and 89 citations visible in Scopus. The minimum national requirements for obtaining the educational and scientific degree of "Doctor," as outlined in the submitted report, have been met and significantly exceeded.

6. Opinions, recommendations and notes.

I have no comments regarding the scientific articles and the dissertation presented by Svetlin Vasilev. The dissertation covers a broad thematic scope and includes a significant number of investigated relationships, models, and experimental data.

7. Conclusion and Evaluation of the Dissertation

Considering the excellent results included in the PhD thesis work, characterized by a significant volume, it can be concluded that the dissertation presented by fully meets the requirements for acquisition of scientific degrees.

Based on the stated opinion, I give a positive assessment of the dissertation and consider that it fully meets the requirements for the award of the educational and scientific degree of "Doctor." I propose that the esteemed scientific jury award Svetlin Vasilev the educational and scientific degree of "Doctor" in professional field 5.10 "Chemical Technologies" (5. Technical Sciences).

date
17.09.2026

Member of the scientific juri: Assoc. Prof. Dr. Eng. Kamelia Ruskova

