

**European Chemistry  
Thematic Network Association**



**Site Visit Report**

**For the application for the**

**CHEMISTRY DOCTORATE EuroLABEL®**

**of the**

**St. Petersburg University  
Institute of Chemistry**

**For the study program:**

**“Chemical Sciences”**

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**Report on the site visit to Institute of Chemistry, Saint Petersburg State University in connection with the application for the Chemistry Doctorate Eurolabel<sup>®</sup>.****1. Composition and Affiliation of the Site Visit Team**

- Prof. Pavel Drařar, ECTN Association, Check Republic
- Pavel Marmysh, JSC PhosAgro-Cherepovets, Russian Federation
- Mikhail Solovev, Minin University, Russian Federation

**2. Persons seen**

*2.1 A Discussion with those responsible for the program, together with one or more representatives of the institution's leadership*

Prof. Marina Lavrikova, First Vice-rector for academic affairs; Prof. Irina Balova, Director of Institute of Chemistry; Viktor Sorokoumov, Head of the EMC, PhD in Chemistry; Prof. Valentin Semenov, Head of the Educational Program

*2.1 B Discussion with members of the teaching staff*

Prof. Alexey Timoshkin, PhD (Professor and acting Head of General and Inorganic Chemistry Department); Andrey Shishov, PhD (Senior Teacher of Analytical Chemistry Department); Prof. Mikhail Novikov, DSc (Professor of Organic Chemistry Department); Associate Professor Igor Prikhodko, PhD (Associate Professor of Physical Chemistry Department); Associate Professor Mikhail Voznesensky, PhD (Associate Professor of Physical Chemistry Department); Prof. Piotr Tolstoy, PhD (Professor of Physical Chemistry Department); Olga Bakulina, PhD (Assistant Professor of Organic Chemistry Department); Anastasiya Govdhi, PhD (Researcher of Organic Chemistry Department); Prof. Regina Islamova, DSc (Professor of High Molecular Chemistry Department); Associate Professor Anastasiya Pen'kova, PhD (Associate Professor of Analytical Chemistry Department); Associate Professor Alexey Povolocky, DSc (Associate Professor of Laser Chemistry and Laser Materials Science Department); Prof. Dmitry Kirsanov, DSc of Chemistry (Professor of Analytical Chemistry Department)

*2.1 C Discussion with employers and, among them, members of the program*

Vera Kulakova, LLK-International, HR manager; Pavel Yelagin, ZAO BIOCAD, Head of the R&D Department; Denis Nilov, CC "Active Component", R&D Director; Maksim Borovitev, Pharmaceutical Company "WERTEKS", Deputy R&D Director.

*2.1 D Discussion with students and, among them, those students direct assessment of whose competencies was carried out (4<sup>th</sup> year)*

Olga Osipova, 2<sup>nd</sup> year (f), Alexey Pochivalov, 2<sup>nd</sup> year (m), Anastasiya Podurets, 3<sup>rd</sup> year (f), Ekaterina Sirotkina, 3<sup>rd</sup> year (f), Yuliya Petukhova, 4<sup>th</sup> year (f), Stanislav Kalinin, 4<sup>th</sup> year (m), Rostislav Apraksin, 4<sup>th</sup> year (m), Artiom Glukharev, 4<sup>th</sup> year (m).

2.2 E Discussion with alumni

Anna Ghubal, Junior Researcher, Institute of Chemistry, SPBU; Darya Dzioma, Assistant Professor, Institute of Chemistry, SPBU; Ilya Smetanin, Synthetic Chemist, ZAO BIOCAD; Alexey Kireev, Specialist for Raman Spectroscopy, Science Park of SPBU.

## 1. Background of the visit

In 1868, at the University of St. Petersburg a Chemical society was opened on the initiative of scientists of the faculty of Physics and Mathematics. A construction of the separate laboratory building was initiated by D. Mendeleev in 1884 and completed in 1894. The Institute of Chemistry today is located in the Peterhof campus of the University near the Peterhof Palace and parks. The Institute of Chemistry includes 14 departments and three new interdepartmental laboratories: Biomedical chemistry, Chemical pharmacology and laboratory of Biogibrid technologies, established in early 2018 by the results of the competition of Megagrants of the Government of Russian Federation. One of the leading pharmacologists of the world — Professor Arto Urtti (Finland) headed the new division. Irina Balova, Doctor of Chemical Sciences, is the Director of the Institute of Chemistry. In continuation of the tradition, training at the Institute of Chemistry of SPBU in Bachelor, Master and postgraduate studies is delivered by teachers who conduct active research work, publish articles in prestigious international scientific journals, undergo foreign internships, manage projects supported by Russian and foreign scientific foundations. Teaching staff of the Institute includes members of the Russian Academy of Sciences: acad. A. Rusanov, corresponding member. V. Kukushkin, V. Stolyarova, N. Smirnova; professors of RAS N. Bokach, A. Bulatov, M. Krasavin.

Postgraduate studies are carried out on the programs "Chemistry" and "Chemistry, physics and mechanics of materials". The program "Chemistry" is more focused on the model of classical University education and the formation of competencies that require both deep fundamental knowledge in chemistry and possession of practical skills in the application of modern experimental and theoretical methods. Teaching on the educational program "Chemistry" is conducted in Russian and English.

## 1. Fitness for Purpose

The purpose of the program is to prepare highly qualified scientific and teaching personnel in accordance with the chosen direction/individual trajectory of training within the educational program, ready for independent research and teaching in various fields of science, high technologies and chemical education, covering a set of tasks of theoretical and applied chemistry (in accordance with the direction of training), as well as related natural Sciences. The main regulatory document for this program is the Order 12242/1 of 19.12.2018. The educational program is developed taking into account the opinion of employers (professional community) on the correlation of graduates' competencies and labor functions in the field of professional activity. The program was introduced in 2014. In 2016 a significant modernization was carried out, which was associated with the transition from a three-year system of education to a four-year one. The goals of the doctoral program are in accordance with the Budapest Descriptors. As it was found during the direct assessment of competencies, a bit problematic for graduates was the communication on the subject of research with people who do not have special training in chemistry.

## 2. Entry to the Program

Doctoral students can be accepted for further training on a competitive basis, having higher education, confirmed by a specialist diploma or a master's degree, and passing a competition of the following documents: portfolio (which includes a description of student's interest in studying, success in studies, research and practical activities), motivation letter (which must contain a reasoned justification of the choice of SPBU for continuing education and a description of the planned field of scientific work) and essay (creative or research work) on one of the given topics. Additionally, students must provide information about available publications in journals with impact factor; the documents and materials confirming participation of applicants in research activities; recommendation letters from teachers and scientific employees of SPBU (required – Candidates or Doctors of sciences) as well as employers in accordance with the direction of the educational program.

Students admitted for places funded from the Federal budget, do not enter into a contract with the University. Students enrolled on a fee-based basis enter into a contract with the University, which regulates the following points: duration of training; the cost of educational services; terms and procedures for payment; responsibility of the parties; the procedure for changing and terminating the Contract; the terms of interaction of the parties; the procedure for determining the supervisor.

### **3. Length of Study**

The duration of the program is four years. The extension of the training period is possible only if the students are provided with a document confirming the presence of an objective reason (difficult family circumstances or health problems).

### **4. Study Program Structure: Coursework and Credits**

The curriculum carries 240 ECTS credits. The training consists of compulsory and variable parts, with the compulsory part allocated on the 1st year. Pedagogical practice is implemented in the 2nd year, practical training – in the 3rd year. The final certification completes the training and includes 9 ECTS. The study of disciplines (modules) takes 30 ECTS, 9 ECTS of which refer to the compulsory part, 21 ECTS – to the variable one. Disciplines (modules) of the compulsory part involve the study of the History and philosophy of science (4 ECTS), and a foreign language (5 ECTS). Disciplines (modules) of the variable part are Chemistry-oriented and cover a wide range of modern chemical knowledge. The average pace of studying is 60 ECTS per 1 year, but the individual curriculum can change it. Visiting foreign specialists may carry out some lectures but this is not necessary. Periods to be spent abroad, in another educational institution or in industry should not exceed the duration of one semester so that a graduate student could successfully pass exams of the required disciplines. As a rule, it is one-two months.

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## 5. Other elements of the Program

### 5.1 Teaching

Students can participate in teaching activities starting from the 4th semester (second year of study) after successful completion of the course "Pedagogy and psychology of modern higher education" (online course). In the 3<sup>rd</sup> and 4<sup>th</sup> years of study, graduate students usually take an active part in teaching. The types of teaching activities of graduate students include the following: participation in student seminars, laboratory classes, management of course and GQW of Bachelors and Masters, lectures in General education and scientific schools. Selection of graduate students for participation in teaching is usually made by a supervisor who analyzes the performances of students at scientific seminars of the relevant Department or scientific group. The maximum teaching workload does not exceed 72 hours. In this case teaching is not paid.

### 5.2 Generic Competences

All key competences required by the Chemistry Doctorate Eurolabel are satisfactory covered. Original independent and critical thinking are enhanced during research activities such as participation in formulation of the research projects, writing publications and training in laboratories. As resulted during the site visit, planning skills and adaptability to novel situations of the PhD students are also developed throughout the organization of national and international conferences (for example, annual conference "Mendeleev"). Ability for knowledge transfer and interactions with audience are acquired during the training of course "Pedagogy and psychology of modern higher education" and in pedagogical practice. Attitude to establish good human relations is acquired when PhD students are involved in training and advising Master and Bachelor students.

## 6. Transcripts

As a transcript, SPBU currently issues a standard diploma in Russian and English. In addition, students get a certificate of PhD exams in the following disciplines: English language, History and Philosophy of chemistry, Chemistry. The Diploma Supplement includes the name of the final qualifying work, name of the supervisor, names of the members of the state examination commission, a list of disciplines of the educational program and final grades for each of the disciplines.

## 7. Graduate School

The Institute of Chemistry has its own Graduate School for both internal and external (Russian and international) graduate students. All departments of the Institute of Chemistry are involved in activities of the graduate school. Also seven institutes of the Russian Academy of Sciences and

four commercial organizations specialized in Chemistry are partners of the program that entered into contracts with the institution.

## 8. Supervision

The supervision of the doctoral students in SPBU is regulated by the order 13.11.2017 No. 11185/1. A student has a right to choose a supervisor, which is approved by the Order of the Rector of SPBU or a person authorized by him. The teacher or researcher can work as the supervisor if he/she has a scientific degree of Candidate or Doctor of sciences and at least two articles over the last three years in journals of higher attestation commission list and/or Scopus and WOS. The employee is not allowed for supervision if for the last 5 years there was a case of a graduate student under his/her supervision not presenting the thesis in appropriate time without a valid reason.

A database of leading scientists of the Institute with successful experience of scientific supervision of graduate students is formed, usually they are Doctors of science. As an exception, the supervision can be carried out by Candidates of science, who are approved by the Scientific commission and recommended for inclusion in the existing database.

## 9. Final Examinations

The students must pass three "candidate exams": English language, History and philosophy of chemistry, Chemistry. The final qualifying work (FQW) must be written in Russian. The title of the FQW in Russian and English should be approved by the educational department. FQW defense is held at the meeting of the Commission approved by the first Vice-rector for academic affairs of SPBU. The speaker takes 15 minutes for the scientific report, after which the members of the commission ask additional questions that might arise during the report. Then the reviews of the supervisor and reviewer are heard. In conclusion, the student answers the questions of the reviewer. Most of the members of the Commission are external experts and are employees of organizations that are potential employers, their inclusion is formalized by the order of SPBU. The final exam is an open procedure, it can be attended by any person interested. The defense is conducted in Russian. For foreign students it is allowed to make it in English (one of the languages of the educational program).

The successful final examination does not lead the student to the PhD diploma. The student gets the graduation diploma and then can manage his further qualification assessment according to two different scenarios. The first one, requires candidate thesis (different from the FQW), three certificates of candidate exams and the defense of the thesis in an external Council. In this case the student may achieve the candidate degree of Higher Certification Commission Label. The second one, requires also an SPBU diploma of the 3<sup>rd</sup> level. In this case a student has a right to defend his/her thesis in the internal SPBU Council and may achieve the candidate degree of SPBU Label which is equal to the HCC one.

**10. Assessment**

For current assessment of competencies the students must pass tests or exams. They can be carried out in different forms (orally, in writing form, in testing, etc.). All assessment procedures and criteria are described in detail in the syllabi of the disciplines.

Assessment of the results of the development of teaching skills is carried out in the form of defense of the report on pedagogical practice at the end of the 3rd semester.

The individual curriculum of the student envisaged an annual certification which requires the assessment of scientific activity of the student at the meeting of the Commission approved by the Director of the Institute of chemistry. The student must provide the results of scientific activity for the reporting period (publications, participation in scientific conferences, internships in other organizations), it is necessary to report on the plans for the next period and the thesis readiness.

**11. Quality Assurance**

The quality of education and training is confirmed by the results of the annual self-evaluation and the results of state, professional, public and international accreditations.

Monitoring of the quality of education in SPBU is carried out annually. The results of the monitoring are being reflected on the corresponding paragraphs and target indicators of the "Program of development of SPBU until 2020" and reported on corresponding committees meetings. Also the results of surveys of students feedbacks, sociological surveys of graduates of SPSU and employers are also taken into account.

**12. Ethical concern**

In the employment contract of employees of SPBU there is a point 4.2.6 "to Follow the moral and cultural traditions of SPBU, to accept moral and ethical standards, to take care of spiritual values".

The ethics commission was formed at the University for solution of various issues (plagiarism, citation, originality and reliable results, interpersonal relations). The members of the Ethics commission are appointed by the Academic council of SPBU. Candidates are recommended by the Board of honorary professors.



## Site visit events

### **17.09.2019.**

9:00-10:00 Internal meeting of the expert group.

10:00-12:00 Meeting of experts and administration. The administration of the University presented to the experts the key staff, including the management of the Institute of chemistry and of the programs being accredited. Program Heads presented their programs and shared their goals, as well as plans for the current and long-term development of the programs.

14:00-15:00 Evaluation of material and technical resources, visit to the library, laboratories, computer classes, etc. During the tour, the program team presented to the experts technical resources that ensure a high level of implementation of the program, including buildings, facilities, laboratories, classrooms, open spaces, library and other infrastructure. Experts pointed out that the level of security during study and research processes should be improved.

15:10-16:00 Interview with Chemistry program managers. The Head of the program reported on the main features of the educational program and the conditions of its implementation, then answered questions.

16:10-17:10 Interview with students. The students gave an impression of well educated people, with flexible thinking, very good English knowledge, understanding of main goals of the program, and they also expressed their satisfaction with its implementation.

17:20- 18:20 Interview with teachers and employees of departments. All teachers are highly qualified, with excellent English knowledge, awareness and understanding of the goals of the program. They all understand the high quality of resources they work with and really hope that the quantity of students will increase.

18:30-19:30 Document processing.

### **18.09.2019.**

9:00-9:30 Internal meeting of the expert group.

9:30-10:15 Visiting of classes. Unfortunately, there were no classes on this program during the site visit. Classes on other programs demonstrated a very high level of teaching of the experienced professors but, in some cases, disadvantage in use of modern pedagogical technologies, methods and devices.

10:30-11:30 Meeting with employers and other social partners. It is very important that all the employers are satisfied with the education level of graduates, but would prefer if graduates are more familiar with certain technologies and equipment which are in use in their industrial companies.

11:40-12:30 Interview with working graduates. Working graduates also demonstrated a very high level of education, communication culture and expressed satisfaction with program results.

12:40-13:25 Direct assessment of students' competencies. To assess the level of formation of competencies, the experts used the technology of solving cases. Students were asked to solve the case of future professional activity and episodes of planning of their own personal and professional development. The solution of the case involved the articulation of the solution plan

by the students, including the reproduction of speech patterns acceptable for specific situations. As a result, the experts found out, that communication competencies are not completely reached yet, it was especially evident when the student had to discuss scientific issues with a person not educated in chemistry.

15:30-16:30 Final meeting of the expert group.

16:30-17:30 Summarizing of the site visit.

## **Internal part**

### **Conclusions**

The Experts recommend that the Chemistry Doctorate Eurolabel be awarded to the “Chemistry” study program of the Institute of Chemistry of the Saint Petersburg State University.

### **Recommendations**

1. It is recommended to consider the possibility of developing and implementing additional disciplines (modules) in the educational process for the best formation of "soft skills" of graduates.
2. It is recommended to keep on modernization of the educational process in the part of applied methods, technologies, and techniques.
3. It is recommended to improve and to guarantee the safety of training and research activities.

### **Conditions**

There are none.