

REVIEW

from DSc. Panteley Petrov Denev - Professor

University of Food Technology - Plovdiv

of the materials submitted for participation in the competition

to occupy the academic position of "**associate professor**"

at Paisii Hilendarski University of Plovdiv

by: field of higher education 4. Natural sciences, mathematics and informatics;

professional direction 4.2. Chemical Sciences (Organic Chemistry, Chromatographic Analysis)

In the competition for "docent", announced in the State Gazette, no. 39 of 02.05.2023 and on the Internet page of Plovdiv University "Paisii Hilendarski" for the needs of the Department of "Organic Chemistry" at the Faculty of Chemistry, as a candidate Chief Assistant Professor Dimitar Georgiev Bozhilov, Ph.D., from the Plovdiv University "Paisii Hilendarski"

1. General presentation of the received materials

By order No. PD-21-1425 dated 30.06.2023 of the Rector of the Plovdiv University "Paisii Hilendarski" (PU), I have been appointed as a member of the scientific jury of a competition for the academic position of "associate professor " in the PU in the field of higher education 4. Natural sciences, mathematics and informatics; professional direction. 4.2. Chemical sciences (Organic chemistry, Chromatographic analysis), announced for the needs of the Department of "Organic Chemistry" at the Faculty of Chemistry.

For participation in the announced competition, documents were submitted by a single candidate: Chief Assistant Professor Dimitar Georgiev Bozhilov, Ph.D., from the Plovdiv University "Paisii Hilendarski".

The set of electronic materials presented by Dimitar Bozhilov is in accordance with the Regulations for the Development of the Academic Staff of the PU, and includes the following documents:

- application for admission to the competition
- autobiography
- diploma for master degree
- diploma for doctor degree
- list of scientific works
- list of citations
- copies of scientific publications
- a reference to the minimum faculty requirements
- annotation of the materials and self-evaluation of the contributions
- declaration of originality of the attached documents
- document of work experience

- document for academic work
- document for scientific research work
- other documents

The candidate has declared the fulfillment of the minimum requirements for holding the academic position "associate professor", indicated in the table 1.

Table 1. Fulfillment of national minimum requirements.

№	A group of indicators	Minimum points required	Declared number of points
1.	A	50	50
2.	B	-	
3.	C	100	155
4.	D	200	215
5.	E	50	206
6.	F	-	

Based on the documents provided to me and the reference made in NACID, Web of Science and Scopus, I declare the accuracy of the data presented below for the minimum required points by groups of indicators for occupying the academic position of associate professor in professional direction 4.2. Chemical Sciences.

Group of indicators A

Content	Associate Professor
Indicator 1 Dissertation work for the award of the educational and scientific degree "doctor"	50

Dimitar Bozhilov's scientific degree "doctor" on the subject of "Phytochemical research on the essential oil and polyphenolic complex of yarrow, mint and fireweed" was registered in NACID with diploma 1000284 / 02.10.2017. In NACID for the minimum required number of points 30, two publications are entered, with total indicators of 37 points:

Constituent composition of *Chenopodium botrys* essential oil - Bulgarian Chemical Communications, 2017, 49(Special Issue G), 124–129, ISSN 0861-9808 - 2017 - Bojilov D., Dagnon S., Ivanov I. 12.00 т.

New insight into the flavonoid composition of *Chenopodium botrys* - Phytochemistry Letters, 2017, 20, 316-321, ISSN 1874-3900 - 2017 - Bojilov D., Dagnon S., Ivanov I. 25.00 т.

Indicator group B for associate professor is not required

Group of indicators C

Indicators 4. Habilitation thesis - scientific publications in journals that are referenced and indexed in world-famous databases with scientific information (Web of Science and Scopus)*	100 25 in Q1 20 in Q2 15 in Q3 12 in Q4
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Georgieva, K., Dagnon, S., Gesheva, E., **Bojilov, D.**, Mihailova, G., & Doncheva, S. (2017). Antioxidant defense during desiccation of the resurrection plant *Haberlea rhodopensis*. Plant Physiology and Biochemistry, 114, 51–59. Q1 25

- Dagnon, S., Novkova, Z., **Bojilov, D.**, Nedialkov, P., & Kouassi, C. (2019). Development of surrogate standards approach for the determination of polyphenols in *Vernonia amygdalina* Del. Journal of Food Composition and Analysis, 82, 103231. Q1 25
- Bojilov, D.**, Dagnon, S., Kostadinov, K., & Filipov, S. (2020). Polyphenol composition of lettuce cultivars affected by mineral and bio-organic fertilization. Czech Journal of Food Sciences, 38(6), 359–366. Q3 15
- Mollova, S., Fidan, H., Antonova, D., **Bozhilov, D.**, Stanev, S., Kostova, I., & Stoyanova, A. (2020). Chemical composition and antimicrobial and antioxidant activity of *Helichrysum italicum* (Roth) G. Don subspecies essential oils. Turkish Journal of Agriculture and Forestry, 44(4), 371–378. Q1 25
- Dragoev, S., Vlahova-Vangelova, D., Balev, D., **Bozhilov, D.**, & Dagnon, S. (2021). Valorization of waste by-products of rose oil production as feedstuff phytonutrients. Bulgarian Journal of Agricultural Science, 27(1), 209–219. Q3 15
- Mollova, S., Dzhurmanski, A., Fidan, H., **Bojilov, D.**, Manolov, S., Dincheva, I., ... Bari, A. (2023). Chemical Composition of Essential Oils from *Nepeta transcaucasica* Grossh. and *Nepeta cataria* L. Cultivated in Bulgaria and Their Antimicrobial and Antioxidant Activity. ACS Omega, 8(17), 15441-15449. Q1 25
- Bojilov, D.**, Manolov, S., Nacheva, A., Dagnon, S., & Ivanov, I. (2023). Characterization of Polyphenols from *Chenopodium botrys* after Fractionation with Different Solvents and Study of Their In Vitro Biological Activity. Molecules, 28(2), 4816. Q1 25
- Total points 155 out of a minimum of 100**

Group of indicators D

7. Scientific publications in journals that are referenced and indexed in world-famous databases with scientific information (Web of Science and Scopus), outside of habilitation work	200
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- Dospatliev, L. K., Petkova, Z. Y., **Bojilov, D. G.**, Ivanova, M. T., Antova, G. A., & Angelova-Romova, M. Y. (2019). A comparative study on the methods of antioxidant activity in wild edible mushrooms from the Batak Mountain, Bulgaria. Bulgarian Chemical Communications, 51(Special Issue A), 245–250. Q4 10
- Bojilov, D.**, Petkova, Z., Manolov, S., Antova, G., & Angelova-Romova, M. (2020). Impact of the duration of ultrasound-assisted extraction on total phenolics content and antioxidant activity of lupin seeds. Bulgarian Chemical Communications, 52(Special Issue D), 222–226. Q4 10
- Manolov, S., Ivanov, I., & **Bojilov, D.** (2020). N-(2-(1H-indol-3-yl)ethyl)-2-(6-chloro-9H-carbazol-2-yl)propanamide. Molbank, 2020(4), M1171. Q4 10
- Manolov, S., Ivanov, I., & **Bojilov, D.** (2021). N-(2-(1H-Indol-3-yl)ethyl)-2-(6-methoxynaphthalen-2-yl)propanamide. Molbank, 2021(1), M1187. Q4 10
- Manolov, S., Ivanov, I., & **Bojilov, D.** (2021). N-(2-(1H-Indol-3-yl)ethyl)-2-(2-fluoro-[1,1'-biphenyl]-4-yl)propanamide. Molbank, 2021, M1177. Q4 10
- Manolov, S., Ivanov, I., **Bojilov, D.**, & Yuliyani Voinikov. (2021). Evaluation of antioxidant, anti-inflammatory and anti-arthritic activity of new ibuprofen derivatives. Bulgarian Chemical Communications, 53(1), 66–71. Q4 10
- Dospatliev, L., Lozanov, V., Ivanova, M., Papazov, P., Sugareva, P., Petkova, Z., & **Bojilov, D.** (2018). Comparison of Free Amino Acid Compositions of Stem and Cap in Wild Edible Mushrooms, Bulgaria. Oxidation Communications, 41(4), 542–549. Q3 15
- Manolov, S., Ivanov, I., & **Bojilov, D.** (2021). Microwave-assisted synthesis of 1,2,3,4-tetrahydroisoquinoline sulfonamide derivatives and their biological evaluation. Journal of the Serbian Chemical Society, 86(2), 139–151. Q3 15
- Manolov, S., Ivanov, I., & **Bojilov, D.** (2021). N-(Benzo[d]thiazol-2-yl)-2-(2-fluoro-[1,1'-biphenyl]-4-yl)propanamide. Molbank, 2021(3), M1260. Q4 10

Manolov, S., Ivanov, I., & **Bojilov, D.** (2021). N-(2,2-Diphenylethyl)-2-(6-methoxynaphthalen-2-yl)propanamide Stanimir. Molbank, 2021(3), M1257. Q4 10

Manolov, S., Ivanov, I., & **Bojilov, D.** (2022). (±)-2-(2-Fluoro-[1,1'-biphenyl]-4-yl)-N-(1-phenylpropan-2-yl)propanamide. Molbank, 2022(1), M1319. Q4 10

Manolov, S., Ivanov, I., & Bojilov, D. (2022). Synthesis of New 1,2,3,4-Tetrahydroquinoline Hybrid of Ibuprofen and Its Biological Evaluation. Molbank, 2022(M1350). Q4 10

Manolov, S., Ivanov, I., & **Bojilov, D.** (2022). Synthesis, in silico, and in vitro biological evaluation of new furan hybrid molecules. Processes, 10(10), 1997. Q2 20

Manolov, S., Ivanov, I., **Bojilov, D.**, & Nedialkov, P. (2023). Synthesis, In Vitro Anti-Inflammatory Activity, and HRMS Analysis of New Amphetamine Derivatives. Molecules, 28(1), 151. Q1 25

Manolov, S., Ivanov, I., **Bojilov, D.**, & Kalinova, Y. (2023). N -(3-Chlorophenethyl)- 2-(4-isobutylphenyl)propanamide. Molbank, 2023(1), M1536. Q4 10

Manolov, S., Ivanov, I., **Bojilov, D.**, & Nikolova, G. (2023). (±)-N-(3-Chlorophenethyl)- 2-(6-methoxynaphthalen-2-yl)propanamide. Molbank, 2023, M1625.Q4 10

Manolov, S., **Bojilov, D.**, Ivanov, I., Marc, G., Bataklieva, N., Oniga, S., ... Nedialkov, P. (2023). Synthesis, Molecular Docking, Molecular Dynamics Studies, and In Vitro Biological Evaluation of New Biofunctional Ketoprofen Derivatives with Different N-Containing Heterocycles. Processes, 11(6), 1837. Q2 20

Total 215 out of minimum 200 points

Group of indicators E

Sum of points in indicator 11	50
11. Citations in scientific publications, monographs, collective volumes and patents, referenced and indexed in world-famous databases with scientific information (Web of Science and Scopus)	

The list presented by the candidate shows citations in 130 articles, of which 103 are indexed in Web of Science and Scopus. Copies of the author's profile in these databases are attached.

A detailed list of links to the articles in which citations were found is provided.

Total number of points 206 points out of a minimum of 50

Indicator group F for associate professor is not required

The additional minimum requirements of the Faculty of Chemistry of the PU include educational and teaching activities (Protocol No. 211/15.10.2019). Chief Assistant Professor Dimitar Bozhilov has worked 2428 hours. With a required minimum of 1080 hours (Table 2).

Table 2. Fulfillment of the faculty's minimum requirements from Chief Assistant Dr. D. Bozhilov

№	Group of indicators	Minimum required number of points	Declared number of points
1.	Teaching and learning activity	1080 hours	2428 hours
2.			

General characteristics of the candidate's research and scientific-applied activity

The scientific research of Chief assistant professor D. Bozhilov, presented in the scientific publications, can be summarized in the following areas:

1. Analysis of polyphenols from medicinal plants and foods of important biological importance using HPLC-PDA.

2. Identification by UHPLC-MS of biologically important polyphenols from medicinal plants and foods.

3. GC-MS analysis of essential oil of catnip *Nepeta* spp.

4. Investigation of *in vitro* biological activity.

Polyphenols play an extremely important role in the defense mechanisms of plants against various stress factors. It is polyphenols that are strong antioxidants and protect resurgent plants from oxidative stress and death under extreme conditions such as drought. The analysis of polyphenolic compounds from medicinal plants and foods of important biological importance is related to the development and optimization of chromatographic conditions in order to obtain a *fingerprint* of the polyphenolic complex. This also includes the identification of secondary metabolites (polyphenols and components of essential oils) using mass spectral methods – GC-MS and UHPLC-MS/MS.

The polyphenolic complex of *Habarella rhodopensis*, *Chenopodium botrys*, *Vernonia amygdalina*, *Rosa damascena* *Lactuca* spp – *Lactuca sativa* *Batavia* cv was studied. *Maritima*, *Lolo rosa* cv. *Tuska* and cv. *Winter Butterhead*. In addition, the essential oil composition of *Nepeta transcaucasica* and *Nepeta cataria* was investigated. The antioxidant activity of the essential oils of *Helichrysum italicum* and the two species of *Nepeta* spp. was studied.

The fingerprint profile is unique and contains a maximum number of well-separated peaks and serves for the identification of polyphenols in order to trace their amount in different stages of plant development. In the research conducted with the participation of Chief Assistant Professor D. Bozhilov, it was shown that extreme conditions, especially drought, have an impact on the polyphenol composition, with the total amount of polyphenols being higher in well-hydrated sunny plants compared to shaded plants, and it mainly due to twice the amount of miconoside and paucifluidide. The effect of mineral, organic and bio-fertilizers on the content of polyphenols was investigated and evaluated by applying Duncan's test. It has been shown that their influence on polyphenols is not unambiguous, therefore the choice of fertilizer is a very important task for the production of agricultural plants with high biological activity.

Collaborative techniques such as HPLC-PDA, UHPLC-MS and standards were used to identify caffeoylquinic acids (mono and di), apigenin and luteolin glycosides contained in *Vernonia amygdalina*. The developments have scientific and applied contributions in HPLC-MS/MS for identification and elucidation of the structure of biologically active compounds. The structure of 6-methoxyflavones and glycosides was studied in negative ionization mode. In the polyphenol composition of *Rosa damasceneca*, new 6 glycosides of gallic acid, quercetin galloyl hexoside and kaempferol disaccharide were identified, which were reported for the first time. Caffeoylquinic acid, apigenin and luteolin glycosides have been identified in *Vernonia amygdalina*.

The composition of the essential oil of two *Nepeta* species - *Nepeta transcaucasica* and *Nepeta cataria* - was studied. The main components in *N. transcaucasica* are β -citronellol, eucalyptol, β -citronellal, germacrene D, (E)- β -ocimene and β -caryophyllene, while in *N. cataria* are β -citronellol, geraniol, neral, nerol, carvacrol and β -Citronellal. These monoterpenes also determine the high antioxidant activity of essential oils.

In vitro biological activity of newly synthesized biofunctional hybrid molecules was studied. Antioxidant activity assessed by hydrogen peroxide deactivation (HPSA) was done. These compounds contain a profen fragment in their structure, and therefore *in vitro* anti-inflammatory activity (assessed by inhibition of albumin denaturation - IAD) and *in vitro* anti-arthritic activity (assessed by antitryptic activity - ATA) was made. The analysis found that all hybrid molecules inherited the

anti-inflammatory and anti-arthritic properties of profens. *In vitro* biological activity of 1,2,3,4-Tetrahydroisoquinoline sulfonamide derivatives was investigated. The newly synthesized sulfonamides are characterized by significant antioxidant (HPSA), *in vitro* anti-inflammatory activity (IAD) and anti-arthritic activity (ATA). This makes them reliable and effective drugs.

The obtained results are of practical application and can be accepted as a contribution of a confirmatory and applied nature.

The scientific results have been published in a series of 24 publications, all of which are reflected in Scopus, and 15 of them in Web of Science. The sum indices are IF (WoS) = 34.316 and impact rank (SJR) = 8.641.

The identification data of the applicant for the scientometric indicators in the world bases are:

SCOPUS Bojilov: ID 57214598724: h-index 5 and Bozhilov: ID 57218363584: h-index 2;
 Web of Science Researcher Bojilov, Dimitar; Bojilov, D.:/ ID: AAD-3181-2020: h-index 3
 ORCID ID <https://orcid.org/0000-0001-6569-8348>
 Bibliographic descriptions in Google Scholar h-index 9, i10-index 7

The candidate - Chief Assistant Professor Dimitar Georgiev Bozhilov covers the minimum scientific metrics described in PPZRASRB and all the indicators of the Plovdiv University "Paisii Hilendarski" Regulations, defining the requirements for occupying the academic position of associate professor. I declare that I have not found data on payment bias or incorrect interpretation of the results in the presented scientific publications.

EVALUATION OF THE CANDIDATE'S TEACHING ACTIVITY

Chief Assistant Professor Dimitar Georgiev Bozhilov, PhD, has provided assurance that he works on a basic employment contract in the Department of "Organic Chemistry" at the Faculty of Chemistry, and as of 06/20/2023 has a total of 12 years, 08 months of work experience and 20 days, of which 09 years, 09 months and 20 days is pedagogical, has an internship as "chief assistant" 05 years, 03 months, 20 days ago he acquired the educational and scientific degree "doctor" 06 years 08 months ago, and 20 days. In 2013, he held the academic position of assistant in the Department of Organic Chemistry. In 2018, he won a competition for chief assistant professor in the department (NACID – 26.02.2018). For the period 2018-2023, he declared the delivery of 481 hours of lectures, 1867 hours of tutoring practical experiments and supervision of graduates, equivalent to 80 hours - supervisor of four graduates in master's programs and 10 in bachelor's. The breakdown is given in the table 3. He conducts practical and seminar exercises in mass spectrometry and UHPLC-MS for students from the bachelor's and master's programs, as well as for doctoral students. He also conducts specialized courses in HPLC-DAD-MS for bachelor and master graduates. He is the head of the post graduate program in high performance liquid chromatography.

Table3. Annual workload for the period 2018 - 2023 (with a plan of 360 hours) for bachelor's programs.

Period	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
Bioorganic Chemistry	219	205	170	210	204
Organic Chemistry	42	81	208	49	
Organic Analysis	84	45	36	-	-
Modern Chromatographic Methods	47	45	-	-	-
Chemistry of Narcotic Substances	64	7	45	-	-

Analysis of Medicinal Substances II	-	-	-	240	204
Chromatographic Analysis	-	-	-	45	98
Graduates	-	20	20	40	
Total	456	403	479	584	506

Develops the curricula in the master programme "Pharmaceutical Chemistry" on: "Chromatographic methods in pharmaceutical analysis" - full-time study, "Chromatographic methods in pharmaceutical analysis" - part-time study, "Phytochemistry of medicinal plants" - full-time study, "Phytochemistry of medicinal plants" - distance learning.

Chief Assistant Professor Dimitar Georgiev Bozhilov, PhD, has participated in 89 national and international scientific forums with students and doctoral students, and in 14 research projects. Member of the organizing committee of 4 scientific conferences.

The candidate - chief assistant professor Dimitar Georgiev Bozhilov, PhD, meets all the requirements for teaching activity, described in the Regulations of the Plovdiv University "Paisii Hilendarski", defining the requirements for occupying the academic position of associate professor.

CONCLUSION

The documents and materials presented by Chief Assistant Professor Dimitar Georgiev Bozhilov, Ph.D., meet all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of ZRASRB, the Regulations of the Plovdiv University "Paisii Hilendarski", describing the manner of holding academic positions.

The candidate in the competition has submitted a sufficient number of scientific works published after the materials used in the defense of the "doctor degree" and to acquire the academic position "chief assistant". The candidate's works contain original scientific and applied contributions that have received international recognition, a representative part of which has been published in journals and scientific collections issued by international academic publishing houses. His theoretical developments have practical applicability. The scientific qualification of Dimitar Georgiev Bozhilov is undoubted. The achievements of Chief Assistant Professor Dimitar Georgiev Bozhilov, PhD, results in the research activity fully correspond to the specific requirements of the announced competition.

After familiarizing myself with the presented documents and scientific works, their significance, the scientific and scientific-applied results contained in them, I give a positive assessment and recommend that a report-proposal be prepared by the scientific jury to the Faculty Council of the Faculty of Chemistry with a proposal Chief Assistant Professor Dimitar Georgiev Bozhilov, PhD, to take the academic position of "associate professor" in scientific field 4. Natural sciences, mathematics and informatics, professional direction 4.2. Chemical sciences in the disciplines "Organic Chemistry", "Chromatographic Analysis" for the needs of the Department of "Organic Chemistry" at the Faculty of Chemistry at Plovdiv University "Paisii Hilendarski", announced in State Gazette No. 39 of 02.05.2023.

22.08.2023

Reviewer:

(Prof. D.Sc. Panteley Denev)