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**CHEMIST IVAN PONOMARYOV (1848–1905):
SCIENTIFIC MILESTONES AND LIFE CHALLENGES**

This article examines the scientific, organizational, and pedagogical activities of the rector of Kharkiv Technological Institute (KhTI), Professor Ivan Ponomaryov. It provides information about the family in which the future professor of chemistry was born. The study analyzes his education at the commercial academy and the influence of a local photographer on his choice of specialty. It has been established that lectures by Professors Fedir Beilstein and Dmytro Mendeleev played a significant role in his scientific development. Additionally, it provides information on the socio-political situation at the end of the 19th century and the role of students in democratic changes. The role of progressive scientists from Switzerland, Germany, and France in shaping I. Ponomaryov's worldview is highlighted. Information is provided about the scientist's research under the guidance of Professor Johannes Wislicenus. It is noted that it was Professor J. Wislicenus who exemplified the use of methodological approaches in teaching chemical disciplines. The ideas of forming a «research school» and creating a laboratory were inherited by I. Ponomaryov from his French mentor, Adolphe Wurtz. It is noted that the scientist worked in several higher education institutions in the city of Odesa, but his name is not mentioned anywhere. Therefore, the Odesa period requires further research. The Kharkiv period is fairly well-documented, but there are «dark spots» as the scientist's personal file has been lost. The article considers the professor's participation in naturalists' congresses and provides information about his publications, including «Course of Organic Chemistry» (1891, 1901) and the fundamental work «On the New Chemical Nomenclature» (1892). His work as assistant director and secretary of the Academic Committee is presented based on the recollections of his colleagues and students. The article also analyzes his pedagogical approaches in teaching disciplines. As a specialist, the professor often provided expert evaluations in court and was a member of several scientific societies. Professor I. Ponomaryov held the position of rector of KhTI for only half a year; due to

his premature death, he was unable to fully reveal his organizational talent in this position.

Keywords: I. Ponomaryov, Kharkiv Technological Institute, rector, education, history of science, local history, biography.

ХІМІК ІВАН ПОНОМАРЬОВ (1848–1905 рр.): НАУКОВІ ВІХИ ТА ЖИТТЄВІ ВИКЛИКИ

У статті розглядається наукова, організаційна та педагогічна діяльність ректора Харківського технологічного інституту, професора Івана Михайловича Пономарьова. Представлено інформацію про родину, у якій народився майбутній професор хімії. Проаналізовано навчання у комерційній академії та вплив місцевого фотографа на обрання подальшої спеціальності. Встановлено, що лекції професорів Федора Бейльштейна та Дмитра Менделєєва відіграли значну роль у подальшому становленні науковця. Разом із тим представлено інформацію щодо суспільно-політичної ситуації наприкінці XIX ст. та ролі студентства у демократичних змінах. Висвітлюється роль прогресивних науковців Швейцарії, Німеччини та Франції у формуванні світогляду І. Пономарьова. Подані відомості щодо досліджень науковця під керівництвом професора Йоганнеса Вісліценуса. Зазначено, що саме професор Й. Вісліценус став прикладом використання методологічних підходів у викладання хімічних дисциплін. Ідеї формування «дослідницької школи» та створення лабораторії були успадковані І. Пономарьовим від його французького керівника – Адольфа Вюртца. Зазначено, що вчений працював у декількох закладах вищої освіти міста Одеси, проте його ім'я ніде не згадується. Тобто одеський період потребує подальших досліджень. Харківський період доволі широко представлений, проте існують «темні плями», адже особову справу науковця втрачено. Розглянуто участь професора у з'їздах природознавців та подано інформацію про його публікації. Зокрема, це – «Курс органічної хімії» (1891 р., 1901 р.), а також фундаментальна праця «Про нову хімічну номенклатуру» (1892 р.). Робота як помічника директора та секретаря Навчального комітету представлена зі спогадів його колег та студентів. У роботі також аналізуються його педагогічні підходи у викладанні дисциплін. Як фахівець професор часто надавав експертну оцінку у суді, був членом декількох наукових товариств. Професор І. Пономарьов обіймав посаду ректора ХТІ всього пів року, через передчасну смерть йому не вдалося повною мірою розкрити свій організаторський талант на цій посаді.

Ключові слова: І. М. Пономарьов, Харківський технологічний інститут, ректор, освіта, історія науки, краєзнавство, біографістика.

Problem statement. The next year, 2025, will be a jubilee year for one of the oldest technical higher education institutions in Ukraine – the National Technical University «Kharkiv Polytechnic Institute» will celebrate its 140th anniversary! During this

significant period, the institution was headed by leading specialists in the fields of chemistry, mechanical engineering, physics, electricity, and various technologies. It is important to emphasize that the rectors not only performed administrative and organizational duties but were also actively involved in teaching activities, influenced higher education reforms of their time, and inspired students to achieve. One such rector was Ivan Ponomaryov.

The aim of this article is to highlight the period of Ivan Ponomaryov's development as a scientist, as well as his work as a researcher and leader of a higher education institution. **Analysis of recent research and publications.** There are many studies dedicated to NTU «KhPI» mentioning the name of I. Ponomaryov, as well as encyclopedic editions specifically about the scientist [1–4]. The most comprehensive biographical reference is the publication [5] and the article by D. Zhurylo and V. Kabachek [6]; the main achievements as rector are covered in the monograph by M. Gutnyk and O. Tverytnykova [7]. Despite numerous mentions as the rector of the Kharkiv Technological Institute, the period of his scientific development, his scientific work in Germany and France remained overlooked by authors.

Main text. Ivan Ponomaryov was born on January 10, 1848, in the family of a wealthy merchant of the 1st guild, who was the mayor of Irkutsk from 1875 to 1877, Mykhaylo Ivanovich (1822–May 19, 1879) and Hanna Andriyivna. The family owned gold mines and a store selling mining and manufactured goods. In addition to the eldest Ivan, the family had sons Prokopi and Innokentiy, and daughter Antonida. Ivan Ponomaryov received his secondary education at the Moscow Practical Academy of Commercial Sciences. The purpose of the Academy was to provide general education as well as prepare for commercial activities. For this, the curriculum included commodity science, accounting, political economy, commercial and bill law, and international markets. The academy was also the only secondary educational institution in Moscow where English was taught (along with German and French). The academy also had a preparatory class. The training lasted eight years [8, p.149]. The knowledge of foreign languages came in

handy during I. Ponomaryov's subsequent educational travels to Germany and France. After graduating from the Academy, I. Ponomaryov returned to Irkutsk, but did not show interest in commercial activities. Instead, he became interested in chemical experiments conducted by a local photographer. Against his father's wishes, I. Ponomaryov entered the chemical faculty of the St. Petersburg Technological Institute, where he studied for a little over two years. The lectures and practical sessions under the guidance of Professors Fedir Beilstein and Dmytro Mendeleev had the greatest influence on the young scientist. It was thanks to his personal acquaintance with D. Mendeleev that I. Ponomaryov was later warmly welcomed in Göttingen. The Göttingen city archive preserves letters from Professor Ponomaryov to the owners of the pension in Göttingen where he stayed [9]. The author mainly recalls his stay in Germany and expresses gratitude to the pension owners for their hospitality.

It should be noted that since the early 1860s, the progressive part of the students not only opposed the official methods of education but also the police arbitrariness in the country. The students' disobedience to the authorities' orders, due to their interference in university affairs, manifested itself in «student meetings». Further, the crop failure of 1867 and forest fires in the spring of 1868, which led to famine in the Russian Empire, catalyzed student unrest. The government was «alarmed» by the increase in the democratic stratum in universities and institutes, which occurred mainly due to the influx of free listeners. In this regard, on May 26, 1867, the «Rules on supervision of students outside the walls of the university and pupils of higher educational institutions of various departments» were enacted, allowing the police to interfere in the internal affairs of universities.

All these disturbances forced I. Ponomaryov to leave the country at the end of 1868. He first went to Zurich, where he attended lectures and conducted research in the chemical laboratory under the direction of the laboratory director, Professor Johannes Wislicenus. J. Wislicenus's research focused on lactic acid. The scientist synthesized ordinary lactic acid and proved its structure. In 1869, the professor first established the identity of ordinary lactic and meat-lactic acids and suggested that their molecules have different

spatial arrangements of atoms [10]. It was there that the young scientist familiarized himself with the organization of work in the chemical laboratory, its equipment, and gained the necessary experience as a chemist. It should be noted that J. Wislicenus had experience working in Boston, meaning his teaching methodology represented a synthesis of the achievements of the European and American education systems. His students noted his excellent oratory skills, unwavering calm, and presence of mind [11]. I. Ponomaryov always remembered his scientific mentor with great admiration.

Later, I. Ponomaryov moved to Paris, where he studied chemistry at the Department of Organic Chemistry under the guidance of Professor Adolphe Wurtz at the Sorbonne. Professor Wurtz is well-known among organic chemists for the «Wurtz reaction» named after him, as well as for his discovery of ethylamine, ethylene glycol, and the aldol reaction. Also well-known is A. Wurtz's 1868 speech, in which the scientist claimed that chemistry is an exclusively French science [12]. As regards the second part of the claim (which gives some support to the first part), everyone has assumed that it relates purely to the cognitive level, that is to say that it referred basically to Lavoisier's oxygen theory and perhaps the list of elements.

Professor A. Wurtz is considered the founder of the idea of the «research school», and he insisted that laboratories be properly equipped, as the equipment of French laboratories significantly lagged behind that of German laboratories. This was an integral part of his grand vision of the science [13]. Later, the experience gained in organizing chemical laboratories was applied by I. Ponomaryov at the Kharkiv Technological Institute. The scientific supervisors of I. Ponomaryov in Germany and France were distinguished personalities of their time, progressive and talented scientists and organizers. The knowledge and skills that I. Ponomaryov acquired in Europe helped him introduce new ideas and solutions that increased the efficiency of his scientific research.

Later, I. Ponomaryov visited Bonn and Göttingen, where in 1875 he obtained a doctorate in chemistry. In 1876, I. Ponomaryov returned to St. Petersburg, but due to health issues and on the advice of doctors, he moved to Odesa in the summer, where he

managed to get a job as a laboratory assistant and private docent at Novorossiysk University. His duties included managing the chemical laboratory. At the university, he lectured on analytical chemistry and simultaneously taught physics at a girls' gymnasium and a seminary. In Odesa, I. Ponomaryov defended his master's thesis on «To the History of urea derivatives» (1878) and later his doctoral dissertation on «The Structure of cyanuric acid» (1885). Since 1878, he held the position of a private docent. During the Odesa period, Professor I. Ponomaryov conducted numerous diverse studies on various waters, muds, industrial products, and ores. However, his name is not mentioned either on the university's website or in publications on the history of chemical research at Novorossiysk University [14, p. 217–230].

At the beginning of 1886, the scientist was offered a position at Kharkiv University, but by April 24, 1887, he had moved to the newly established Kharkiv Practical Technological Institute due to an open vacancy caused by the illness of Professor Oleksandr Eltekov, where he took the position of Professor. Here, the scientist lectured on analytical chemistry and served as the secretary of the Educational Committee until 1905. Later, the subjects taught by Professor I. Ponomaryov expanded to include the course «Technology of mineral substances» for first-year students and the course «Organic Chemistry» for second-year students. In addition to teaching these courses, I. Ponomaryov was involved in equipping the chemical laboratory with various chemical instruments, with active assistance from Mykola Chernay, who later became a professor of chemistry. This laboratory could simultaneously accommodate 150 students for research and was considered «one of the best institutions in the empire» [7, p. 44]. In 1904, the professor took over the management of this laboratory. The professor was also actively involved in the construction of the chemical workshops building (today, it is the technical building), which was carried out between 1886 and 1889, with I. Ponomaryov being part of the construction commission.

From December 28, 1889, to January 7, 1890, the scientist participated in the VIII Congress of Naturalists and Physicians in St. Petersburg. This congress was indeed an

event of the year. The number of participants who registered as members of this congress reached the unprecedented figure of 2,224 people, of which 935 were from other cities. A total of 392 reports were heard at 77 scientific meetings. In particular, at the meeting of the chemical section on January 6, 1890, Professor I. Ponomaryov was elected Chairman of the section, and Professor Oleksandr Reformatskyi was elected secretary.

It should be noted that the scientist also actively participated in the subsequent IX Congress. The IX Congress was held in Moscow in January 1894, and the number of reports increased to 395. Here, the scientist presented a report on «To the History of alloxanic acid and the structure of allantoin». I. Ponomaryov's research formed the basis for the synthesis of the simplest cyclic ureides, which the scientist wrote about as early as 1872.

In subsequent congresses, the scientist did not participate because he was assigned many new responsibilities. In 1891, I. Ponomaryov was appointed Assistant Director. He worked in this position until September 18, 1900, when Professor Oleksii Predtechenskiy became the assistant director [15]. In 1899, the professor received the rank of Actual State Councillor [16, p. 4]. During the turbulent years of 1904–1905, I. Ponomaryov carried out a significant amount of work as the assistant director. For several years, the scientist chaired the examination committees for the fifth-year students of Chemistry department.

According to the memories of contemporaneous teachers and students, there were no forbidden topics for Ivan Mykhailovych, and any student could come for advice. I. Ponomaryov often helped poor students with his own money. Students did not give him peace either in the morning or in the evening, but everyone was heard, and help was provided. The appointment of Mykola Shiller as director of KhTI in 1903, a new person for the institute, prompted students to increasingly turn to the secretary of the Educational Committee, Professor I. Ponomaryov. To the surprise of colleagues, the scientist knew each student not only by face (there were about 1000 students) but also knew all the flaws in each subject and gave warnings long before exams. No student, even after the professor's instructions, showed disrespect to I. Ponomaryov. In the last year before his

death, the scientist received students from 9 a.m. to 3 or 4 p.m. (every day, 100-180 people).

To ensure the courses he taught were provided with educational literature, the scientist published the textbook «Course of organic chemistry» (1891, 1901), as well as the fundamental work «On the new chemical nomenclature» (1892). The latter publication was a reaction to the decisions of the Geneva Congress of April 19–22, 1892, regarding the reform of chemical nomenclature. The group of thirty-four chemists included presidents of national chemical societies, editors of prestigious journals, and three future Nobel laureates, gathered for an event that a local newspaper promised would «mark an important date in the history of chemistry». They had come to Geneva to address a serious obstacle to the continued progress of chemical science and industry: confusing nomenclature. The main reason for this gathering was the absence of unified criteria in the nomenclature of chemical compounds. In particular, there were disputes over the names of many complex organic compounds. The congress participants aimed to create a system of names that would reflect the composition of compounds. Previously, compounds had names that did not reveal their structure, such as glycerin, phoron, etc. Therefore, the International Congress of Chemists attempted to establish a unified official international nomenclature that would reflect the structure of chemical substances. Although later certain clarifications were made to the nomenclature, the principles laid down in 1892 remained unchanged [17]. These were the first scientifically substantiated rules, and the principles established then remained the most accurate and still retain some relevance today.

It should be noted that the lecture material was presented by the professor with supplementary experiments and was quite understandable. As for the rehearsals (weekly exams), they were built on the principle of «question-answer». Professor I. Ponomaryov posed various questions, all of which were simple to answer but required knowledge of chemical laws. The rehearsals always attracted many listeners, and the students were from different courses.

In 1902, I. Ponomaryov was assigned to teach inorganic chemistry at the Kharkiv Veterinary Institute and to conduct practical classes in analytical chemistry. At the beginning of the 20th century, it was common practice to invite lecturers to teach courses at various institutes, as indeed, there were not enough subject matter experts, especially of the caliber of Professor I. Ponomaryov. At the same time, the professor was often invited to act as an expert on various chemical technology issues in court.

Moreover, the professor was a member of the German Chemical Society (founded in 1867), the Russian Physico-Chemical Society (founded in 1878), and the Society of Physico-Chemical Sciences in Kharkiv (founded in 1893, formerly a section of the Society of Experimental Sciences at Kharkiv University).

In February 1905, I. Ponomaryov was appointed director of KhTI. This was a challenging period of restoring the institution's work, which had been closed due to student unrest. He had to organize the resumption of classes and return qualified teaching staff to the Institute. All this had an extremely negative impact on the professor's health. On August 24, 1905, Ivan Mykhailovych passed away, as his heart could not withstand the significant strain [17, p. 3].

Conclusion. Thus, Ivan Ponomaryov left a profound mark on the history of Ukrainian science and education. His outstanding scientific career, which began in Germany and France, later became the foundation for significant achievements in Ukraine. As rector of the Kharkiv Technological Institute, I. Ponomaryov promoted the introduction of advanced technologies and methods, significantly enhancing the level of teaching and scientific research at the Institute. His scientific works, organizational skills, and boundless dedication to his cause became an example for subsequent generations of teachers and students. Honoring the memory of I. Ponomaryov means paying tribute not only to his personal achievements but also to the entire history of the development of higher technical education in Ukraine, which, thanks to such personalities, continues to thrive today.

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