REVIEWER STATEMENT

on the materials submitted for participation in a competition for the academic position of "Associated professor" in the field of higher education 4. "Natural Sciences, Mathematics and Informatics", Professional field 4.2. "Chemical Sciences" (Chemistry), announced in SG, issue. 14 of 18.02.2022 for the needs of the Department “Chemistry” , Faculty of Pharmacy, Medical University - Varna

from Prof. Dr. Irina Karadjova from the Faculty of Chemistry and Pharmacy at Sofia University "St. Kliment Ohridski

The only candidate in the competition is Senior assistant K. Peycheva. The presented materials are in accordance with the Law for the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), its regulations, Regulations for application of Medical University-Varna.

1. Brief biographical data

Senior assist. K. Peycheva acquired higher chemical education in the period 2001-2007 after graduating from the Faculty of chemistry, University of Sofia “St. Kliment Ohridski”; with qualification bachelor, Speciality "Analytical chemistry". The master's degree in the master ‘s program “Modern spectral and chromatographic methods of analysis” is defended with a thesis on Comparative evaluation of plasma damaged low-k film by TNSC repairment agents and TCMS/scCO2. She obtained the scientific and educational degree "Doctor" in 2017 by PhD thesis on "Determination of toxic and essential chemical elements content in the system water-biota-sediment".

The scientific career of senior assist. K. Peycheva began still at her master degree education with successful participation in join research project at the team of Prof. Michail Baklanov, IMEC, Leuven, Belgium and continue with her election as assistant at Department of chemistry, Faculty of pharmacy in 2008. She successively acquired academic positions of senior assistant after she defended her doctoral degree. K. Peycheva has a specialty “Theoretical basis of medicinal chemistry”

Senior Assistant Professor Peycheva effectively combines scientific activity with applied perspectives by linking research on the environmental characterization of aquatic biota with its future application in healthy eating. The main line in the research of Senior Assistant Peycheva is a characterization of the processes in the aquatic environment by successfully combining the assessment of environmental quality, processes of distribution of chemical elements in the water/sediment/biota system, definition of bioavailability of chemical elements with biota assessment as a source of important for the human body essential elements and in addition a risk assessment based on the imminent presence of toxic elements. The main part of the research is devoted to the processes in the aquatic environment of Black Sea and the assessment of the quality of the Black Sea biota. The topic is extremely relevant both in the view point of modern aspects of understanding the idea of bioavailability of toxic and essential chemical elements in water and the degree of bioaccumulation in aquatic organisms and in the view point of characterizing the Black Sea - a unique sea without significant connection with the world. ocean, relatively poor biodiversity and high risk of pollution due to significant river inflow. The quality

of the Black Sea biota, the attitude towards healthy eating and the risk assessment for the consumers is the second essential direction in the research of Senior Assistant Professor Peycheva. Within 10-11 years, systematic results were obtained for the content of a number of components characterizing the Black Sea biota as an important part of the diet of the Bulgarian population. As a result of the conducted research, a reliable assessment of the Black Sea has been achieved both in terms of the quality of the environment and in terms of the modern aspects of seafood consumption.

Chief Assistant Peycheva is a participant in the collective award "Varna" in the field of natural sciences, 24 May 2012. She also has three first and second place posters at international conferences.

2. Description of the submitted materials

The materials that senior assist. Peycheva has applied are very precisely organized and it might be easily concluded that all formal requirements of LDASRB, the regulations for its implementation as well as the criteria of the Medical University-Varna (since 21.03.2022 г) for the academic position of associated professor are met.

Katya Peycheva has attached a list of scientific papers for her entire scientific career, selecting publications for the award of educational and scientific degree doctor (3 publications) materials for awarding the academic position of assistant professor (4 publications), materials for this competition and additional materials , which characterize her research interests and achievements. She is the co-author of a total of 31 publications, of which 12 publications in journals with SJR and / or IF (indexed in Scopus and / or Web of Science); 12 publications refereed in the Web of Science and 7 publications published in non-refereed journals with scientific review or conference proceedings without IF and SJR (non-indexed). The number of noticed citations of all scientific publications according to Scopus data is 119. In the competition for associate professor, the candidate participates with 12 publications, which are used to cover the minimum requirements of LDASRB. In addition, the candidate presented 11 publications, outside the minimum criteria for an overall assessment of her scientific achievements. A review of the journals in which the publications are published shows an almost uniform distribution in quartiles Q1-Q4, which is understandable given that the candidate develops approaches and methods of interest to the entire scientific community, but then applies them for the characterization of local processes, content of components in the Black Sea biota, which is naturally of interest at the national level. The habilitation thesis is an independent monograph and is a critical analysis of the behavior of toxic and essential elements in marine biota and risk assessment for consumers. The results of the research have been reported at a significant number of national and international forums, more than 39 participations with posters and oral presentations at national and international forums have been presented. The applicant has an h-index 3 according to SCOPUS

Participation and project activity of K. Peycheva is high - she has participated in 6 projects funded by NSF, for two of them she is a lead researcher and she participate in 2 international projects. On the basis of the declared publication activity the candidate has attached a reference for the fulfillment of the minimum national requirements and the recommended criteria for holding the academic position "Associate Professor" in the scientific field "Natural Sciences, Mathematics and Informatics", professional field "Chemical Sciences" MU-Varna . The distribution by indicators is as follows: indicator A - 50 points; indicator B - 100 points

(independent habilitation work is presented); indicator D - 205 points (recommended 200); indicator D11 - 66 points (recommended 50). It is evident that the data, presented by K. Peycheva meet and exceed the required minimum under Art. 2b of the Law on Higher Education in the field of higher education 4. Natural sciences, mathematics and informatics in Professional field 4.2. "Chemical Sciences", holding the academic position of "Associate Professor".

3. General characteristics of the research activity and personal contribution of the candidate. Scientific contributions.

The habilitation thesis presented is an independent candidate study, all other publications are collective. In about 50% of publications candidate is a first author. Scientific topics covered include a combination of experimental and theoretical approaches to characterize the processes in the aquatic environment, morphological distribution of essential and toxic elements in biota, assessment of bioaccumulation, assessment of content and composition of essential organic components, risk and benefit assessment of Black Sea biota. In general, the scientific directions in which Senior Assist. Peycheva conducts research are:

- *Characterization of processes in the aquatic environment*. Based on systematic studies and results obtained on the bioavailability of chemical elements, a mathematical description of the bioaccumulation and distribution of chemical elements in the system water/sediments/biota is proposed. In order to assess the bioaccumulation of essential and toxic elements and to assess fish and mollusks on the one hand as an indicator of pollution and on the other hand as an important food in the human diet, a number of studies have been conducted. The total concentration of Cd, Cr, Cu, Fe, Mn, Ni, Pb and Zn was determined in the muscle tissue of the species *M.cephalus* caught from the waters of the Black Sea (Bulgaria) and the Aegean Sea (Greece) and the distribution in the gills, liver and liver was defined. The same elements in muscle tissue of the same species of fish caught in the Ionian Sea (Italy) was measured in order to assess bioaccumulation and the influence of external factors. The content of Cd, Pb, Cu, Mn and Fe in muscle tissue, gill and liver of two fish species (*P. saltratrix* and *A. pontica*) from the northeastern Black Sea was determined to assess the distribution of toxic and essential elements. The results show the high overall quality of Black Sea biota with values for toxic elements below the maximum allowable concentrations, according to European and national legislation. It has been shown that chemical elements generally accumulate significantly in organs such as the liver and mechanically/due to adsorption on the gills of Black Sea fish. The suggested hypothesis that the essential elements are under control and their levels are regulated depending on the specificity of the organism is confirmed. Concentrations of toxic elements depend on a number of factors and the establishment of bioaccumulation factors requires data on chemical species. The conducted research is a good example of combining theoretical models with experimental application and the final result for assessing the quality of the aquatic environment.
- *assessment of the content of essential and toxic elements in the Black Sea biota*. The content of total concentration of Cd, As, Hg, Pb, Zn and Cu in muscle tissue and gills of seven of the most commonly consumed Black Sea fish in Bulgaria: sprat (*sulinus*), horse mackerel (*Trachurus mediterraneus ponticus*), kaya (*Neogobius melanostromus*), carrion (*Alosa pontica*), bonito (*Sarda sarda*), black grouse (*Pomatomus saltatrix*) and mullet (*Mugil cephalus*), the total concentration of As, Cd, Hg, Cu, Cr, Mn, Fe, Ni, Zn and Pb in three Black Sea fish (*E. encrasicolus, B. Belone, C. saliens*) and mussels (*M. galloprovincialis*) is determined. The concentration of trace elements Cd, Cr, Cu, Fe, Ni, Pb and Zn) in bivalve Black Sea organisms

(*D.trunculus, M.galloprincialis and C.gallina*); the concentration of toxic (As, Cd, Ni and Pb) and essential (Cr, Cu, Fe and Zn) elements in wild and cultivated Mediterranean mussels (*M. galloprovincialis*) sampled from the Black Sea coast; the concentration of Cd, Mn, Fe, Cu and Pb in *P. saltatrix* fillets; the content of ten elements in wild and cultivated mussels (*M. galloprovincialis*) and rapana (*R. venosa*) sampled from the Bulgarian Black Sea coast are measured. The task of these studies is to obtain data on the content of chemical elements over a long period of time in order to assess the potential of marine biota as an indicator for the pollution of aquatic environment. The results generally show that mollusks are preferable organism able to reflect the degree of pollution of the marine environment.

- *Studies on the lipid composition and content of lipids/lipid composition and vitamins* in Black Sea and freshwater fish and mollusks. Based on systematic studies, it has been shown that the content of biologically active lipids in edible tissue from mussels and rapana is low, but with a favorable PUFA/SFA ratio and a high content of polar lipids, vitamin D3 and astaxanthin. Regarding the lipid composition of wild and cultivated Mediterranean mussels *M. Galloprovincialis*, eicosapentaenoic and docosahexaenoic acid have been shown to be the main polyunsaturated fatty acids, regardless of where the mussels are grown. Similar studies with eleven species of fish, mussels and rapana make it possible to obtain data on lipid composition and changes in different types of biota. Studies of the fatty acid profile and the content of fat-soluble vitamins and carotenoids in the Black Sea species *Rapana venosa* have shown a strong seasonal effect on lipid classes and their fatty acid profile.

Data on phenolic content and antioxidant and antibacterial activity of extracts of Black Sea mollusks with potential future applications in the development of medicinal products of marine origin have been obtained.

- *the risk of consumption of contaminated biota* (Black Sea fish, mollusks and freshwater fish) has been assessed, which includes an assessment of the content of toxic elements and an assessment of the benefits of consuming marine biota. The assessment is based on the calculation of non-carcinogenic risk factors, hazard index and carcinogenic risk factors for the consumption of three Black Sea fish (*E. encrasicolus, B. Belone, C. saliens*) and mussels (*M. galloprovincialis*), bivalve Black Sea organisms (*D. trunculus, M.galloprincialis* and *C.gallina*) and cultivated and wild populations of *M.galloprincialis* and rapana with respect to the elements As, Cd, Hg, Cu, Cr, Mn, Fe, Ni, Zn and Pb. The results obtained for the lack of risk for biota consumption are essential for a healthy diet. In addition, studies have shown the significant benefits of consuming marine biota based on calculated indices, including the recommended daily allowance of essential fatty acids and other components.

The scientific contributions can be characterized as new scientific results with very good practical application and potential final realization. Senior assist. Peycheva is quite comprehensive and very correctly outlines her own contributions, which gives me reason to conclude that the personal contribution of the candidate in the presented research is undoubted and significant.

4. Reflection in the literature

Senior assist. Peycheva presented a list of citations of the works with which she participated in the competition and the general conclusion is that the research she has conducted and published has found a serious response in the literature. Articles devoted to the assessment of the

distribution of essential and toxic elements in the biota have a significant number of citations and show the relevance of the results obtained. The articles characterizing the chemical forms of the elements in water / sedimentary / biota also received a wide response.

6. Critical remarks I have no critical remarks concerning research studies of K. Peycheva. I believe that the observation for high concentrations of As in the biota shows only the lack of possibilities for speciation analysis to prove that these are organic non-toxic chemical species of arsenic.

CONCLUSION

Senior assistant professor K. Peycheva has submitted for participation in the competition detailed information about her scientific activities. The evaluation of the presented materials undoubtedly demonstrates that K. Peycheva covers the requirements for the occupation of the academic position “Associated Professor” in the professional field of "Chemical Sciences". The presented documents show that she is a researcher with her own style and original ideas, who successfully combines theoretical approaches with experimental results to solve scientific problems and in addition to reach effective application of the results obtained in practice. A review of the publications shows that she successfully upgraded the achievements of the Department of chemistry and has a clear perspective for her future development. In this aspect, based on current and promising scientific topics, quantity and quality of scientific papers, responses in the literature, scientific contributions, leadership and participation in scientific projects, as well as my personal impressions, I strongly recommend the Scientific Council of Faculty of pharmacy to vote positively for the award of the academic position " Associated Professor” in professional field 4.2. Chemical sciences, scientific specialty “Chemistry” for K, Peycheva.

29.05.2022 г.,

София Рецензент: