



The First Chemical Laboratory of the Academy of Sciences

One Experiment over a Thousand Opinions

Model of Lomonosov's Chemical Laboratory, 1/10 life-size. To provide a view of the laboratory's interior, the front wall, as well as a part of the roof and side walls, was removed. The project was developed by R.I. Kaplan-Ingel. Manufactured by the Art and Design Plant, Leningrad Branch of the Art Foundation (city of Pushkin). 1948–1949. Lomonosov Museum, MAE RAS

Draft design of the model of Lomonosov's Chemical Laboratory.
Drawing by R.I. Kaplan-Ingel.
1946–1947. Lomonosov Museum, MAE RAS

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Russia's first scientific chemical laboratory appeared in 1748 through the efforts of Mikhail V. Lomonosov, who had been fighting for six years to set it up. Unfortunately, the laboratory has not survived to this day, but the Lomonosov Museum in St. Petersburg displays an exact model of it. In the difficult years after WWII, the museum staff managed not only to recreate the exterior and interior of Lomonosov's laboratory but also fill it up with all the necessary equipment and supplies. An outcome of a painstaking scientific search, this museum exhibit gives everyone a unique opportunity to look two centuries into the past, when Russian science was taking its very first steps

The history of setting up the Chemical Laboratory reflects a difficult stage in Mikhail V. Lomonosov's career as a chemist. Until 1748, Lomonosov, who clearly understood the role of experiment in science, had had no opportunity to conduct extensive chemical research, and yet he valued one experiment over "a thousand opinions, born of imagination alone" (Lomonosov, *Polnoe sobranie sochinenii* (Complete Works), V. 1, P. 125).

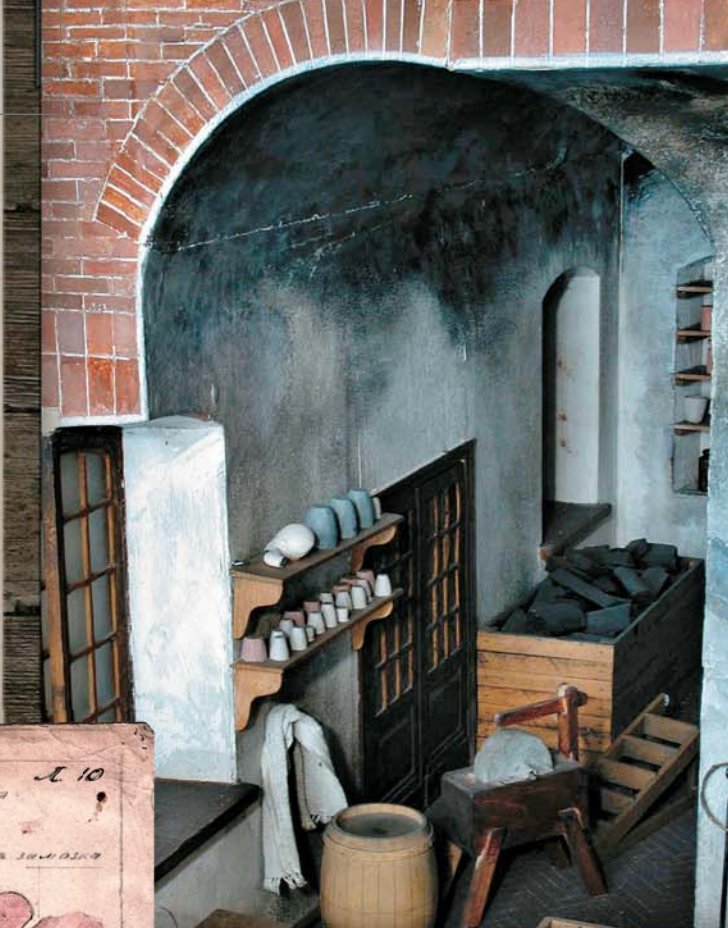
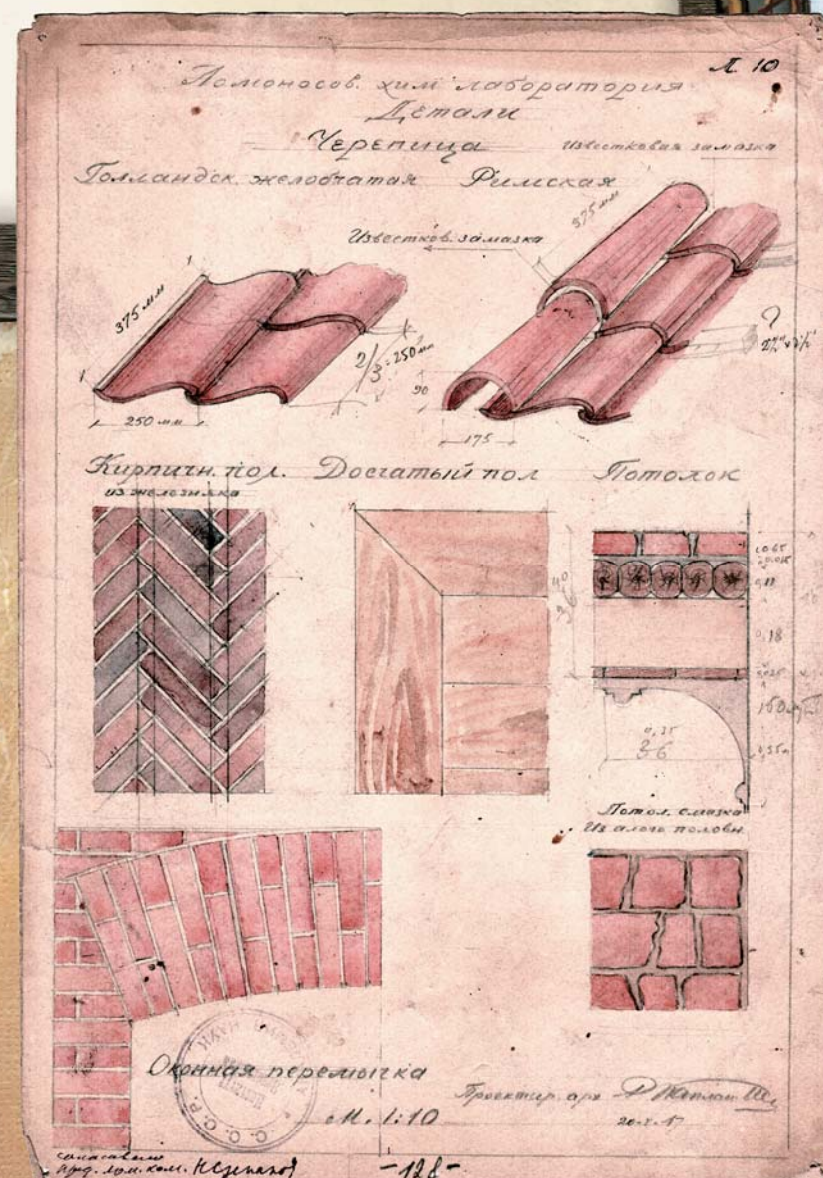
Lomonosov submitted his first petition to the Chancellery of the Academy of Sciences, articulating the need to set up a chemical laboratory in January 1742, immediately upon his return from Germany, but Lomonosov's request remained unanswered. In May of the following year, he submitted the second petition,



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but it was turned down. In March 1745, Lomonosov made the third attempt to organize a chemical laboratory. "...the Academy of Sciences can clearly see," he wrote in his petition, "what great and necessary means for studying nature and expanding the arts it lacks without a chemical laboratory. Despite my zeal to practice chemical work and thereby bring honor and benefit to my country, without a laboratory I am forced to confine myself to reading chemical books and studying theory and to leave practice almost completely and, thus, grow unaccustomed to it over time" (St. Petersburg Branch, Archive of the Russian Academy of Sciences (SPB ARAS), Fund 3, Register 1, Case 747, Sheets 3–3 rev.). This time Lomonosov attached to his petition a draft design of the laboratory, indicating its size and a description of future works, but, like the previous ones, it was left unattended.



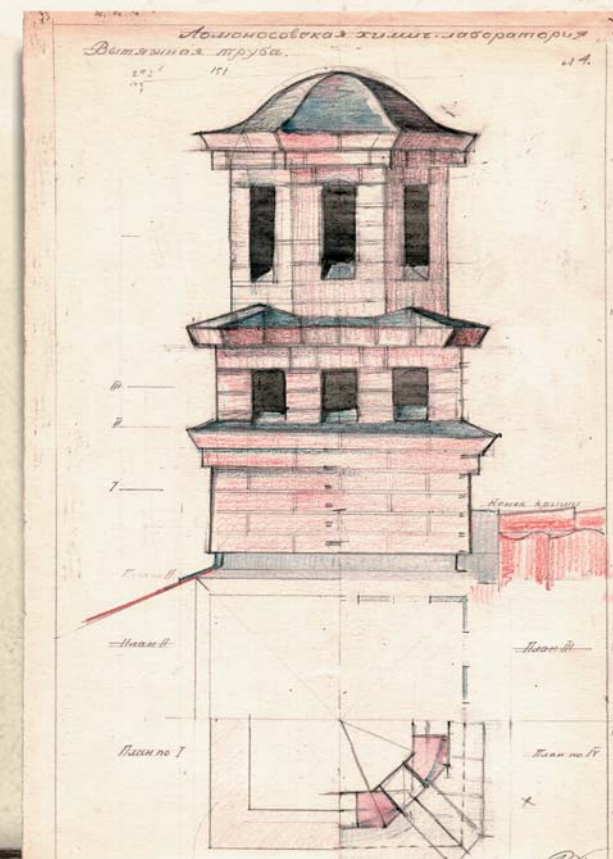
In July 1745, after presenting his dissertation "On metallic luster," Lomonosov was confirmed in the rank of professor with the department of chemistry; thus, he became Russia's first chemistry professor. With even greater persistence, he continued to strive for creating a chemical laboratory. In October, Lomonosov filed yet another petition; this time, bypassing the Academy's Chancellery, he addressed directly

Two chimneys rise from the laboratory's gable roof: one for removing combustion products from the laboratory kilns and furnaces, and the other for removing smoke from the heating furnace. Sketch of an exhaust pipe for the model of the laboratory.

Drawing by R.I. Kaplan-Ingel. 1947. Lomonosov Museum, MAE RAS

To make the model look authentic, the author used different types of tiles, bricks, and flooring; he even showed traces of time by covering the ceiling vaults and chimneys with soot, polluting the floor, and aging the tiles. On the left is a sketch of the tiles, floor, and window lintel for the model of the laboratory.

Drawing by R.I. Kaplan-Ingel. 1950. Lomonosov Museum, MAE RAS



the Academic Conference. Signed by all the academicians, the petition was submitted to the Government Senate, and in July of the following year, Empress Elizaveta Petrovna signed a decree on the need to build a Chemical Laboratory for the Academy of Sciences “at the expense of the Cabinet.”

The year 1748 saw the construction of Russia’s first scientific chemical laboratory (the previously existing ones were of an applied nature) on Vasilievsky Island in St. Petersburg, carried out by the First and Second Lines. The project was between by an academic architect Johann J. Schumacher (brother of the adviser to the Chancellery), with the active participation of Lomonosov himself.

The one-story brick building of the laboratory was situated not far from Lomonosov’s house, so that the chemistry professor could find it convenient to conduct there his chemical experiments. The building consisted of a large vaulted hall, which housed laboratory furnaces, and two small rooms: an office and a storage room. Lomonosov worked in this laboratory until 1757 and carried out more than 4000 experiments on silicate chemistry and technology, solution theory, metal roasting, etc. Here he taught, for the first time in the world, a course in physical chemistry to students of an academic university.

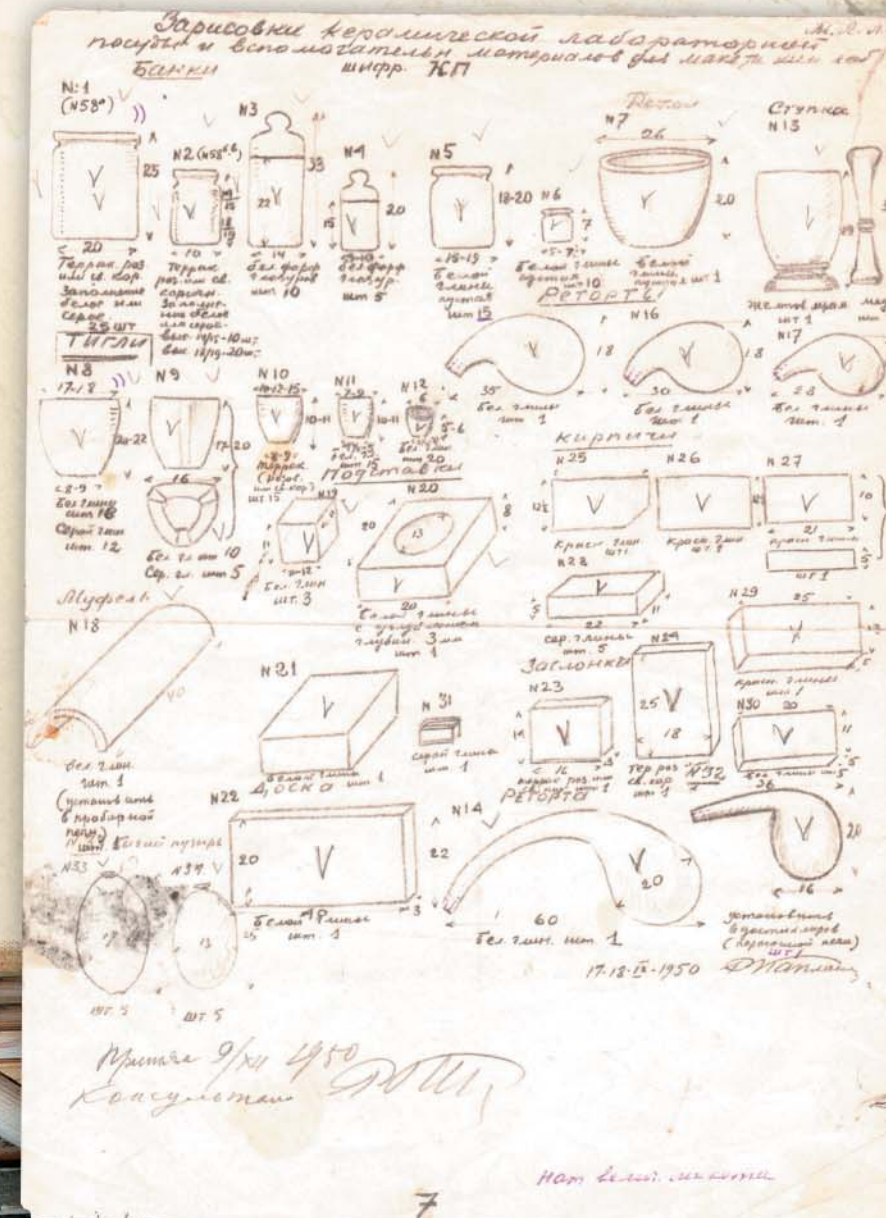
Unfortunately, the laboratory building has not survived to this day. At the end of the 18th century, it was passed into private hands and, in 1811–1812, converted into a residential building. In the first year of the siege during WWII, the building already was in an extremely dilapidated condition; what remained by the end of the war was only the foundation and a part of the walls.

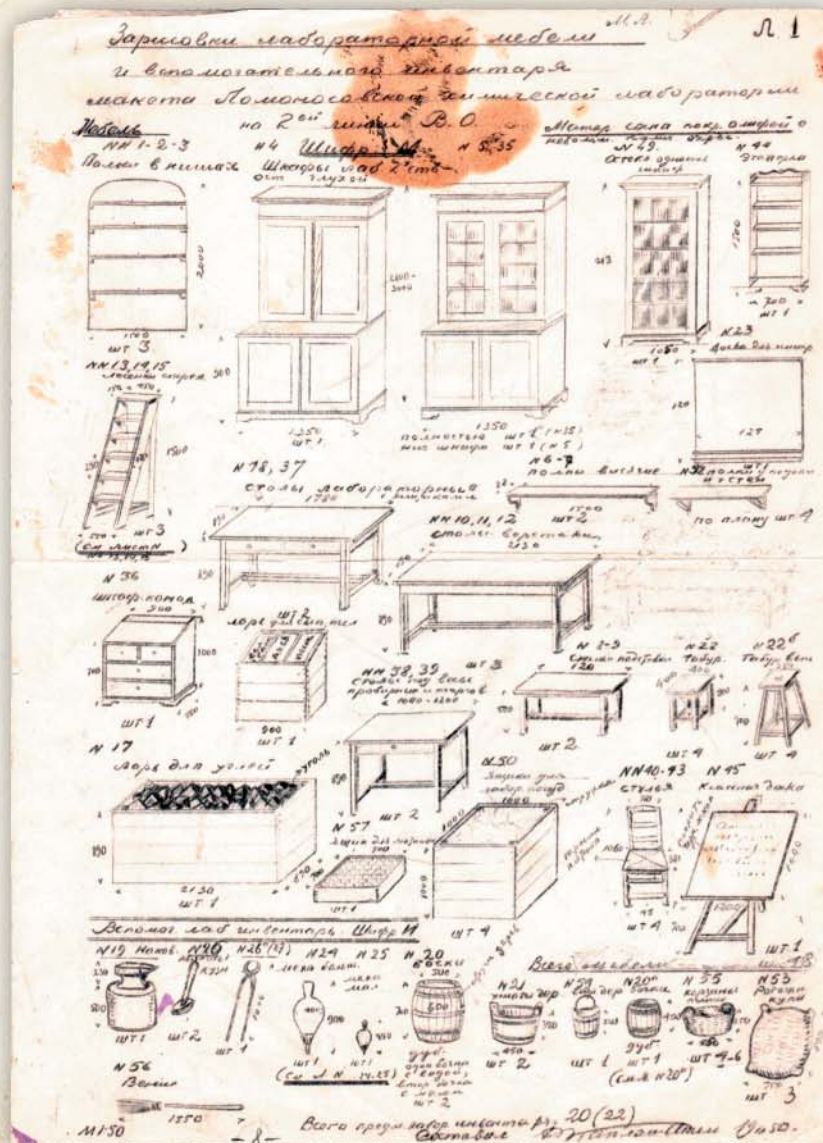
In 1946, the Commission on Organizing the Lomonosov Museum proposed building a model of the Chemical Laboratory. This initiative was promoted by a member of the commission, Academician I. V. Grebenshchikov, a famous chemist; the project was developed by the first director of the museum R. I. Kaplan-Ingel, an architect and science historian.

Various chemical utensils on the shelves and in the cabinets of the laboratory: glass vials and jars for storing reagents, flasks, retorts, evaporating cups, copper and cast iron mortars. Lomonosov Museum, MAE RAS

Sketch of ceramic laboratory glassware and auxiliary materials for the model of the Chemical Laboratory. Drawing by R. I. Kaplan-Ingel. 1950. Lomonosov Museum, MAE RAS

Below is spare glassware stored in wooden boxes in the attic (left); ceramic vessels were stored mostly near the furnaces (right). Lomonosov Museum, MAE RAS





A variety of furniture was made for the laboratory model: glass and solid cabinets, laboratory tables, tables for assay scales, whatnots, benches, shelves, utensil drawers, stools, chairs, a stepladder, and even a varnished blackboard. The model was also equipped with necessities a laboratory could not do without in the 18th century: tubs, barrels, baskets, bellows, etc. On the left is a sketch of the furniture and auxiliary equipment for the model of the Chemical Laboratory.

Drawing by R.I. Kaplan-Ingel. 1950. Lomonosov Museum, MAE RAS

Time illusion

In order to reconstruct the laboratory precisely as it was in the 18th century, Kaplan-Ingel had to consult archival sources. The Archives of the USSR Academy of Sciences preserved Lomonosov's design drawings, Schumacher's project and construction estimate, general site plans indicating the building to be constructed, and several other documents (SPB ARAS, Fund 3, Register 1, Case 474). Although the drawings were made rather carelessly, even with technical faults, and required further investigations (Kaplan-Ingel and Barzakovsky, 1951), the researchers were able to determine the size of the laboratory, the proportions of the rooms, and the location of door and window openings and managed to identify from the architectural

descriptions the places to locate equipment, utensils, and furnaces.

Also helpful was the advice given by Prof. Mikhail A. Bezborodov, who prepared an extensive work entitled *Mikhail V. Lomonosov and His Work on Silicate Chemistry and Technology*, dedicated to the 200-year anniversary of the first chemical laboratory in Russia. In one of his letters to Bezborodov, Kaplan-Ingel wrote: "Dear Mikhail Alekseevich, as you pointed out in your speeches, Lomonosov's Chemical Laboratory must have had a furnace similar to the experimental one at D. M. Vinogradov's porcelain manufactory. We ask you to hand over to the Lomonosov Museum the photographs

of the said furnace, which you found in the archives, in order to construct a model based on it" (Archive of the Lomonosov Museum).

All the available documents were processed to prepare a complete laboratory reconstruction project: hand-drawings, working blueprints, and watercolor paintings. The result was a complex model of Lomonosov's Chemical Laboratory, 1/10 life-size, furnished with 480 units of equipment. The model was built mainly of wood; tiles and pavement were crafted of papier-mâché; shutters and brackets were made of metal.

When painting the model, special attention was paid to creating an illusion of authenticity. The internal plaster of the "hearth" arches was covered with soot; the floors looked dirty, and the furnace equipment appeared decrepitated; the coloring of the brickwork was done in such a way that one could feel the difference in the types of brick, which also had to look as if worn by time, i.e.,

with rain stains and a soot coating (Kaplan-Ingel and Barzakovsky, 1951).

Flasks, vials, retorts...

The project authors conceptualized the interior of the Chemical Laboratory mainly from the reports, statements, and entries in the journals of the Chancellery of the Academy of Sciences. Some information was gleaned from the various versions of the project prepared by Lomonosov. Also helpful were the inventory listings, compiled during the transfer of the laboratory to Lomonosov's successor, Academician Ulrich C. Salchow, and the subsequent heads of the laboratory.

Descriptions of glass chemical vessels from the early and mid-18th century – various flasks, vials, retorts, evaporating cups, glasses, bottles, and jars for storing liquid and solid reagents, etc. – were found in the numerous





contemporary manuals on chemistry and pharmacy, e.g., in *Description of the Art Required at the Mint* by Ivan Schlatter (1739), *Problems of Coin-Minting Art* (1754), and *Instructions for Mining* (1760). The main difficulty in making the models was to obtain glass, especially green, and to treat its surface so that it looked older. Stoppers for the glassware designed to store reagents were made of both glass and cork tree bark. The contents of the vessels imitated the reagents indicated on the label. All inscriptions on the labels were written in an 18th-century font, with the same symbols as the ones used by Lomonosov himself.

A particular difficulty in reconstructing the laboratory was associated with making kilns and furnaces, which Lomonosov used to carry out his “works on adjusting compositions and melting colored glasses as well as his famous experiments in metal roasting” (Kaplan-Ingel and Barzakovsky, 1951). Information about the number and types of furnaces available at that time in the laboratory was retrieved from the fifth chapter of *Preliminaries of True Physical Chemistry* by Lomonosov (1753). This book also contained a description of the distillation furnace. That of the assay furnace was found in Lomonosov’s *Fundamentals of Metallurgy or Mining*. When modeling the enamel kiln, the project authors used drawings by D.I. Vinogradov, who built the kiln at St. Petersburg Porcelain Factory.

At the center of the hall, mounted on a brick foundation, you can see the models of the furnaces of Lomonosov’s Chemical Laboratory. These are distillation and smelting furnaces, made of bricks; an iron assay furnace; a round-shaped glass-smelting furnace and a square-shaped enamel kiln, etc. To give the models an authentic look, the furnaces were smoked and covered with soot near the fireboxes, and miniature light bulbs, wrapped in red paper, were inserted inside the fireboxes. *Lomonosov Museum, MAE RAS*

Recreating the instruments for physicochemical measurements, as the researchers themselves admitted, presented such a global challenge for them that they “could not solve it even to a small extent,” placing their hopes on future studies (Kaplan-Ingel and Barzakovsky, 1951). According to the 1759 inventory list, the Chemical Laboratory had a large set of scales: “large iron scales; three made of brass, including one small set; assay scales, kept in a small cabinet” (Ibid.). The project authors made a brass model of scales designed to hold three to four pounds and a model of assay scales in a wooden box with glass walls. Of the other equipment, mention should be made of microscopes, which the laboratory had always had. A mid-18th-century microscope kept in the Lomonosov Museum was used as an example to make a model of the laboratory microscopes.

The model of Lomonosov’s Chemical Laboratory was first displayed in the year marking the bicentennial anniversary of the first scientific chemical laboratory in Russia. Being an outcome of a painstaking scientific search, it would become, for many years, the key exhibit of the chemical department of the Lomonosov Museum. Subsequently, two replicas of it were made: one for the Polytechnic Museum in Moscow and the other for the Lomonosov Historical and Memorial Museum in Kholmogory (Kravchenko, 2010).

Marking the 300th anniversary of the birth of the great Russian scientist, the State Hermitage Museum in St. Petersburg held an exhibition “Lomonosov and the Elizabethan Age” from November 2011 to March 2012. The model of the Chemical Laboratory stood out as one of the main exhibits during that event. Transferred for the time being to the Lomonosov Library, the model then returned to the Lomonosov Museum, where it took pride of place among the exhibits at the Circular Hall, dedicated to the history of Russian science in the 18th century.

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