



## OPINION

by

**Assoc. Prof. Ismail Efraimov Ismailov, Ph.D.**

Member of the Scientific Jury

*Konstantin Preslavsky* University of Shumen

**in regard** to the the defense of dissertation submitted for awarding the educational and scientific degree Doctor, Area of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.2 Chemical Sciences, Doctoral Program 01.05.02. Inorganic Chemistry, for the needs of the Faculty of Natural Sciences, *Asen Zlatarov* University of

Burgas

**titled**

*Experimental and Theoretical Studies of Selenate Systems*

**Eng. Dencho Ivanov Mihov**, a full-time Doctoral student

*Scientific Advisor: Assoc. Prof. Rumyan Yankova-Avramova, Ph.D.*

By order № УД-289/ 26.10.2022 signed by the Rector of *Asen Zlatarov* University of Burgas I'm appointed as a member of the scientific jury. I was chosen to write an opinion at its first meeting. The set of the documents I have received by Dencho Ivanov Mihov both electronically and in hard copy meets The Regulation on the Terms and Procedure for Acquisition of Academic Degrees and the Occupation of Academic Jobs at University of Burgas. The opinion is in accordance with The Regulation on the Terms and Procedure for Acquisition of Academic Degrees and the Occupation of Academic Jobs at University of Burgas.

### **Brief Biographical Data**

Dencho Ivanov Mihov was born in Burgas. In 1988 he was awarded a Master Degree in Chemical Engineering at *Asen Zlatarov* University of Burgas. He is an assistant, and chef assistant at *Prof. Assen Zlatarov* University of Burgas between 1988 and 1999. In the period of 1999 – 2001 he is a chief of *Employment and Structural Development Company* in Aytos City. From 2002 till now he is a chief of *Libra Scorp* Publishing house in Burgas.

Since 2021 Dencho Mihov is a PhD student at Department of Chemistry, Faculty of Natural Sciences, *Asen Zlatarov* University of Burgas, Doctoral Program *Inorganic Chemistry*. In his professional work, the doctoral student acquires significant scientific and organizational skills

### **Relevance of the Doctoral Thesis and the Scientific Contributions**

The dissertation includes 7 chapters. It contains 143 typewritten pages, including 30 tables and 24 figures. The bibliographical list includes 199 references - 169 in Latin and 30 in Cyrillic. A separate chapter of the literature review discusses "The development of thermodynamic studies of mixed solutions of strong electrolytes". The information is well systematized, at a good scientific level and fully corresponds to the aims and the experimental part of the dissertation. The aim of the dissertation work is a thermodynamic study of phase equilibria in systems of metal selenates in order to obtain new salts. It is formulated clearly and thoroughly. The tasks assigned, realized under the guidance of Assoc. Prof. Rumyana Yankova-Avramova, Ph.D., a significant world scientist with long time experience and impressive list of publications in studies of selenite solutions and solid phases, fully correspond to the goals set.

The experimental data from the study of the co-crystallization of the selenates of alkali and divalent metals were obtained by the Khlopin method for rapid isothermal depressurization. The compositions of the existing equilibrium phases of 16 ternary systems were investigated. Experimental data have been obtained from the isopiestic study of binary alkali metal selenate systems. Important thermodynamic characteristics /heat capacities, enthalpy, entropy and thermochemical potential/ of the synthesized selenate solid phases were determined. Various analysis methods were applied - physicochemical, derivatographic, X-ray phase, differential scanning calorimetry and regression analysis. Different theoretical methods were used to evaluate some thermodynamic parameters and interpret the solubility diagrams of selenate systems accordingly - Meissner and Kusik's method and Pitzer's method. The results are illustrated in tables and graphics.

On the basis of the conducted experiments and the analysis of the obtained results, 7 defined scientific contributions were derived. These are appointed in the abstract. The abstract correctly describes the main goals and contributions of the thesis. Some of the results are also reported in 4 scientific forums in Bulgaria.

### **Scientific indicators**

Dencho Mihov submits for the completion a total list of 3 publications (Web of Science and/or Scopus, SJR):

1. Ojkova T., D. Michov, R. Jankova. Dreistoffsysteme Wasser-Salz mit Lithiumselenat, Natriumselenat, Cobaltselenat und Magnesiumselenat bei 25°C (The triple system water-salt with lithium selenate, sodium selenate, cobalt selenate or magnesium

selenate at 25°C). Monatshefte für Chemie – Chemical Monthly, 1993, ISSN 0026-9247 124, pp. 349–354 (1999: Q2- 20 т.)

2. Mihov, D., R. Yankova. Crystal structure, IR investigation and interpretation of interactions in cobalt selenate pentahydrate. Chemical Data Collections, 2021, ISSN 2405-8300, 36, pp. 100776. (2021: Q3 -15 т)

3. Yankova R., I. Tankov, D. Mihov, A. Kostadinova. Coordination metal effect on the nonlinear optical properties and biological activity of double selenates. Journal of Molecular Structure, 2022, ISSN 0022-2860, 1268, pp. 133712. (2021: Q2-20 т)

The scientific production of Dencho Mihov brings a total of 55 points, which significantly exceeds the required minimum according to the national minimum requirements According to the analysis of the results the minimum number of points (30 points) required for the PhD degree in the professional field 4.2 Chemical Sciences, according to the Minimal National Requirements.

### **Conclusion**

Once I have read the materials and scientific publications submitted and have made an analysis of their significance and the scientific contributions contained in them, I think that the candidate Eng. Dencho Mihov has accomplished the minimal national requirements set in the Republic of Bulgaria, The Regulation on the Terms and Procedure for Acquisition of Academic Degrees and the Occupation of Academic Jobs at Asen Zlatarov University of Burgas, and all other relative normative documents. I do believe that Dencho Ivanov Mihov as a promising scientist in the field of inorganic chemistry and the development of thermodynamic studies of mixed solutions of strong electrolytes.

I find it worthwhile to give my **positive assessment** and to recommend to the Scientific Jury to grant the educational and scientific PhD degree to Eng. Dencho Mihov at Asen Zlatarov University of Burgas in the Area of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.2 Chemical Sciences (Inorganic Chemistry).

Подпис заличен  
Чл.2 от ЗЗЛД

10.12.2022  
Shumen

Member of the Scientific Jury:  
(Assoc. Prof. Ismail Ismailov, Ph.D.)