

## 150 YEARS OF CHEMICAL AND TECHNOLOGICAL EDUCATION AT LVIV POLYTECHNIC NATIONAL UNIVERSITY

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This<sup>1</sup> year, chemists of Lviv Polytechnic National University celebrate a significant date – the 150<sup>th</sup> anniversary of the Department of Chemical Technology foundation. The Department became the basis for further organization of specialized chemical departments, Faculty of Chemical Technology and the current Institute of Chemistry and Chemical Technologies. On June 18, 1871 the Emperor of Austria-Hungary Franz Joseph I ordered the establishment of the department in the then Technical Academy. This fact led to raising the level of chemical-technological education and science to the best European standards, initiated the training of qualified chemical engineers in Lviv and played an important role in economic and cultural development not only of Galicia but also of the whole empire.

The first professor of the newly created department was Rudolf Günsberg (1823-1879), who taught a course in chemical technology of organic and inorganic substances, organized a laboratory of chemical technology, where he began research works on vodka and alcohol technology, oil and petroleum properties, salt refining, and others. R. Günsberg published his research results in well-known European scientific journals.

In 1872 in the Technical Academy a school of technical chemistry (later renamed the Faculty) was established, which included 3 departments: Chemical Technology headed by Rudolf Günsberg, General and Analytical Chemistry headed by August Freund (1835-1892), Mineralogy and Geology headed by Julian Medvedskyy (1845-1918), as well as Center for doctoral training in zoology and botany headed by Emil Godlewski (1847-1930).

The training of chemists-technologists at first lasted three years, and from 1874 – four years. Students received thorough knowledge of general and special disciplines and good practical training. Teaching was

provided by highly qualified professors, known among chemists for their scientific achievements, textbooks, monographs. In particular, A. Freund discovered the synthesis of cyclopropane (this reaction is named after him) and established its structure; J. Medvedskyy explored the deposits of minerals in Galicia, collected one of the best collections of rocks and minerals in Europe.

A special event, which significantly expanded the capabilities of chemists, was the construction of chemical building in 1876, and two Regional research stations (oil and ceramic) in 1886. The Faculty of Technical Chemistry not only trained highly educated engineers, but also performed many technological and design works for oil refining, fermentation, ceramic and other enterprises of the region.

Since 1880 the Department of Chemical Technology was headed by Julius Brühl (1850-1911), known for his studies of organic matter spectra depending on the structure, and Bronisław Pawlewski (1852-1917) – a versatile scientist, author of numerous works in the fields of organic chemistry refining, mining and geology. Roman Zalozetskyi (1861-1918) achieved great success in research on oil and ozokerite technology. Due to his great ability and comprehensive erudition, he gained a reputation as a leading scientist in oil technology not only in Austria-Hungary but also in Europe, was a representative of French and British oil companies. All chemists know the name of Stefan Niementowski (1860-1925) – the Head of the Department of General and Analytical Chemistry. He studied aromatic and heterocyclic compounds, and his main achievements were the condensation reaction of aromatic amino acids with acid amides (Niementowski Quinoline Synthesis) and the properties of anthraquinone derivatives.

The beginning of the XX century was marked by a significant development of the Faculty of Technical Chemistry. In 1910 there were 7 departments and 3 doctorates, 2 research stations, museums and laboratories. The number of students-chemists in 1912/1913 increased to 214. The creation of specialized depart-

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ments began. In 1903 the Department of Chemical Technology II (processing of agricultural products) and Department of Technical Microbiology headed by Wiktor Syniewski (1865-1927) were separated from the Department of Chemical Technology, which trained specialists for inorganic, organic and food industries. In 1912, on behalf of the Senate, Ignacy Mościcki (1867-1946) organized the Department of Physical Chemistry and Technical Electrochemistry, which was soon renamed to Chemical Technology I (large inorganic industry) and Technical Electrochemistry. He initiated scientific research on the technology of nitrogen compounds, potassium salts, oil distillation, *etc.*, and founded the Metan Scientific Union. Professor Mościcki was elected dean, rector, and in 1926 – President of Poland.

After the war the evolution of chemical-technological education in Lviv Polytechnic continued. The faculty was renamed as Chemical Faculty and divided into two departments: factory chemists and laboratory chemists (later this division was abolished). The emergence of new chemical plants in Poland provided in 1923 the creation of the Department of Chemical Technology III (organic industry) headed by Waclaw Leśniański (1889-1956). The long-awaited event was the creation of the Department of Oil and Gas Technology in 1924. The Department was headed by Stanisław Pilat (1881-1941) – a famous scientist, organizer of the Polish oil refining industry, a world-renowned specialist in oil refining. In 1924 the National Research Ceramic Station was transferred to the Polytechnic, and in 1928 a laboratory of salt industry technology was organized under the leadership of Karol Kelichen. This has significantly expanded the opportunities for students' specialization and created new areas of research.

In 1926 the Department of Chemical Technology I and Technical Electrochemistry was headed by Tadeusz Kuczyński (1890-1945), who began to introduce chemical engineering as a new direction in the training of students. He published the magazine "Przegląd Chemiczny".

Before World War II, the Faculty of Chemistry graduated chemical engineers in 7 branches of chemical technology; the Faculty had 9 departments, a ceramic research station, a laboratory of the salt industry, a laboratory of oil technology and others. The number of students in 1938/1939 increased significantly – 530 students, including 51 women; 2 Doctoral dissertations (in technical sciences) were defended.

The development of the Faculty of Chemistry was interrupted by World War II, which led to numerous casualties, repression, destruction of material and technical base, and a significant loss of human resources.

In 1944 the activity of chemical departments was revitalized, and they became the part of three faculties: Faculty of Chemical Technology, Faculty of Food and Faculty of Petroleum. In 1949 a new Faculty of Cement Technology was formed. Eventually, all chemical departments were united into the Faculty of Chemical Technology (FCT).

In the late 1950s, Ukraine began to "chemicalize" the national economy. The FCT opened specialties in the synthesis of rubber, plastics and their processing and 3 new departments were created. Construction of potash and sulfur plants in western Ukraine, as well as production of nitrogen fertilizers results in the creation of the Department of General Chemical Technology.

In 1963 an academic building for new Faculty of Organic Substances Technology (FOST) was built. This faculty was separated from FCT and involved 5 Departments.

The 80s were fruitful for the chemists of Lviv Polytechnic – 17 doctoral and dozens of PhD dissertations were defended, specialized scientific councils for dissertation defense were created. Research directions were constantly developed and some new ones appeared. During the period of 60-80's several scientific schools were formed headed by such known scientists as Tymofii Yurzhenko (polyfunctional peroxide modifiers); Hryhorii Akselrud (solid phase mass transfer processes); Viktor Yavorskyi (chemistry and technology of sulfur compounds); Vasyl Shevchuk (thermal and catalytic conversions of hydrocarbons and their derivatives); Dmytro Tolopko (liquid-phase processes of hydrocarbons autooxidation) and others.

In 1990/1991 both FCT and FOST include 11 departments, a series of research laboratories, 1465 students.

The formation of independent Ukraine marked the beginning of a new period in the history of chemists of Lviv Polytechnic. In 2001 the faculties were merged into the Institute of Chemistry and Chemical Technologies (ICCT), the director of which for 25 years was Professor Yosyp Yatchyshyn. The Department of Chemical Engineering and Industrial Ecology was divided into two: Department of Ecological Engineering and Department of Environmental Protection, on the basis of which the Institute of Sustainable Development named after Viacheslav Chornovil was soon organized. In 2018, a new Department of Physical, Analytical and General

Chemistry was created by merging of three departments. In 2015 Professor Volodymyr Skorokhoda was elected director of the ICCT.

Today the Institute is one of the main structural subdivisions of Lviv Polytechnic National University, which includes 9 departments: Chemistry and Technologies of Inorganic Substances (Prof. Zenovii Znak), Technology of Biologically Active Substances, Pharmacy and Biotechnology (Prof. Vira Lubenets), Chemical Technology of Oil and Gas Processing (Prof. Mykhailo Bratychak), Organic Chemistry (Prof. Stanislav Voronov), Chemical Technology of Silicate Materials (Prof. Yaroslav Vakhula), Chemical Engineering (Prof. Volodymyr Atamaniuk), Organic Products Technology (Prof. Zorian Pikh), Chemical Technology of Plastic Processing (Prof. Oleh Suberliak), Physical, Analytical and General Chemistry (Prof. Pavlo

Shapoval). The structure of the institute also includes 5 research laboratories and the laboratory for collective use of equipment. A laboratory of modern instrumental research is expected to be opened soon (sponsored by Roshen corporation).

In 2020 the Institute's team trained 1050 students, published 99 articles, received 59 patents. Three doctoral dissertations were defended. Two scientific journals edited by Prof. M. Bratychak (Chemistry & Chemical Technology) and Prof. V. Skorokhoda (Chemistry, Technology of Substances and their Application) are launched.

The glorious 150-year history of chemical-technological education and science has become a solid foundation for the current team of ICCT, whose achievements are recognized and known far beyond Ukraine.

