

# Chemistry at the University of Tartu in 1919 – 1947

Vello Past

## The Department of Chemistry at a National University

In September 1918 the German military administration opened the so-called Landesuniversität in Tartu, however, already in November their regime collapsed and, as a result, the University was handed over to a commission headed by Peeter Põld, Minister of Education of the Provisional Government of Estonia. Peeter Põld was appointed curator of the University with a task to coordinate the preparations to reopen the closed University. It should be emphasized that the preparations had to be started in a situation where the battles of the Estonian War of Independence were taking place on the Estonian soil, and it was a long way to the Peace Treaty with Russia on 2nd February 1920.

After a preparation period, Tartu University started functioning as an Estonian national university on 1st December 1919. The date became a milestone, marking a new era in the national culture and education. For the first time in the history of the University, the Estonian language obtained full rights as a language of instruction. National sciences could rise to the fore. Although the national University was a successor to the Imperial University of Yuryev of the Czarist Russian Empire, its aims and principles differed considerably [1]. Even in the early 20th century the Department of Chemistry had educated numerous chemists for the universities, scientific laboratories and industrial laboratories of Eastern Europe and the Empire. However, starting from 1919 the University was supposed to meet the needs of Estonia, being a single establishment of tertiary education of the Republic, thus paying more attention to the applied branches of Chemistry. For this purpose, in 1919, professor's chair was established in Technical Chemistry, and the education of chemists as well as specialists in chemical technology was launched.

Already before the official opening of the national University the Provisional Council of the University elected the first professors of the Department of Chemistry. They were Professor of Inorganic Chemistry **Georg Landesen** (1867 – 1935), a Baltic German, and Professor of Technical Chemistry **Michael Wittlich** (**Mihkel Vitsut**) (1866 – 1933), an Estonian by origin [2]. G. Landesen had graduated from Tartu University in 1892 as a student of Professor G. Tammann. In 1906 he had been awarded Master's degree by St. Petersburg University. In 1917 he had become Professor of Chemistry at Tartu University. He was highly respected in his pedagogical work, however he published relatively few research papers [3]. Michael Wittlich, the oldest specialist in Estonia in chemical industry, graduated from Riga Polytechnic with an engineer's diploma in 1890. After having worked for years at the factories of Tallinn, he started a teaching career at Riga Polytechnic in 1905 and obtained professorship in Chemical Technology there in 1909. During the years he spent in Tartu he actively studied the issues of local industry and transport [4, 5].



Johannes Narbutt

In the early 1920s the lectures on Organic Chemistry, Physical Chemistry, Electrochemistry and other subjects were delivered by **Johannes Narbutt** (1879 – 1937) who had become Professor of Physical Chemistry in Nizhny-Novgorod in 1918. He applied for professorship of Organic Chemistry at Tartu University, but did not obtain it. Therefore he left Tartu 1924 and worked in the field of scientific photography in Dresden and Odessa. His Doctor's degree was awarded by Giessen University [6].

In those years the Estonian Government favoured the education of specialists in chemical technology at Tartu by establishing here another professorship of Technical Chemistry in Inorganic Substances Technology in 1921. From 1922 the chair was held by Finnish Professor **Yrjö Kauko** (1886 – 1974) whose goal was to modernize the training of chemists and specialists of chemical technology [5]. Under his initiative new laboratories for the students were established, seminars and colloquiums were introduced into the teaching process, and students were given numerous tasks in research. During a short period 8 Master's theses and a doctoral thesis were completed under his supervision. Y. Kauko's successful activity here came to an unexpected end in early 1925 when he expressed his wish to leave the University. Probably his

decision was motivated by the Government's resolution to discontinue the admission of students majoring in Chemical Technology.

At the time when the University had arranged conditions to train specialists of chemical technology the Government decided to rely on technological education abroad. Soon it became evident that the decision was not reasonable, since specialists of technology with tertiary education were increasingly needed by the expanding industry. Therefore, the issue of the arrangement of higher technical education in the country continued to be topical [7]. By the Government's decree of 1934 Technological Department was opened at the Faculty of Mathematics and Natural Sciences. In 1935 the Department became an independent Technological Faculty. The next year of 1936 witnessed new fundamental changes that will be further described.

## **Arrangement of teaching at the Department of Chemistry**

The Department of Chemistry as a part of the Faculty of Mathematics and Natural Sciences worked on the basis of curricula compiled by the staff of the Faculty and approved by the University Council. Curricula for the students in the specialty of Chemistry and Chemical Technology can be read in the printed collections of curricula of the Faculty of that period. The curricula contain lists of subjects plus the numbers of lectures, practical lessons and laboratory lessons. The subjects were divided between 4 academic years, however the length of the overall University course of studies was not fixed. This principle differed from that of the Russian universities where the students had been grouped according to the year of studies. Examinations could be taken twice a semester by groups of subjects closely linked. There were 6 state exams for the students majoring in Chemistry and 7 state exams for those majoring in Chemical Technology. The curriculum for the students of Chemistry was relatively bulky and complicated since beside the fundamental subjects (Inorganic, Analytical, Organic and Physical Chemistry) as well as Mathematics, Mechanics and Physics the obligatory subjects included General Technology, Chemical Technology, Mineralogy, Geology, Economics. Elective subjects were to be chosen from lists.

The burden for the future specialists of Chemical Technology was even more impressive since several subjects orientated to industrial and technological processes had been added. To fulfill the required tasks at basic practical laboratory lessons of Chemistry, the students spent more time than that planned by the curriculum. No wonder that the basement laboratories in the University's main building where the ventilation was inadequate and where the students were supposed to spend long days of practical laboratory lessons of Chemical Analysis were nicknamed „the hell“. The demands were the strictest and the amount of laboratory lessons was the greatest in Analytical Chemistry where the demanding G. Landesén acted as the basic instructor [9].

According to the statistics of 1920 – 1930 less than 30% of the students admitted to the Department of Chemistry were able to graduate [10]. In the 1920s the number of students at the Department of Chemistry was great as there were no entrance exams. Therefore the students whose motivation was low or who lacked the necessary base knowledge could not stand the burden and had to withdraw. Starting from 1927 the admission was regulated by entrance examinations and a higher tuition fee [2].

Transition from the system of years of studies, inherited from Czarist Russia, to the system of subjects at the national University of Tartu assumed greater independence for the students in the educational process. To increase motivation and acquire better knowledge the students were supposed to participate in workshops, seminars, colloquiums and solution of problems in addition to lectures and practical lessons. High-level reviews analysing the University of that period recognised that the Faculty of Mathematics and Natural Sciences was the first one to adopt the educational principles characteristic of Western universities, and that the curricula compiled by the Faculty offered more options for the students.

In the first half of the 1920s the University graduates were handed a certificate of graduation. Later, a diploma of graduation was issued. The graduates holding a degree received a particular diploma. Until 1921 the Candidate's degree was the first scientific degree, later replaced by the Master's degree. Excellent marks for the exams of the specialist subjects and successful defence of the Master's thesis were prerequisites for a Master's degree. The highest scientific degree of dr. phil. nat. was awarded after the defence of the doctoral

thesis. In 1920 – 1936 171 persons graduated from the Department of Chemistry, including 79 persons with a Master's degree. Later 9 Masters became Doctors [11]. High percentage of Masters and Doctors among the graduates, reaching 46%, certainly indicates good qualification of the alumni of the Department.



**Faculty members in 1932. a.**

First row, from left to right: August Paris, Paul Kogerman, Georg Landesen. Michael Wittlich, Jaan Kopvillem.  
Second row from left to right: Leonhard Tiganik, Heinrich Arro, Hans Sossi, Hugo Raudsepp, Johannes Põllumaa, Ants Laur, Aleksander Sinka.

## Faculty members and the research

Great efforts were needed to provide the University with the teaching staff drawn from the population of the Republic. The task proved to be rather serious due to the fact that in the preceding period only a few Estonians had been among the academics. Therefore, it was necessary to select talented graduates and help them qualify for work at the University. The promising young graduates were offered a University scholarship and assigned to European wellknown research and educational institutions.

**Paul Kogermann** (1891 – 1951) belonged to the first group of the gifted graduates sent to improve their knowledge abroad. Having graduated from the Department of Chemistry in 1918, he spent two years in the Royal College of Science and Technology in Britain. After the defence of the Master's thesis he was elected the docent of Organic Chemistry of the University in 1922, extraordinary professor in 1924 and full professor in 1925. In his Master's thesis P. Kogermann studied the thermal decay of oil-shale. His fruitful research laid a foundation to a new perspective of oil-shale chemistry research at the University. In 1925 P. Kogermann and M. Wittlich set up a laboratory to study oil-bearing shales (i.e. oil-shale) which became known as the first research unit of the University. P. Kogermann was appointed the head of the laboratory [12]. After World War II research on oil-shale was mainly conducted in the institutes of the Academy of Sciences. As a student, P. Kogermann had done research under the guidance of Professor Ivan Kondakov, a specialist of Organic Chemistry, professor of Pharmaceutics of the Medical Faculty in 1895 – 1918. The study of the conjugated double bond hydrocarbons attracted his attention during the whole period of his scientific activity. In 1934 he defended in Zurich his doctoral thesis on the combining and polymerization reactions of the isolated double bond dienes.

**Jaan Kopvillem** (1885 – 1956), Professor of Chemical Technology, worked at the University in 1928 – 1936. He received education at Riga Polytechnic and Leipzig University, obtained the degree of dr. phil. nat. at Zurich University in 1927. At Tartu University he worked initially as docent of Chemical Technology and as a professor from 1935. In the academic year of 1935/36 J.Kopvillem was the dean of the Faculty of Technology of the University. During his Tartu period his scientific interest was connected with oil-shale processing and oil-shale products utilization problems.

In the 2nd half of the 19th century Physical Chemistry achieved recognition as a successful research trend at the University, initially named the University of Dorpat, later the University of Yuryev. Outstanding physical chemist Wilhelm Ostwald, a Nobel prize winner, Johann Lemberg and Gustav Tammann gave their contribution to the development of research here. G. Tammann is considered the founder of a school of research on Physical Chemistry which gained widespread recognition in 1880 – 1890. After G. Tammann's departure from the University research on physico-chemical processes was continued by his pupils. The characteristics of phase movement processes was a subject of research for J. Narbutt in the early 1920s.

The birth of a new physico-chemical research trend at the University is connected with the activity of Professor **August Paris** (1888 – 1944). Having graduated from the Department of Chemistry of the University in 1915 he worked at the fine chemistry plant of W. K. Ferrein in Moscow. In 1920 he joined the Department of Chemistry of the University and became docent of Physical Chemistry after a successful defence of the doctoral thesis in 1925. After a year of research at the Kaiser Wilhelm Institute of Physical Chemistry and Electrochemistry in Berlin he became professor of Physical Chemistry of Tartu University in 1929, the first ethnic Estonian in this position [13]. In research he devoted himself to the study of the mechanisms of heterogenic reactions and properties of colloidal systems. Concerning colloidal solutions, he emphasized the necessity of the consideration of their electrical properties. The trend was continued in the research on dielectric properties of organic compounds carried out by the younger colleagues of A. Paris.



Adolf-Gustav Parts

**Adolf-Gustav Parts** (1904 – 1996) became the most successful physico-chemist of the period under observation. In 1925 he graduated from the Department of Chemistry majoring in Chemical Technology and obtained the Master's degree in 1926 and Doctor's degree in 1929. His doctoral thesis was an extensive work of research into the impact of electrolytes on the kinetics of ionic reactions. The studies on the molecular structure and electrical properties of substances were the main fields of interest in his Tartu period. The results of his precise measurements of dipole moments in organic compounds won acknowledgement in the world of science, so that, thanks to their high reliability, they became a part of the commonly used reference books of Physical Chemistry [14].

Already at the beginning of his scientific career A. G. Parts was awarded the grant of the Rockefeller Foundation and assigned for a year to the Institute of Physical Chemistry of Göttingen University and later to the Madrid National Institute of Physics and Chemistry. As a result of his assignments abroad the theoretical aspects of his research strengthened. So, he was the first Estonian scientist to introduce in 1932 the method of quantum mechanics into the research on the structure and properties of molecules. His achievements can vividly prove how a talented youth from among the local ethnic Estonian population was able to become a successful scientist and respected academic. In 1934 A.-G. Parts was elected a docent holding the Chair of Physical Chemistry. After leaving for the Tallinn Technological University in 1936 he became full professor of Physical Chemistry in 1939. **Leonhard Tganik** (1900 – 1974), Ph D in Chemistry, carried on his trend of research at Tartu.

The Department of Chemistry existed in 1919 – 1936 exhibiting remarkable progress during the 17- year period. The Department started with a staff of 2 full positions only, however by the early 1930s the Department could be proud of an efficient team of ethnic Estonian faculty members who educated young chemists and developed research into problems of theoretical and applied chemistry. Until 1936 the Department had 4 Chairs with laboratories held by Professor A. Paris (Laboratory of Inorganic Chemistry), Professor P. Kogermann (Laboratory of Organic Chemistry), Professor J. Kopvillem (Laboratory of Chemical Technology) and Docent A.-G. Parts (Laboratory of Physical Chemistry). The laboratories were

serviced by senior and junior assistants with a duty to assist the professor in instructing the students on their laboratory work and fulfill other tasks.

In the 1930s the assistants of the Department of Chemistry were Doctors **Jaak Kuusk**, **Karl Loskit**, **Ants Laur**, **Leonhard Tiganik** and Masters of Science **Heinrich Arro**, **Edgar-Harald Korro**, **Hugo Raudsepp**, **Natalie Rägo**, **Aleksander Sinka**, **Hans Sossi**, **Heinrich Tamm** et al. The doctoral thesis of Jaak Kuusk on the method of hydrothermal processing of phosphorites (1929) attracted international attention and it was introduced into production in the USA and USSR.



Osvald Hallik

Several alumni of the Department of Chemistry continued working in the structure of the University where their high qualification in Chemistry was of great help in their research, e. g. **Osvald Hallik**, a soil scientist and agrochemist. **Jaan Kalviste (Kranig)**, a chemist-mineralogist, **Heinrich Tamm**, an agrochemist et. al.

The research into crystalline structure at Tartu University was initiated by the Estonian physicist **Harald Perlitz** (1889 - 1973). The results of research obtained by H. Perlitz and his colleagues in the field of the structure of the metallic alloys and intermetallic compounds attracted the chemists' attention since they are taken into account in Chemistry, too.

The faculty members of the Department of Chemistry were active in creating Chemistry textbooks in Estonian. As early as in 1922 A. Paris and K. Loskit published a textbook of the laboratory work on qualitative analysis. Later, almost all leading faculty members (e.g. M. Vitsut, P. Kogermann, A. Paris and A.-G. Parts) wrote textbooks in their specialties for the University students, used at the universities of this country also in the post-war period.

To establish a scientific association for the chemists, Academic Society of Chemistry (Akadeemiline Keemiaselts) was set up in 1923 with P. Kogermann as its first President and A. Paris as the President from 1928. By 1936 the membership of the Society reached 144. Starting from the birth of the Society young chemists and university students played an active role in its activities. In the years 1932 – 1937 the Society published 8 issues (in 2 volumes) of the periodical „*Chemistry News*“ (Keemia Teated) with A. Paris as the Editor-in-Chief. The Society promoted the development of the terminology of Chemistry in Estonian, investigation of the history of Chemistry, protection of the vocational rights of the chemists and activities in other fields [15].

## Closure of the Department of Chemistry in 1936 and its reopening in 1947

Although the Department of Chemistry had been fruitfully functioning in the first period of Estonian independence between the two World Wars, the higher educational training of chemists was transferred to Tallinn in 1936. A public debate on the arrangement of technological education in the country was interrupted by the decree of the State Head Konstantin Päts on 25th June 1936. In accordance with the decree the Faculty of Technology of the University was closed after a year of its existence and the speciality of Chemistry was opened at the Tallinn Technological University, so that the chemist's diplomas could only be awarded there. Therefore, the students of Chemistry of Tartu University were offered an opportunity to complete their studies at Tallinn.

The Tartu University community expressed their disappointment, and the students sent their delegation to the State Head. Dissatisfaction about the reform was expressed in daily periodicals by Gerhard Rägo, professor of Mathematics, August Paris, professor of Chemistry and other academics [16].

It may look funny how the leadership of the country had changed their mind during the 1920s and 1930s. For instance, in 1924 their opinion was that Estonia did not need to educate specialists of Chemical Technology. However, in 1936 their standpoint was just the opposite: Estonia was supposed to educate specialists of Chemical Technology only and not chemists any more. The decisions were later corrected, but by that time the continuity of the education of chemists at Tartu University had undergone an interruption.

Several academics and other staff members of the Department of Chemistry accepted positions at the Tallinn Technological University, e.g. Professor P. Kogermann who became Rector of the new University in Tallinn, Professor J. Kopvillem, Professor A.-G. Parts, Assistant A. Laur, Assistant H. Raudsepp as well as the assistants of the oil-shales laboratory.

Tartu University preserved the professor's chair in Inorganic and Analytical Chemistry, held by Professor A. Paris, and the professor's chair in Organic Chemistry, held by Extraordinary Professor L. Tiganik. The laboratory of Physical Chemistry was headed by A. Paris. Now the chemistry labs served the students of non-chemistry specialties, and chemistry research got extinct.

When the battles of World War II ended in Tartu in late August 1944, the chemistry laboratories in the University's main building had been devastated with the equipment been broken or stolen. Fortunately, the library of the department and more valuable laboratory equipment were preserved in the basement of the main building.

The University opened its doors to the students on 16th November 1944 after elementary order in the building had been restored. In the beginning, the Chairs of Inorganic Chemistry and Organic Chemistry started functioning. The laboratories were in the main building as formerly, principally on the ground floor, but also on the top floor and in the basement.

Shortage of the teaching staff proved to be most serious, since Professor A. Paris had died during German occupation, and Professor L. Tiganik had emigrated to Sweden. From the prewar staff only 2 Masters of Chemistry continued working in the field of chemistry. They were **Natalie Rägo** (1897 – 1979), holding the Chair of Inorganic Chemistry, and **Hans Sossi** (1892 – 1975), holding the Chair of Organic Chemistry. In addition to them, three more persons belonged to the staff teaching Chemistry, viz. **Linda Imelik**, **August Kaalep** and **Voldemar Ora** [17].



Natalie Rägo



Linda Imelik



August Kaalep



Voldemar Ora

The war being over, Tartu University expressed initiative to reopen the Department to educate chemists and teachers of Chemistry, so badly needed by the national economy and schools of the country. Naturally, the chemists working at the University were the first initiators, especially N. Rägo, and the idea was supported by other members of the faculty.

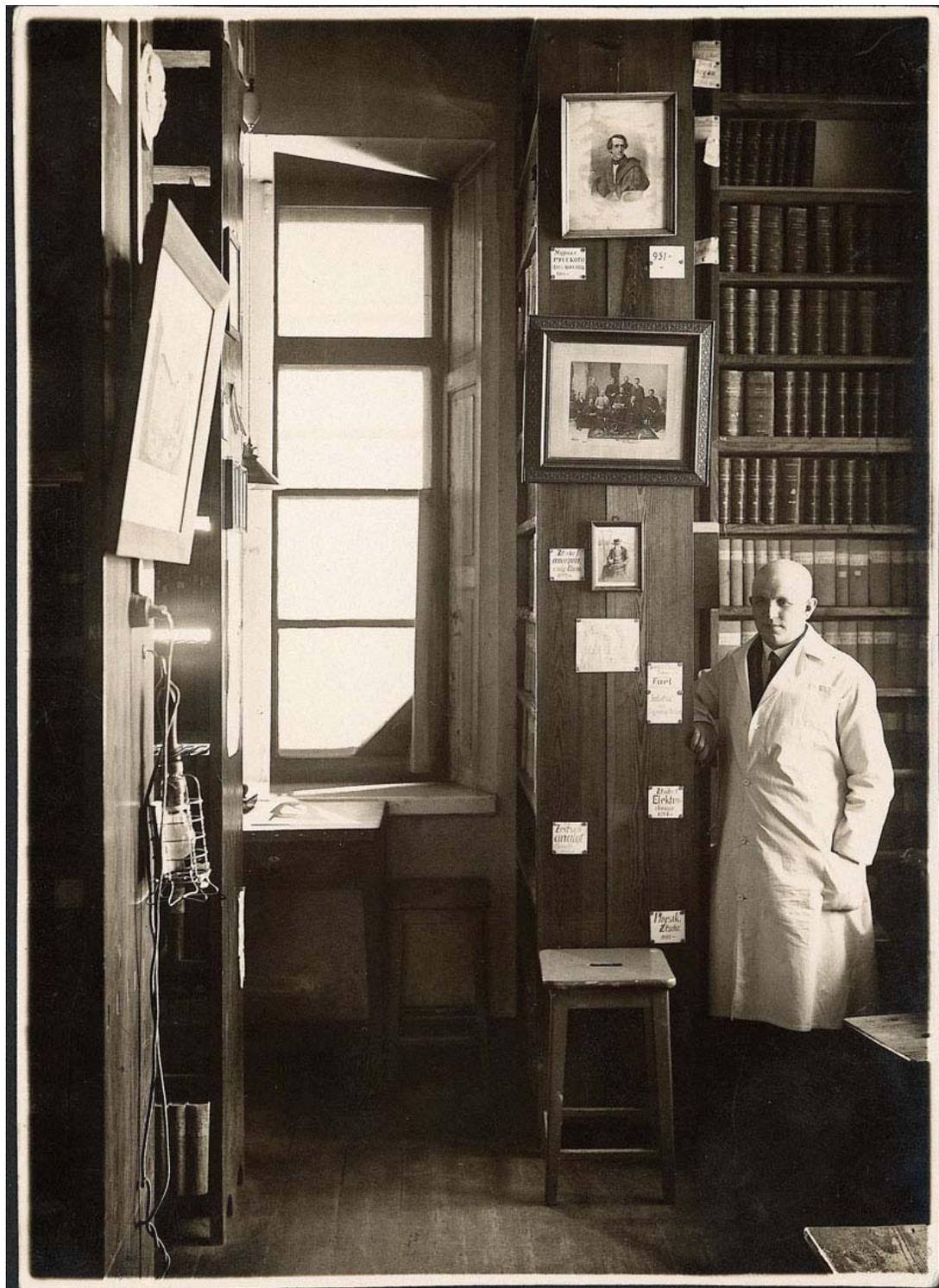
Shortage of the rooms for teaching Chemistry and doing research could only be alleviated by the completion of the construction of the Chemistry Building that had stood unfinished since the war. There were delays in the construction activity, however in 1949 the Department started to move into the new building, and the process lasted till early 1950. New students were admitted to the Department before the new building was ready.

Decree No 804 of 14th June 1947 by the Minister of Higher Education of the Soviet Union is considered the fundamental document authorizing the reopening of the Department of Chemistry, as the Decree declared the Department a unit of the structure of the Faculty of Physics and Mathematics. Admission competition was declared to select the first-year students majoring in Chemistry. As a result 17 students of Chemistry started their studies on 1st September 1947. At that time the two Chairs of the Department employed 15 full-time faculty members, including 6 Masters of Science whose degree was officially recognized in 1946—1950 as that of Candidate of Science [17]. The year 1947 introduced a new period in the development of the Department of Chemistry.

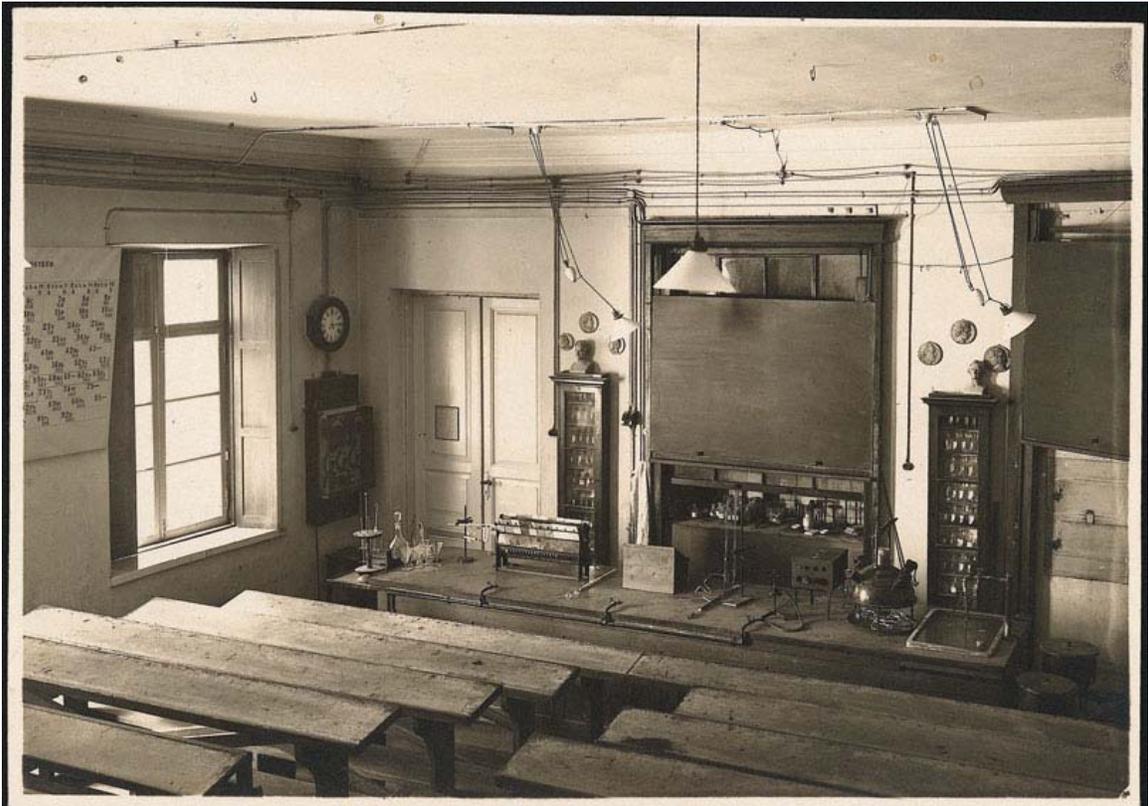
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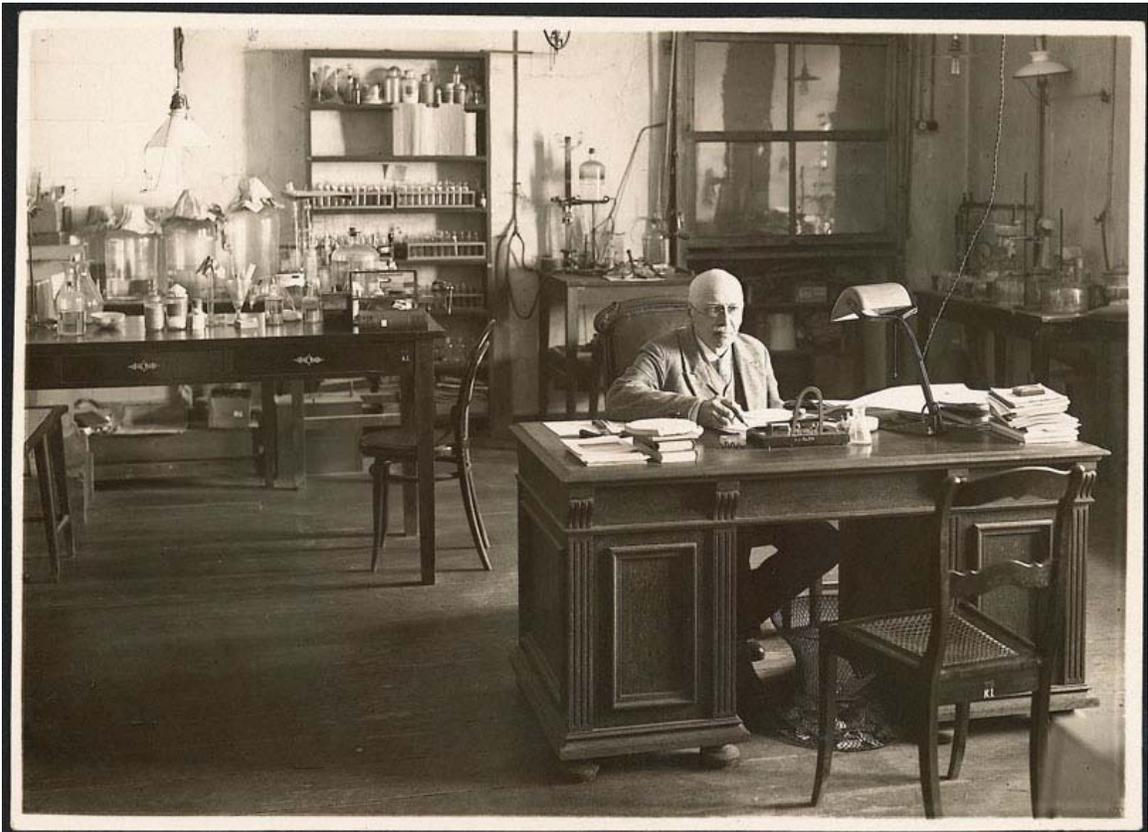
**Some pictures from the chemistry department in 1929**  
(in the main building of the University of Tartu)



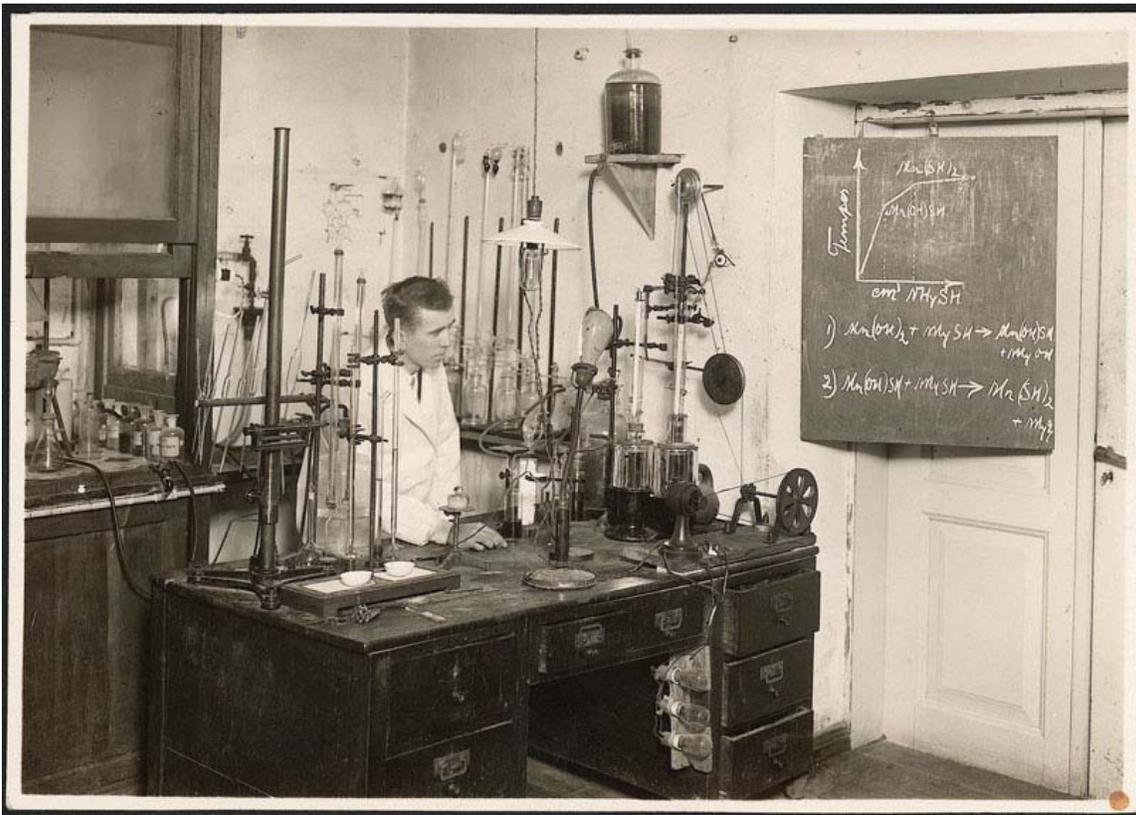
**Assistant Heinrich Arro in the library of the department**



Lecture room



Prof Georg Rudolf Wilhelm Landesen in their office



Assistant Aleksander Sinka in the laboratory of the inorganic chemistry



Laboratory for inorganic synthesis



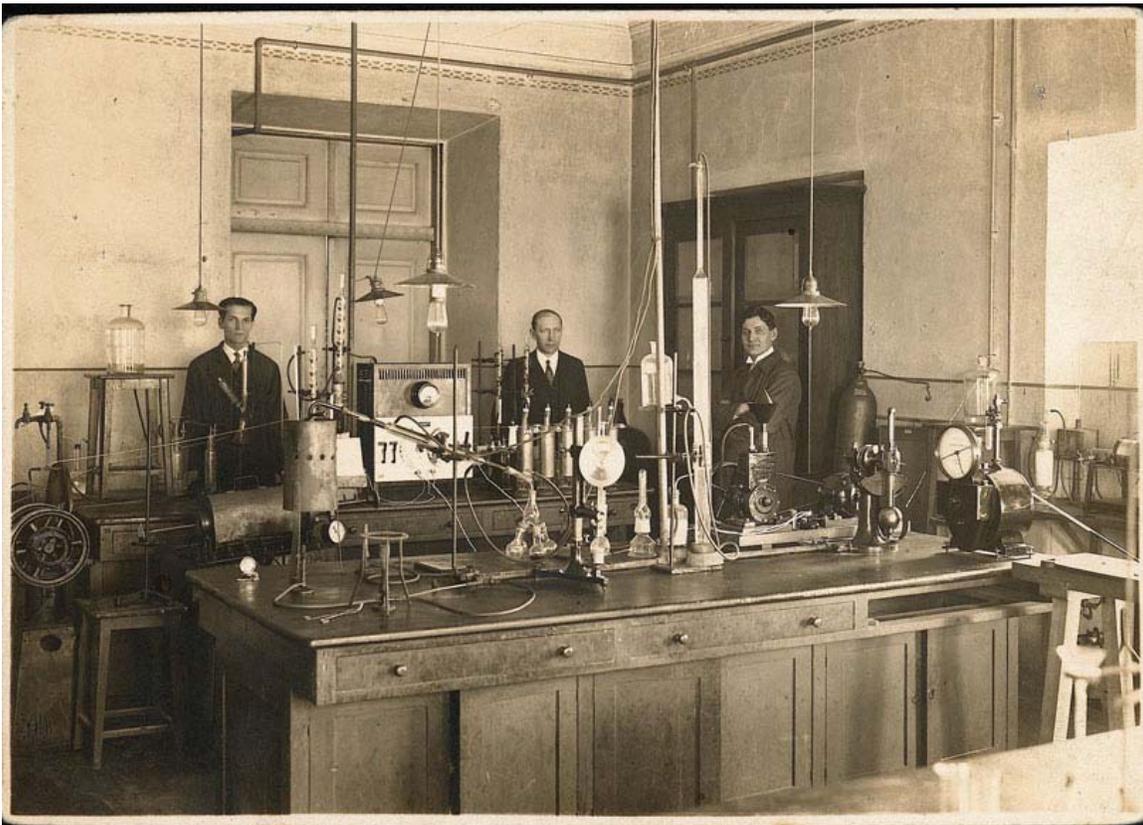
**Laboratory of qualitative analysis (named "The Hell")**



**Laboratory for quantitative analysis**



**Chemical storage room.**



**Laboratory for oil-shale investigations.**

**From left: Stud. Chem. Voldemar Ora, Prof. Paul Kogerman (Head of the laboratory), Ass. Prof. Jaan Kopvillem.  
Mai, 1929.**

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