Lidija Liepiņa (1891–1985) – the First Female True Member of Latvian Academy of Sciences

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Lidija Liepiņa (1891–1985) – the First Female True Member of Latvian Academy of Sciences

Lidija Liepiņa (1891–1985) – pirmā Latvijas Zinātņu akadēmijas īstenā locekle

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Ķīmijas zinātņu doktore, profesore, Latvijas PSR Zinātņu akadēmijas akadēmiķe, vairāk nekā 200 plaši pazīstamu ķīmijas zinātnisko darbu autore Lidija Liepiņa piederēja tai Krievijas zinātnieču-sieviešu spilgtajai paaudzei, kas valsts vēsturē pirmās ieguva tiesības nodarboties ar profesionālu zinātniski pētniecisko darbu. 20. gadsimta sākumā Maskavā darbojās Augstākie sieviešu kursi, kur sievietes varēja iegūt zināšanas augstskolas līmenī. Veiksmīgi pabeigusi studijas līdz 1917. gada revolucionārajiem notikumiem, Lidija Liepiņa bija viena no gāzmaskas izstrādātājām Krievijā. Starpkaru periodā strādājusi daudzās Maskavas augstskolās. 1934. gadā viņa kļuva par profesori, bet 1937. gadā PSRS Zinātņu akadēmijas Prezidijs piešķīra ķīmijas zinātņu doktores grādu bez disertācijas aizstāvēšanas. Pēc Otrā pasaules kara L. Liepiņa strādāja Latvijas Valsts universitātē un Rīgas Politehniskajā institūtā. LPSR laikā par pētījumiem korozijas jomā viņai 1970. gadā piešķirta Latvijas PSR Valsts prēmija.

Atslēgvārdi: gāzmaska, korozija, pirmā akadēmiķe, Rīgas Politehniskais institūts, Latvijas Universitāte.

Introduction

In the third edition of the Great Soviet Encyclopedia devoted to the Latvian Soviet Socialist Republic, in the section “Science and Scientific Institutions”, the name of L. Liepiņa opens the list of Latvian chemists twice. First, when listing Latvian scientists working in the 1920s–1930s in the scientific institutions

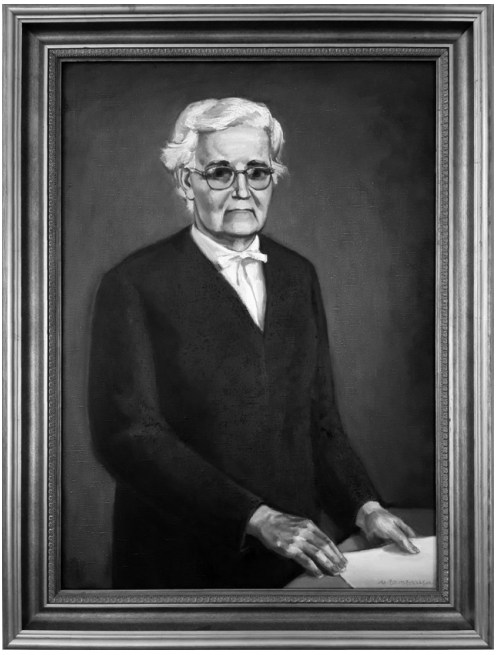


Figure 1. **Painting by Uldis Zemzaris. Portrait of LAS academician Lidija Liepiņa.** Photo by I. Griņevičs

of the USSR [1], and then, in the list of the most significant studies of Latvian chemists in the 1960s – early 1970s [2]. These publications express great respect, and the significance of this acknowledgment increases significantly, considering that it is bestowed upon a female scientist. Doctor of Chemical Sciences, Professor, Academician, member of the Academy of Sciences of the Latvian SSR, author of more than 200 well-known works in chemistry, Lidija Liepiņa (Lidiya Lepinya[1]) (1891, St. Petersburg – 1985, Riga) belonged to that bright generation of Russian female scientists, who were the first to acquire a right to take part in professional research activities. She was born in the 1890s, finished her education before the revolution, 1917, and made a brilliant scientific career in new conditions.

Not much is known about her life, especially private life. Her parents – Kārlis Liepiņš (Karl Liepinsh) (1864–1942) and Ekaterina Shelkovskaya (Jekaterina Shelkovskaya) (1867–1956) met in St. Petersburg, the native city of E. Shelkovskaya, while K. Liepinsh studied there in Forestry Institute. By the time Lidija Karlovna entered the Higher Courses for Women in Moscow, her father had gained a position of the collegiate secretary (kollezhskiĭ sekretar′) – a very modest rank in accordance with the existing Table of Ranks. Nevertheless, in reality his work was

[1] Hereinafter – in brackets the transcription according to the Russian language sources of the corresponding time.

quite prestigious: he was the manager of the estates of Prince (kn͡iaz′) Golitsyn. Consequently, as a child Lidija Liepiņa lived in the famous estate Bolshie Vyazemi (in the vicinity of Zvenigorod, near Moscow); today, the museum of Russian poet Alexander Pushkin is located there. According to the testimony of Jānis Stradiņš (Jan Stradin), a chemist, member of the Latvian Academy of Sciences, who wrote a detailed biographical essay about Lidija Liepiņa, her father used to send her to their relatives in Latvia every summer, when she was a child [4]. This, apparently, influenced Lidija Liepiņa, and she grew up as "a child of two nations".

In 1902, Lidija Karlovna entered one of the most famous women's gymnasiums in Moscow founded and operated by madam L. F. Rzhevskaya: "As it is reflected in the documents, the daughter of the provincial secretary (gubernskiĭ sekretar′), who was 17 years old (born on April 22, 1891), passed the examination and entered the second grade of a private female gymnasium in Moscow, in the academic year 1902–1903. During the whole time, she behaved very well, passed all the tests successfully thanks to which was transferred to the upper classes," it is written in the certificate of graduation from the gymnasium issued to L. Liepiņa in 1908 [5]. There are only excellent marks on this school certificate [6]. It is also noted that: "Taking into account excellent behaviour and outstanding success in the sciences, the Pedagogical Council of the private women's Gymnasium of L. F. Rzhevskaya in Moscow, according to "The regulations on women's gymnasiums of the Ministry of Public Enlightenment" (ministerstvo narodnogo prosveshcheni͡ia) has decided to award golden medal to Lidija Liepiņa" [7].

Unfortunately, even in 1908 after the events of the 1905 revolution, which seemed to open the doors of universities for the women in Russia, the way to the higher level of education was not fast and easy. Firstly, by 1908 the admission of girls to universities was again suspended. In addition, before entering the Higher Courses for Women in Moscow (after graduation from which girls attained education, but not a state diploma that would allow this education to be applied in professional activities), it was necessary to finish the eighth, additional class of the gymnasium and receive a title which could be approximately translated as "home tutor". Lidija Liepiņa received the title of "the home tutor of the Russian language and literature, mathematics and French" [8] on May 30, 1909. Then she applied for admission to the Department of Natural Science of the Higher Courses for Women in Moscow. In accordance with rules prevailing at the time, unmarried girls had to obtain the permission of their fathers to enter the courses. A note with permission written by Kārlis Liepiņš is stored in the personal file of L. K. Liepiņš in the collection of documents of the Higher Courses for Women in Moscow at the Central State Archive of Moscow: "I have nothing against the enrolment of my daughter Lidija Liepiņa at Higher Courses for Women in Moscow..." [9]. Notably, Lidija was lucky to be supported by her father, because a lot of her contemporaries had to overcome controversies with their families, who did not understand girls' desire to continue their education. However, even without additional difficulties, the choice of a future profession is often very difficult for a young person, especially if she has two equally passionate hobbies. This was the case of L. Liepiņa. She was

Figure 2. **Academician, Dr. habil. chem. Lidija Liepiņa**

fond of music and science, and she wanted to do both. Jānis Stradiņš (Jan Stradin), who has researched the personal archive of Lidija Liepiņa, wrote: "According to Lidija Liepiņa's memories, that time of her life was the "epoch of suffering", because of the necessity to choose. Concurrently with the chemistry, she was going to attend the Moscow Conservatory – she wanted to become a pianist. She was inspired by N. P. Borodin, who was a composer and a chemist at the same time. Her first music teacher was a professor of the Moscow Conservatory – A. Yaroshevsky. The musical talents of Lidija Liepiņa were evaluated by her contemporaries, even by A. Goedicke and S. Rachmaninoff. Nevertheless, she eventually realized that she could not follow the path of Borodin. Today, Lidia Karlovna does not regret her choice" [10].

The Higher Courses for Women

However, while studying at the Higher Courses for Women, and as the final choice, apparently, had not yet been made, music occupied a significant place in L. Liepiņa's life. The famous Soviet writer Marietta S. Shaginyan (1888–1982) wrote in her memoirs on S. V. Rakhmaninoff: "My close gymnasium friends – E. P. Velyasheva (now a music teacher), L. Liepiņa (now a professor of chemistry in Riga), – studied at the conservatory and played the piano well. After the seminars, we often got together and arranged long discussions about the music. I remember at that time I first heard about the tragic failure of the First Symphony of Rachmaninoff and various explanations of this failure. [...] I didn't fully

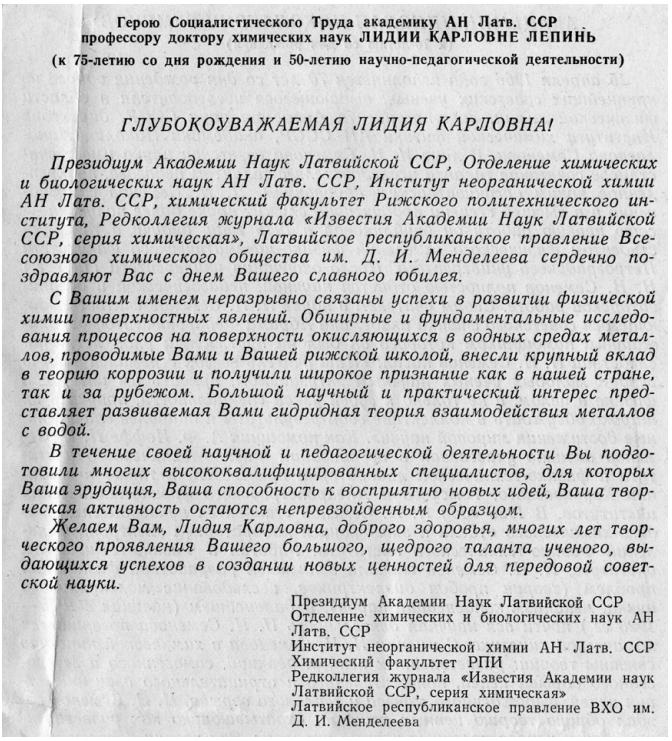
understand the whole tragedy of Rachmaninoff at that moment, but I felt it unconsciously, so after all those philosophical debates on that topic I went to Liepiņa or Veliacheva, and we met the sunset playing Rachmaninoff's Second Piano Concerto four-handed [11].

For some unknown reason, Lidija Liepiņa missed the academic year of 1914, and she was reinstated in September 1915 [12]. Maybe the outbreak of the First World War helped her make a final choice: it is not known. Already the next year, 1916, found her, still a student, at the frontline, in a military field laboratory. The famous historian of chemistry, Doctor of Chemical Sciences Nikolai Figurovsky (1901–1986) in his "History of the Development of a Russian Gas Mask During the Imperialistic War of 1914–1918" mentions the existence of a mobile chemical laboratory, one of whose employees was L. Liepiņa [13]. According to J. Stradiņš, this laboratory was organized in the autumn of 1915 by Professor Nikolai Shilov (1872–1930) on the Western Front.

In an interview given allegedly in 1938, Lidija Liepiņa talked about the beginning of her scientific work: "My first works proceeded in the gas laboratory at the front (I was a student at the time) [14]. [...] That was a military laboratory (gas laboratory), located at the Western Front. There was a whole train, specially equipped; chemical laboratory was in one of the carriages. We tested the quality of gas masks" [15]. According to the words of L. Liepiņa, one of the major tasks of the laboratory, was to find out "whether the charcoal could protect against chlorine gas". As Lidija Liepiņa explained: "For example, masks came to the front in the autumn, we took our time to test them – to check how much they protected against gases. As a result, we obtained evidence, which made it possible to say that, in general, the assertion that coal can only provide protection for a week was wrong". We also focused on the issue of "coal ageing" or if that time gas mask could be used repeatedly (that was a very primitive gas mask – just coal in a box), whether it was possible to reuse chlorine in atmosphere" [16].

Lidija Liepiņa reported that the results of that test were analysed in reports, which were sent to the military organisations. Sometimes quite funny and tragicomic stories occurred. For example: "We suddenly received an order from the headquarters: to investigate the effect of the tobacco as an adsorbent against chlorine," says Lidija Liepiņa, "and it was assumed that everything would be thrown away and replaced by tobacco. Of course, it turned out to be a bluff – the tobacco did not protect against chlorine or phosgene. We immediately sent back the report that this was utter nonsense. And, if our work had not been done, then maybe whole divisions would have been destroyed. At that moment, we were terrified, because according to the order, we had to immediately eliminate all the masks, throw away the coal and fill the masks with a tobacco. In time, it was discovered that it was a provocation of the Germans".

In addition, according to the memoirs of L. K. Liepiņa, the laboratory also solved analytical tasks. They received a variety of new substances for the analysis. Laboratory staff actively deciphered substances used by the Germans [18]. The historians highly appreciate the significance of these works both with regard



Герою Социалистического Труда академику АН Латв. ССР
профессору доктору химических наук ЛИДИИ КАРЛОВНЕ ЛЕПИНЬ
(к 75-летию со дня рождения и 50-летию научно-педагогической деятельности)

ГЛУБОКОУВАЖАЕМАЯ ЛИДИЯ КАРЛОВНА!

Президиум Академии Наук Латвийской ССР, Отделение химических и биологических наук АН Латв. ССР, Институт неорганической химии АН Латв. ССР, химический факультет Рижского политехнического института, Редколлегия журнала «Известия Академии Наук Латвийской ССР, серия химическая», Латвийское республиканское правление Всесоюзного химического общества им. Д. И. Менделеева сердечно поздравляют Вас с днем Вашего славного юбилея.

С Вашим именем неразрывно связаны успехи в развитии физической химии поверхностных явлений. Обширные и фундаментальные исследования процессов на поверхности окисляющихся в водных средах металлов, проводимые Вами и Вашей рижской школой, внесли крупный вклад в теорию коррозии и получили широкое признание как в нашей стране, так и за рубежом. Большой научный и практический интерес представляет развиваемая Вами гидридная теория взаимодействия металлов с водой.

В течение своей научной и педагогической деятельности Вы подготовили многих высококвалифицированных специалистов, для которых Ваша эрудиция, Ваша способность к восприятию новых идей, Ваша творческая активность остаются непревзойденным образцом.

Желаем Вам, Лидия Карловна, доброго здоровья, многих лет творческого проявления Вашего большого, щедрого таланта ученого, выдающихся успехов в создании новых ценностей для передовой советской науки.

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Figure 3. **Congratulatory address in honour of L. Liepiņa's 75th birthday and 50th anniversary of scientific work**

to development of the research abilities and skills of Lidija Liepiņa, and considering science in general. A. Grosskaufmanis, for example, wrote: "The aforementioned research can be considered the first scientific work of Lidija Liepiņa" [19]. J. Stradiņš agreed: "These were works of great importance both for practice and for theory. They allowed first to make appropriate changes in the impregnation of gauze protective masks, and after the creation of Kummant-Zelinsky's coal gas mask, to improve the construction of the latter. The tests of gas masks and the study of the protective properties of activated carbon in a front-line were naturally conditioned by purely practical, patriotic inquiries – the salvation of the lives of Russian soldiers. However, under the leadership of such a deep and broad-minded chemist as N. Shilov, they were developed into fundamental scientific research. [...] The researches of N. A. Shilov, L. K. Liepiņa, S. A. Voznesensky formulated the main provisions of the theory of the effect of a gas mask [...] The found regularities have retained their significance up to the present, forming the basis of the theory of filtering devices (including gas masks) and the theory of chromatography" [20].

Based on the information provided by A. Groskaufmanis [21] and J. Stradiņš [22], the laboratory, where L. Liepiņa worked for some time was also located on the South-Western Front. After the 1917 revolution, as Lidija Liepiņa recalled,

the laboratory was transferred to the Timiryazev Agricultural Academy, because "it was fairly well equipped and organized" [23].

L. Liepiņa received a postgraduate diploma at Moscow Higher Courses for Women on September 29, 1917. As indicated in the text of the diploma, "The bearer of this Lidija Karlovna Liepiņa [...] in 1909 entered the Faculty of Physics and Mathematics of the Higher Courses for Women in Moscow in the Department of Natural Sciences, attended a course on this branch during the XIV semesters and passed all the established tests. [...] In addition, Lidija Liepiņa performed all the practical work required by the faculty, was specially focused on chemistry and has credits for laboratory classes in this subject, as well as for the research work in organic chemistry. According to the resolution of the Faculty of Physics and Mathematics of 1917, September 29th, she was issued the first level diploma" [24].

An essay of Lidija Liepiņa has been kept in her personal file of the Higher Courses for Women in Moscow. It was written by hand in an ordinary student's writing-book on the topic: "Catalytic Splitting of Fats by Sulfonaphthenic Acids" [25]. In the upper right-hand corner of the title page, there is an inscription made by very young Sergey Nametkin (1876–1950), who later became an outstanding organic chemist, a member of the USSR Academy of Sciences, but in 1917 he was the dean of the Faculty of Physics and Mathematics [26]: "Very satisfactory" [26].

However, as noted above, the diploma of the Higher Courses for Women in Moscow did not give any professional rights. However, in 1911, while Lidija Liepiņa was still studying, a new law was passed, permitting women who graduated from the Higher Courses for Women to take exams under specially created state test commissions in order to obtain a university degree, as well as the right to teach in secondary schools, to continue education after that and to obtain scientific degrees which allowed to teach in universities and work in research institutions.

In an interview of 1938, L. Liepiņa speaks twice about her experience of passing the state exams. At the beginning, she says: "In 1917, I finished courses, took the state exam in November 1917." [27]. And later repeats: "I took the state examinations very soon after the October Revolution" [28].

Did Lidija Karlovna, who was busy preparing for exams, notice a fundamental change of power in the country, or did she not pay any attention to the regular squabbles of politicians, and only much later realized what exactly had happened? Unfortunately, we do not have an answer to this question. Nevertheless, the change of power did not interfere with Lidija Liepiņa's researching work and career.

Plekhanov Institute

In an interview given in 1938 L. Liepiņa recalled: "Immediately after graduation from the Higher Courses for Women I entered the Plekhanov Institute as a teacher" [29]. Indeed, she had no difficulty to find a job.

During the first decade of her creative activity (1917–1930), Lidija Liepiņa worked at the Institute of National Economy (subsequently named after G. Plekhanov),

Figure 4. **Colleagues of the Department of Physical Chemistry, in the foreground – L. Liepiņa. From left: The 1st row – A. Ruplis, B. Macijevskis, Prof. L. Liepiņa, J. Balodis, V. Breicis. The 2nd row: Z. Danosa, A. Kazačenko, M. Krieviņa, Riekstiņa, R. Bluķe, V. Seļava. The 3rd row: A. Sokolovskis, M. Strautmanis, B. Apsītis.**
Photo from the archive of Chemistry History Museum of Latvia

where she taught analytical and inorganic chemistry; since 1920 she also worked at at the Moscow Higher Technical School (later – Bauman Moscow State Technical University), becoming the first female teacher there.

Perhaps, she partly owed this success to N. Shilov, under whose leadership she worked in the frontline laboratory, she considered him to be her teacher [30], as she conducted her first studies under his supervision. Famous science historian Yu. Solovyov in the article "Revenge of the obscurant. A grim episode from the life of academician N. Semenov" mentions N. Shilov's letters kept by Lidija Karlovna. Unfortunately, he did not reveal the details of their content [31].

Yet, as we see from the 1938 interview mentioned above, L. Liepiņa did not measure her success with official posts. Her criterion for success was the scientific ideas that she developed and partly, scientific publications. "My first publication on adsorption [from solutions] on coal appeared in 1920. It was published in 1930 in the Lomonosov Physicochemical Collection. I did this work in 1918–1919" [32]. Regarding the date of publication of this article, L. Liepiņa was wrong. The article had already been published in 1919 in Russia and in 1920 in Germany [33].

This work was published as a joint work with N. A. Shilov. However, Lidija Karlovna herself considered another joint research to be the first most significant one: "The work on the electrode potentials was done at the same institute in 1923–1924. That was the first rather large research work accomplished jointly with Prof. Shilov" [34].

J. Stradiņš describes the results of these works, as follows: "The results of these first studies (as well as the laws of gas adsorption from air flow obtained earlier) retain their significance to this day. At that time, they were widely quoted in the scientific literature and textbooks on physical chemistry [...] and immediately placed Lidija Liepiņa in the list of the best representatives of the N. Shilov's scientific school" [35]. Lidija Karlovna talked about that time: "Until 1933, the main topic [...] of my works was "gaseous products absorption by coal". [...] There were others, who, besides me, were working in that area, for example, Voznesensky; a number of works that appeared then were implemented with Shilov's participation, in particular, those related to gas absorption dynamics in filter tubes (gas absorption dynamics from the air flow)" [36].

Russian Institute of Scientific Research and Chemistry

Lidija Liepiņa claims that her independent scientific work commenced in 1926–1927: "We must assume that I began to work independently starting from 1926–1927, when the laboratory of inorganic synthesis appeared" [37]. Lidija Karlovna meant working in the laboratory of the Moscow Higher Technical School. "... I have been engaged in inorganic synthesis since 1926," she wrote [38].

According to her words, since 1933 she had been engaged in "the field of complex compounds – purely inorganic synthesis connected, on the one hand, to the production of new synthesis products, on the other hand, to the study of their structure". This cycle of work is a completely separate group of L. Liepiņas researches. "Since I once worked a lot in the field of inorganic chemistry, I have a number of scientific works in that sphere" [39].

In the interview, Lidija Karlovna did not mention any trips abroad in the 1920s. However, according to J. Stradiņš, throughout the 1920s, she made several trips to Germany to study in labs of the greatest chemists of that time, including Nobel laureate Fritz Haber (1868–1934), Herbert Max Freindlich (1880–1941), Wolfgang Ostwald (1883–1943), M. Leblanc, F. Foerster, R. Luther. Later, in 1929, she worked in the laboratory of Professor Max Bodenstein (1871–1942) at the University of Berlin. Then she met the Nobel Prize winner – Walter Hermann Nernst (1864–1941) [40].

It is difficult to say whether L. Liepiņa made a conscious effort to advance her career. While reading her interview, it seemed that she was completely preoccupied with scientific research, and formal, daily life was slowly flowing by disregarded, somewhere outside. In 1930 Lidija Karlovna obtained one more place of employment – Russian Chemical Research Institute under the domain of Moscow State University. Remarkably, Lidija Liepiņa did not bother herself with memorizing the official names (which, to the point, constantly changed at that time) and other bureaucratic subtleties: "A research institute of chemistry was organized at the institute. A lot of the employees from the chemical school and the polytechnic institute joined that. I worked there in parallel with the Polytechnic Institute. The research

work on the phenomenon of the distribution of solutes between two solvents was carried out there in 1932" [41].

In 1930, the Faculty of Chemistry of Moscow State Technical University was transformed into the Second Moscow Chemical and Technological Institute. Perhaps Lidija Liepiņa was talking about that event. In 1932, the Second Moscow Chemical and Technological Institute, in turn, was merged with the chemical faculty of the Military-Technical Academy of the Workers' and Peasants Red Army, and turned into the Military Chemical Academy (Voenno-khimicheskuĭu akademiĭu RKKA) [42]. Lidija Liepiņa joined the new institution and continued to work there until 1942.

Military Chemical Academy

In 1932, she became the head of the Colloid Chemistry Department of Military Chemical Academy. In 1934, she was made a full professor, the first woman to be awarded a professorship and in 1937 she was awarded a doctorate from the Presidium of the Supreme Soviet [43]. "I was nominated for the doctor's title last year without defending the dissertation", – Lidija Liepiņa said in an interview, it sounded quite indifferent, as if this would be something inconsequential and self-evident [44]. In fact, it was one of the country's first doctoral degrees in chemistry assigned to a woman, hence, that was a very significant event to be proud of.

Nevertheless, it seemed that Lidija Karlovna was much more inspired by her research work. "I am working now," we recall that the interview took place in 1938, "in the field of colloid chemistry and, specifically, in the field of studying surface phenomena," she said. "The topic is very close to absorption. Part of the scientific work was carried out in the field of complex compounds chemistry and focused on inorganic synthesis [...] So now I am developing intermediate area between the adsorption of such substances that are absorbed on the surface without being deformed, remaining as whole molecules. [...] and another area of surface phenomena, where due to chemical reaction new substances are formed... Between these two phenomena there is an intermediate region of phenomena where the substance is absorbed due to the reaction, which I call the surface chemical reaction: the new substance is not formed, but at the same time, the adsorbed molecules are so strongly deformed that they can no longer be considered the same molecules. A chemical bond is now formed between the surface of the atom and this absorbed substance.

I am developing this area now mainly on such substances as coal. On the other hand, I have recently moved to metals. Now I am dealing with the issue of metals' passivity [...]

Presently, I am working on the general article devoted to the passivity of metals and surface compounds. Part of the work has already been submitted to print. This work is mainly related to surface phenomena, but it focuses on what is being done in the solution itself. The question is connected with the coagulation of the destruction of colloidal solutions and, up to now, attention has mainly been paid to what is being done on the surface of the colloidal particles.

Currently we are thinking of linking the issues of coagulation with the results of chemical reactions in the solution, speaking more precisely, with the phenomena of the interaction of ions with each other and with the phenomenon of complex formation in solutions. As a result, we developed the idea to study the antagonism of ions, coagulation, so far involving the simplest colloids. This work has almost been completed...

This is the next direction of the researches I am focusing on. I started actively practicing it recently, approximately in 1936. However, thoughts and ideas about doing this have been in my mind for quite a long time. So, since 1936 we are closely engaged in antagonism" [45].

Moscow State University

In 1941, Liepiņa left the Military Chemical Academy and went to work at the Moscow state University. Although it was officially evacuated from the city already in the summer of 1941 due to World War II, classes were still held and those who had not left were expected to work in the unheated buildings. Liepiņa remained in Moscow and served as the head of Department of General Chemistry of the Faculty of Chemistry. In 1942, for some time she also headed the Department of Inorganic Chemistry and chaired the Scientific Council of the Faculty of Chemistry. Later, she was awarded the Medal for Valiant Labour in the Great Patriotic War [46].

According to Stradiņš, during that period L. Liepiņa began the research on corrosion. In his opinion, this "was caused by the necessity to protect aircrafts from corrosion, to search for effective inhibitors. It was the second time, when the solution of the defense task led L. Liepiņa to a new direction in her research: after the end of the war, she was destined to become the founder of the corrosion school in Riga" [47].

Latvian State University

In 1945, the Higher School Affairs Committee invited Lidija Karlovna to join the Latvian State University in Riga. For some time, she combined work in Moscow and in Riga, and in 1946 she finally moved to Riga, accepting the position of the Head of the Department of Physical Chemistry at the Latvian State University. This concludes the Moscow period of activity of Lidija Liepiņa.

She remained at the Latvian State University until 1958, when a chair was created for her in physical chemistry at the Riga Polytechnic Institute [48].

In Riga, Lidija Liepiņa lived on P. Stuchkas (currently – Tērbatas) Street 5, apt. 4 together with her sister Olga. There is a memorial plaque on the facade of the house informing that the academician of the Latvian Academy of Sciences L. K. Liepiņa lived here. Her memory was immortalized on the initiative of historians and

chemist Jānis Stradiņš, who after the death of L. Liepiņa settled in her apartment. After the restoration of independence of the Republic of Latvia, the house was handed over to the heirs of the pre-war owners. Nowadays, apartment number 4 is used as an office for a real estate company.

By the early 1950s, Lidija Liepiņa had published over 60 scientific papers and in 1951 she was elected an academician of the Latvian Socialist Soviet Republic Academy of Sciences. Scientific organizations expressed recognition of Lidija Karlovna, electing her as a member of various commissions, societies and committees.

In 1965, she was awarded the title "Hero of Socialist Labour". The government honoured Lidija Liepiņa with other significant awards and prizes. It was the sign of great respect for a female scientist, as well as recognition of her abilities and achievements [48, 49, 50].

Lidija Liepiņa passed away on 4 September 1985 in Riga, Latvia and was laid to rest in the First Forest Cemetery of Riga after a state funeral, which was attended by senior officers of the Soviet Armed Forces and scientists [51].

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Summary

Lidija Liepiņa is the one of the first woman to receive a doctorate in chemistry and the first woman to become a true member of Latvian Academy of Science. She received education at the Higher Courses for Women in Moscow in the early 20th century. During the interwar period she worked at different universities in Moscow. Lidija Liepiņa is one of the developers of the first gas mask in Russia. In 1934, she received the title of professor, in 1937 the Presidium of the USSR Academy of Sciences nominated her for the title of Doctor of Chemical Sciences without requiring of her to defend a dissertation. After World War II she worked at the Latvian State University and at Riga Polytechnical Institute. In 1970, she was awarded the State Prize of the Latvian Soviet Socialist Republic for research in the field of corrosion.

Keywords: *Lidija Liepiņa, gas mask, corrosion, the first female academician, Riga Polytechnical Institute, Latvian State University.*