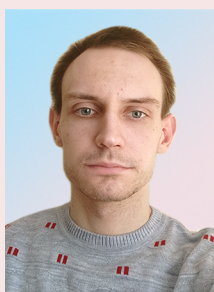
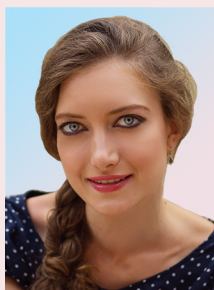


## Dynamics of Export-Import Operations in the Russian Chemical Industry: Current State of Affairs on the Threshold of Geopolitical Shifts



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**Abstract.** The chemical industry in Russia is of great importance for industrial production, agriculture and the consumer sector. This industry in the Russian Federation has a rather low share in GDP (less than 2%), and produces goods with relatively low added value: mineral fertilizers, nitrogen compounds, plastics, synthetic resins and rubbers. The chemical industry is characterized by imports consistently prevailing over exports. Thus, for 2013–2020 average excess of imports over exports in value terms was 62.6% or 16.3 billion US dollars. Mineral fertilizers occupy a key share (44.1%) in the structure of chemical exports, producing revenues of about 64.2 billion US dollars over eight years. While the bulk of imports fell on pharmaceutical products (39.2%) with a total volume of purchases amounting to 91.2 billion US dollars. Significant reduction in the average cost of an export ton of chemical products by 40% to 324 US dollars became a negative trend in foreign trade. The aim of the work is to identify key trends in foreign

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trade in Russian chemical industry products, which will become an information and analytical base to work out and adopt strategic decisions aimed at the development of the industry based on the principles of import substitution and deepening processing. The object is the relations that arise between the Russian Federation and foreign countries regarding export and import of chemical products. We use methods such as comparative, dynamic and specific weight analysis, and systematization. The information base includes data from the Federal Customs Service on export-import activities of the Russian chemical industry; Russian and foreign literature on the functioning of the industry under sanctions; data from information, news and analytical agencies.

**Key words:** foreign trade, export-import operations, sales markets, sanctions, chemical industry, production of mineral fertilizers.

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### Introduction to the problem

Studying the indicators of export and import activities of industrial production sectors for any country shows the specifics of development and the place of a particular country in world trade. In the framework of Russian exports, commodity orientation and low degree of processing is typical not only for oil and gas industry and metallurgy, but also for chemical industry.

The chemical sector is a leading branch of heavy industry. It plays an important part in the development of productive forces, strengthening national defense capability and ensuring the vital needs of society. Products of this industry are consumed by almost all segments of the national economy (mechanical engineering: plastics, varnishes, paint; agriculture: mineral fertilizers, feed additives, pest control preparations; transport: motor fuels, lubricants, etc.)<sup>1</sup>.

In the structure of RF industrial production chemical industry occupies about 6.8%, in the structure of manufacturing industries – about 10.4% in terms of the volume of goods shipped

across a full range of enterprises. At the same time, chemical enterprises provide about 5% of the total Russian volume of foreign exchange earnings<sup>2</sup>. Chemical industry accounts for only 1.8% of the Russian gross product, whereas in more developed countries its share is much higher: South Korea – 10%, Germany – 8%, Japan – 7%, France – 7%, Italy – 6%, European Union – 5%, USA – 5%<sup>3</sup>.

In Russia, chemical industry mainly produces large-scale products with low added value, has a high capacity for producing goods of higher processing, which is especially important under sanctions pressure and amid the need to reduce dependence on imports, but it does not use this capacity effectively.

In this regard, the aim of the study is to identify key trends in foreign trade in Russian chemical industry products, which will become an information and analytical base for designing and

<sup>2</sup> Chemical complex in the structure of Russia's GDP. Available at: [https://www.consultant.ru/document/cons\\_doc\\_LAW\\_144190/4125ee61cb16b4e5fb24f676bb90038570b89c4e/](https://www.consultant.ru/document/cons_doc_LAW_144190/4125ee61cb16b4e5fb24f676bb90038570b89c4e/)

<sup>3</sup> Network publication of the Center for Research and Analysis of the Foundation for Historical Perspective. World Chemical Industry. Available at: <https://www.perspektivy.info/print.php?ID=88615>

<sup>1</sup> Exhibition KHIMIA-2024: Chemical Industry. The role of chemical industry. Available at: <https://www.chemistry-expo.ru/ru/articles/rol-himicheskoy-promyshlennosti/>

adopting strategic decisions to develop the industry based on the principles of import substitution and deepening processing.

The aim implies a step-by-step solution of the following interrelated tasks:

- analyze literature on issues concerning the development of RF chemical industry, as well as the impact of sanctions pressure from Western countries on the economy of the world, Russia and, in particular, on its chemical industry;
- analyze the structure and volume of export-import operations in monetary and physical terms;
- identify changes in mutual trade in chemical industry products between Russia and other countries;
- identify major commodity items for exports and imports, as well as those RF regions that are key exporters and importers of chemical industry.

Based on the set goal and the listed tasks, the hypothesis of the study is that Russian chemical industry export currently has a lower added value relative to the import of industrial products.

#### **Theoretical overview and the extent of elaboration on the subject**

Scientific and economic literature considers specifics of development of RF chemical industry from different positions. Thus, Russian authors considered the potential of import substitution of Russian chemical industry; its competitiveness on the world stage; technology exchange under sanctions; development of domestic pharmaceuticals; contribution of chemical industry companies to the formation of budget revenues, development of territories and local communities; impact of anti-Russian sanctions on world food security, and so on. Publications of foreign researchers have noted the spread of the impact of sanctions not only on energy markets, but also on other sectors of the Russian natural resource and industrial complex; from this position, the research analyzes factors influencing the pricing of mineral fertilizers.

The scientists (Butsenko et al., 2017) concluded that Russia has a competitive price advantage in world trade in chemical industry products, and the directions of further growth are seen in innovations, increased investments in new types of mineral fertilizers. Researchers at the State University of Management noted that RF chemical industry was affected by a number of restrictions, including a ban on the export of technologies, equipment and components for the production of chemicals, as well as sanctions against some major Russian manufacturers (Smagulova, Fetisova, 2023). A work of the researchers at the Russian Foreign Trade Academy examines cooperation between Russia and India in the field of pharmaceuticals. The authors concluded that the most economically rational option for cooperation is to create joint ventures engaged in R&D for production and sale of products in the markets of both countries (Logina et al., 2021). In addition, the scientists have noticed a particularly acute situation in the global fertilizer market due to Russia's presence in the top three global suppliers and, accordingly, the country's strong influence on ensuring global food security. The published material predicts that events around Ukraine will continue to create problems in financing, insurance, logistics and cargo delivery, supporting further price increases (Zvorykina, Tikhonova, 2022).

Researchers at the Russian Technological University believe that key problems of import substitution in the Russian chemical industry include a superficial attitude toward improving the business climate in the industry, questionable distribution of state subsidies for production, as well as complex bureaucratic procedures when applying for a subsidy or grant (Provorova, Zhemerikin, 2020). Researchers at N.V. Parakhin Oryol State Agrarian University have proposed measures to develop mineral fertilizers segment in the context of sanctions pressure on Russia. The authors considered it necessary to improve the facilities and

logistics framework and state support measures for both agricultural producers and fertilizer producers (Bogachev, Dorofeeva, 2022).

Scientists from Kursk State Medical University and Kursk Institute of Cooperation have found that in Russia's foreign trade in pharmaceutical products imports exceed exports, which is due to low science and technology potential of the country's chemical industry. Russia's continued high dependence on imported drugs remains a critical problem that needs to be addressed (Ovod et al., 2023). A team of researchers from Vyatka State University considered trends in the development of production of low-tonnage chemical products in the framework of import substitution program. The authors noted a decrease in imports of plant protection chemicals in recent years, which predetermined the need to replenish these products on the domestic market by domestic analogues (Savelieva et al., 2022). Researchers at the Institute for African Studies of the Russian Academy of Sciences have identified the problems faced by African countries in 2022 as a result of the confrontation between Russia and the Collective West. The authors noted a decrease in Africa's purchases of cereals, oil and gas, as well as mineral fertilizers due to rising prices for these products. Negative impact was primarily felt by less economically developed countries and vulnerable population groups (Volkov, Konstantinova, 2023).

The research on chemical industry, conducted at Vologda Research Center of the Russian Academy of Sciences, deals with assessing the financial interaction of chemical corporations with the state, the role of chemical industry in generating budget revenues (Malyshev, 2021a; Malyshev, 2021b), impact of the activities of the largest chemical industry enterprises on development of the regional economy (Razgulina, Barabanov, 2014; Razgulina, 2015), capacity of chemical industry as a driver of economic growth in the country and the region (Shirokova, 2021).

Publications of foreign scientists consider the impact of sanctions on the Russian economy, in particular its chemical industry.

R. Johnston writes that the governments of the United States and the European Union are closely monitoring the situation concerning further sanctions against Russia, which go beyond energy markets and directly target other sectors of the Russian natural resource and industrial complex. The author emphasizes that even without direct sanctions, Russian production and exports of a wide range of raw materials such as wheat, fertilizers, gold, uranium, lumber, pulp and paper, coal, aluminum and palladium are under threat due to unauthorized alienation of assets by non-Russian firms and sanctions restricting access to international banking and insurance markets (Johnston, 2022). In a joint publication, M. Cormann and L. Boone note that Russia and Ukraine play an important role in the global economy. These countries account for about 30% of world exports of wheat, 20% of corn, mineral fertilizers and natural gas, and 11% of oil. As a result of the conflict, prices for many of these goods have soared, although there were no significant disruptions in production or export volumes (Cormann, Boone, 2022). In a publication by researchers from China, it is noted that Western sanctions against Russia have led to a shortage of energy resources in the European Union. Energy-intensive industries such as agriculture and chemical industry are affected quite considerably. Production of nitrogen-based fertilizers for European companies has become extremely expensive, and therefore the EU has reduced tariffs on energy imports from other countries, which to some extent contributed to improving the general situation for other countries (Chen et al., 2023). An article by Moldovan researchers notes that political tensions between the Republic of Moldova and the Russian Federation have led to Russia's

imposition of embargoes, bans and taxes on imports of Moldovan products. Due to the high share of Moldovan exports focused on Russia until 2014, the republic reoriented its trade to EU countries after the signing of an Association Agreement<sup>4</sup> (Clichici, Iordachi, 2019). X. Yui writes that restrictive measures against Russia concern not only the state, but also legal entities and some government representatives. These measures include freezing of funds of illegal economic resources of a technical or material nature, as well as those economic entities whose activities are aimed at production and use of chemical weapons (Yui, 2022). A study by Polish scientists has determined that the prices of raw materials needed for the production of mineral fertilizers play a significant role in farmers' production decisions. The increase in fuel and fertilizer prices in 2022 had a negative impact on the efficiency and profitability of agriculture, which was observed in European countries with an increase in the cost of gas (Weremczuk, Malitka, 2022).

Thus, the works of Russian and foreign authors on the development specifics of Russian chemical industry and its functioning under sanctions, note the leading positions of the Russian Federation in the global market of mineral fertilizers. At the same time, the 2022 global energy crisis caused by sanctions against Russian fuel and energy companies has significantly affected the rise in the cost of gas in Europe, and the work of European enterprises that use gas has become unprofitable. In particular, this applies to the production of mineral fertilizers (especially nitrogen).

#### **Research materials and methods**

While preparing the publication we used a range of methods and resources to make the study more holistic. Thus, a vertical analysis of available

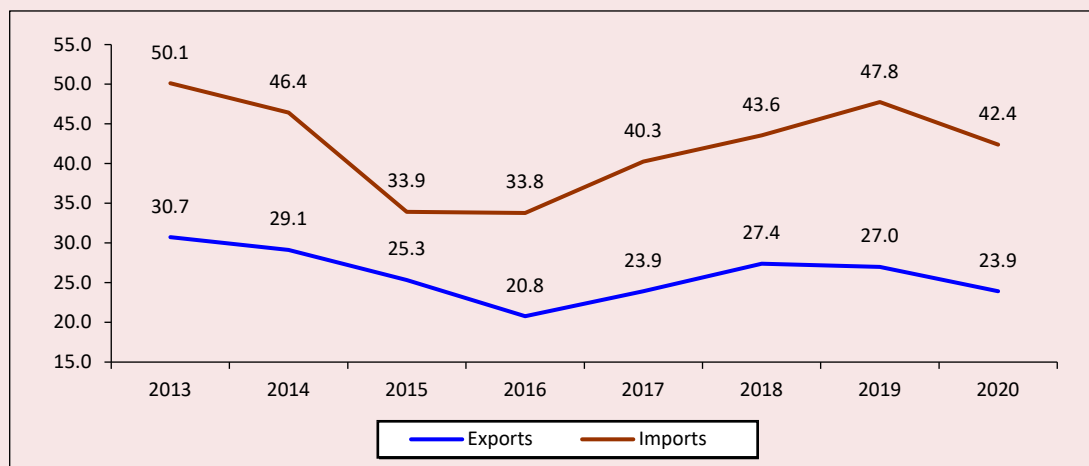
complete data of the Federal Customs Service (2013–2020) indicates that the largest share in the financial structure of exports of chemical industry products from Russia belongs to mineral fertilizers (42.2–49.2%, or 7–9.1 billion US dollars), which are not high-value-added products. Taking into account the volume of exports of mineral fertilizers in weight terms (27.3–34.6 million tons), it was determined that the price of their sale abroad was ranging from 205 to 334 US dollars per ton and was decreasing (-38.6%).

A structural analysis of imports of chemical industry products to Russia over the same period showed the largest share of pharmaceutical goods in the total volume of purchases (35.6–43.3%, or 8.7–14.6 billion US dollars). In this regard, the estimated cost of one ton of key imports of chemical products to the Russian Federation ranged from 54.4 to 85.9 thousand US dollars (an average of 69.6 thousand US dollars per ton). Thus, the average price of one ton of key exports (mineral fertilizers) is 194.9–376.3 times lower than the price of one ton of key imports (pharmaceuticals), which clearly shows Russia's high dependence on foreign drugs, and also negatively affects the foreign trade balance for chemical industry. A retrospective comparative analysis of the dynamics of exports and imports of chemical industry products shows that in financial terms, the total value of chemical industry imports to Russia exceeded exports from the country by 34–77.3%. Based on a specific weight analysis of the export structure, countries leading in the procurement of chemical products from Russia have been identified: Brazil (12.9%), Ukraine (12.7%), China (9.6%), as well as countries leading in importing products to Russia: Germany (38.6%), France (21.7%), China (19%).

An analysis of weighted average prices for exports and imports of products showed that the cost of one ton of imported chemical products to Russia is 5.6–8.3 times higher than the price of one export ton from the Russian Federation.

<sup>4</sup> Content of the Association Agreement between the Republic of Moldova and the EU. Available at: <https://defta.md/rus/soderzhanie-soglasheniya-ob-associacii-mezhdurm-i-es>

Figure 1. Dynamics of exports and imports of Russian chemical industry products for 2013–2020, billion US dollars



Source: Chemical production: Analytical bulletin. Issue 45. Results of 2021. Available at: [https://riarating.ru/files/ratings/chemistry\\_demo45.pdf](https://riarating.ru/files/ratings/chemistry_demo45.pdf)

### Research results

In 2013–2020, Russia's exports and imports of chemical products had similar dynamics trends (decline / growth). However, average value of imports was 62.6% (16.3 billion US dollars) more. At the same time, due to the COVID-19 pandemic, the volume of purchases of chemical products decreased by 15.4% – from 50.1 to 42.4 billion US dollars, while exports shrank by 22.2% – from 30.7 to 23.9 billion US dollars (*Fig. 1*).

The excess of the aggregate cost of imports over exports is due to the export of cheap low-cost and large-tonnage goods from Russia abroad (fertilizers, various carbons and alcohols, ammonia) in exchange for purchases of expensive products with high added value (pharmaceuticals, artificial corundum and aluminum oxides, radioactive elements and isotopes).

Fertilizers (44.1%), inorganic chemical products (19.7%) and organic chemical compounds (19.3%) occupy the largest share in the structure of exports of chemical industry products, the remaining 16.9% of exports include essential oils; perfumes, cosmetics, toiletries; soaps, detergents, lubricants, waxes, candles, pastes and plasticine; paints,

varnishes, mastics and putties; explosives; pyrotechnics; matches; protein substances; modified starches; adhesives; enzymes.

In 2013–2020 exports of mineral fertilizers abroad in monetary terms decreased by 23%, from 9.12 to 6.99 billion US dollars, approximately similarly in composition: by 26% to 2.5 billion US dollars for nitrogen fertilizers, by 19% to 1.8 billion US dollars for potash fertilizers, by 24% to 2.7 billion US dollars for mixed ones. Such values have developed even despite a commensurate increase in natural volumes – by 25% to 34.1 million tons. This situation provoked a strong reduction in the cost of an export ton of fertilizers – from 334 to 205 US dollars per ton (-39%).

Exports of inorganic chemicals from Russia in monetary terms decreased by 46% – from 5 to 2.7 billion US dollars. However, as with fertilizers, its natural volume increased by 29% to 7.9 million tons, and the average cost of an export ton gradually lost 58% in price – from 815 to 339 US dollars per ton. Among the products of inorganic chemistry, which have the largest share in the export structure, a slowdown in sales was noted in the trade of ammonia (-47%, or -739 million US

dollars), carbon (-28%, or 172 million US dollars) and precious metals in colloidal state (-99.8%, from 1.31 billion to 2 million US dollars). Exports of other metal oxides increased by 3%, from 170 to 175 million US dollars; carbonates – by 11%, from 179 to 199 million US dollars. The fall in gas prices on world markets, against the background of maintaining regulated domestic prices, has jeopardized the competitiveness of Russian producers of ammonia and its derivatives<sup>5</sup>.

Exports of organic chemical compounds showed negative dynamics (-46%, from 4.6 to 2.5 billion US dollars), in physical terms they increased by 5% (to 5.6 million tons). As a result of such changes,

the average cost of one ton of organic compounds exported abroad decreased by 49%, to 441 US dollars. There was a decrease in the export of acyclic hydrocarbons (-69%, or -1052 million US dollars), acyclic and derivative alcohols (-41%, or 339 million US dollars), heterocyclic nitrogen compounds (-40%, or -212 million US dollars), cyclic hydrocarbons (-44%, or -206 million US dollars) and esters (-40%, or -118 million US dollars; *Tab. 1*).

Thus, despite an increase in exports in kind by 24% (to 49.7 million tons), a decrease in the average price of an export ton by 40% (to 324 US dollars) led to a decrease in the value of exports by 25% – from 21.4 to 16.1 billion US dollars.

Table 1. Exports of chemical products from Russia by key commodity group for 2013–2020\*

| Period                     | Fertilizers  |              |             | Inorganic chemistry products |              |             | Organic chemical compounds |              |             | Total exports of chemical industry products from the Russian Federation |              |             |
|----------------------------|--------------|--------------|-------------|------------------------------|--------------|-------------|----------------------------|--------------|-------------|---|--------------|-------------|
|                            | million USD  | million tons | USD per ton | million USD                  | million tons | USD per ton | million USD                | million tons | USD per ton | million USD   | million tons | USD per ton |
| 2013                       | 9120         | 27.3         | 334         | 4980                         | 6.11         | 815         | 4600                       | 5.36         | 858         | 21400   | 39.95        | 536         |
| 2014                       | 8990         | 30.9         | 291         | 5110                         | 6.15         | 831         | 4500                       | 5.61         | 802         | 21300   | 43.92        | 485         |
| 2015                       | 8850         | 31.7         | 279         | 3820                         | 6.45         | 592         | 2970                       | 5.85         | 508         | 18000   | 45.39        | 397         |
| 2016                       | 6420         | 30.6         | 210         | 2370                         | 6.85         | 346         | 2360                       | 5.89         | 401         | 13600   | 44.83        | 303         |
| 2017                       | 7220         | 34.4         | 210         | 2630                         | 6.77         | 388         | 3240                       | 5.65         | 573         | 16400   | 48.49        | 338         |
| 2018                       | 8230         | 34.1         | 241         | 3620                         | 8.11         | 446         | 4250                       | 6.32         | 672         | 19500   | 50.29        | 388         |
| 2019                       | 8400         | 34.6         | 243         | 3450                         | 8.47         | 407         | 3670                       | 6.68         | 549         | 19300   | 51.71        | 373         |
| 2020                       | 6990         | 34.1         | 205         | 2670                         | 7.88         | 339         | 2480                       | 5.62         | 441         | 16100   | 49.71        | 324         |
| <b>Total for 2013–2020</b> | <b>64200</b> | <b>257.6</b> | <b>249</b>  | <b>28700</b>                 | <b>56.8</b>  | <b>505</b>  | <b>28100</b>               | <b>47.0</b>  | <b>598</b>  | <b>145500</b>   | <b>374.3</b> | <b>389</b>  |
| 2020 to 2013, fold         | 0.77         | 1.25         | 0.61        | 0.54                         | 1.29         | 0.42        | 0.54                       | 1.05         | 0.51        | 0.75  | 1.24         | 0.60        |
| Share, %**                 | 44.1         | 68.8         | x           | 19.7                         | 15.2         | x           | 19.3                       | 12.5         | x           | 100   | 100          | x           |

\* The period was chosen due to the availability of access to detailed and structured statistics for these years. In addition, according to existing data, for the year 2021 (Commodity turnover “Chemical industry products”. Analytics for 2021. Available at: <https://ru-stat.com/analytics/9120>) there was an increase in fertilizer exports (+78.8%) to 12.5 billion USD, inorganic chemical products (+52.1%) to 4.06 billion USD, and organic chemical compounds (+38.7%) to 3.44 billion USD relative to 2020. Total exports for 2021 after COVID-19 pandemic restrictions had been lifted amounted to 25.9 billion USD (+60.9% relative to 2020).

\*\* Share in total exports of chemical industry products from the Russian Federation.

Source: Exports of chemical industry products from Russia by commodity. Available at: <https://ru-stat.ru/date-Y2013-2022/RU/export/world/06>

<sup>5</sup> From January to September 2020, Russia reduced ammonia exports by 6.5%. Available at: <https://chem.ru/news/33415-s-janvarja-po-sentjabr-2020-goda-rossija-snizila-jeksport-ammiaka-na-65.html>

Table 2. Structure of chemical exports from Russia, broken down by country for 2013–2020

| No.  | Country     | 2013        | 2014        | 2015        | 2016        | 2017        | 2018        | 2019        | 2020        | Total for 2013–2020, billion USD | Share, %* | 2019 to 2013 | 2020 to 2019 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------------------|-----------|--------------|--------------|
|  |             | million USD |             |             |             |             |             |             |             |                                  |           | fold         |              |
| 1  | Brazil      | 1560        | 1860        | 1570        | 1180        | 1460        | 1910        | 1910        | 1430        | <b>12.9</b>                      | 8.9       | 1.22         | 0,75         |
| 2  | Ukraine     | 2480        | 2260        | 2020        | 1530        | 1630        | 1160        | 963         | 700         | <b>12.7</b>                      | 8.7       | 0.39         | 0,73         |
| 3  | China       | 1590        | 1470        | 1320        | 974         | 1100        | 1000        | 1210        | 892         | <b>9.6</b>                       | 6.6       | 0.76         | 0,74         |
| 4  | Finland     | 1410        | 1370        | 961         | 740         | 989         | 1430        | 1250        | 971         | <b>9.1</b>                       | 6.3       | 0.89         | 0,78         |
| 5  | Kazakhstan  | 1060        | 926         | 787         | 837         | 1330        | 1140        | 1170        | 1230        | <b>8.5</b>                       | 5.8       | 1.10         | 1,05         |
| 6  | Belarus     | 909         | 896         | 709         | 732         | 1020        | 1170        | 1210        | 1100        | <b>7.7</b>                       | 5.3       | 1.33         | 0,91         |
| 7  | USA         | 961         | 922         | 1210        | 524         | 663         | 1100        | 856         | 461         | <b>6.7</b>                       | 4.6       | 0.89         | 0,54         |
| 8  | Türkiye     | 1180        | 974         | 671         | 397         | 438         | 672         | 634         | 462         | <b>6.4</b>                       | 4.4       | 0.54         | 0,73         |
| 9  | Poland      | 742         | 685         | 582         | 518         | 681         | 787         | 760         | 560         | <b>5.3</b>                       | 3.6       | 1.02         | 0,74         |
| 10   | India       | 546         | 609         | 875         | 541         | 483         | 583         | 557         | 771         | <b>5.0</b>                       | 3.4       | 1.02         | 1,38         |
| 11   | Netherlands | 505         | 727         | 531         | 484         | 550         | 788         | 831         | 454         | <b>4.9</b>                       | 3.3       | 1.65         | 0,55         |
| 12   | Estonia     | 187         | 354         | 308         | 315         | 343         | 563         | 788         | 770         | <b>3.6</b>                       | 2.5       | 4.21         | 0,98         |
| 13   | Italy       | 942         | 1100        | 517         | 85.8        | 107         | 108         | 91.1        | 72.6        | <b>3.0</b>                       | 2.1       | 0.10         | 0,80         |
| 14   | Belgium     | 343         | 294         | 443         | 241         | 226         | 432         | 390         | 191         | <b>2.6</b>                       | 1.8       | 1.14         | 0,49         |
| 15   | Germany     | 467         | 383         | 272         | 226         | 250         | 353         | 318         | 275         | <b>2.5</b>                       | 1.7       | 0.68         | 0,86         |
| 16   | Lithuania   | 345         | 277         | 247         | 179         | 207         | 307         | 306         | 223         | <b>2.1</b>                       | 1.4       | 0.89         | 0,73         |
| 17   | Latvia      | 225         | 233         | 217         | 196         | 225         | 284         | 299         | 268         | <b>2.0</b>                       | 1.3       | 1.33         | 0,90         |
| 18   | Switzerland | 565         | 552         | 344         | 74.6        | 97.6        | 71.5        | 62.8        | 150         | <b>1.9</b>                       | 1.3       | 0.11         | 2,39         |
| 19   | Uzbekistan  | 199         | 220         | 177         | 180         | 216         | 251         | 301         | 358         | <b>1.9</b>                       | 1.3       | 1.51         | 1,19         |
| 20   | Sweden      | 199         | 322         | 148         | 143         | 218         | 259         | 177         | 61.8        | <b>1.5</b>                       | 1.1       | 0.89         | 0,35         |
| <b>Total for 20 countries, billion USD</b> |             | <b>16,4</b> | <b>16,4</b> | <b>13,9</b> | <b>10,1</b> | <b>12,2</b> | <b>14,4</b> | <b>14,1</b> | <b>11,4</b> | <b>108,9</b>                     | x         | 0.86         | 0.81         |
| <b>Total for the world, billion USD</b>    |             | <b>21,4</b> | <b>21,3</b> | <b>18,0</b> | <b>13,6</b> | <b>16,4</b> | <b>19,5</b> | <b>19,3</b> | <b>16,1</b> | <b>145,6</b>                     | 100       | 0.90         | 0.83         |
| Share, %**                                 |             | 76,7        | 77,2        | 77,3        | 74,2        | 74,6        | 73,7        | 73,0        | 70,8        | 74,8                             | x         | -3,7         | -2,2         |

\* Country's share in total exports of chemical products from Russia for 2013–2020.  
\*\* Share of 20 leading countries in chemical products exports from Russia by year.  
Source: Export of chemical products from Russia by country. Available at: <https://ru-stat.su/date-Y2013-2022/RU/export/world/06>

Speaking about the country structure of exports of Russian chemical industry products for 2013–2020 (*Tab. 2*), we should note that the largest number of deliveries were made to Brazil (12.9 billion US dollars, or 8.9%).

If we do not take into account indicators of the year 2020 that witnessed the coronavirus crisis, we see that exports to Brazil in 2013–2019 increased by 22% (to 1.91 billion US dollars) as a result of an increase in Brazil's purchases of mineral fertilizers by 21% (+330 million US dollars). The reduction in volume by 2020 by 25% (to 1.43 billion US dollars) was primarily due to a decrease in the supply of mineral fertilizers not only because of the

COVID-19 pandemic, but also due to the creation of full-cycle enterprises in Latin America<sup>6</sup>.

Gradual decrease in foreign trade with Ukraine in 2013–2020 by 72% (from 2.5 billion to 700 million US dollars) was associated with economic sanctions and the outbreak of an armed conflict in 2014<sup>7</sup>. These events affected the export of fertilizers (33.6-fold decrease, or -547 million US dollars), inorganic chemistry products (-81%, or -800 million

<sup>6</sup> Fertilizers go to Brazil. Available at: [https://bereg-broker.ru/2020/08/25/udobreniya-edut-v-braziliyu/?utm\\_referrer=https%3A%2F%2Fyandex.ru%2F](https://bereg-broker.ru/2020/08/25/udobreniya-edut-v-braziliyu/?utm_referrer=https%3A%2F%2Fyandex.ru%2F)

<sup>7</sup> Russian Ministry of Economic Development: Foreign trade turnover between Russia and Ukraine fell by 28.8% in 2014. Available at: <https://ria.ru/20150127/1044531237.html>



US dollars), organic chemical compounds (-64%, or -126 million US dollars). While the supply of pharmaceutical products to Ukraine increased by 78% (by 71 million US dollars). Total volume of exports to the country over eight years amounted to 12.7 billion US dollars, or 8.7% of total shipments abroad.

China was the third largest export partner of the Russian Federation, accounting for 6.6% of total exports of chemical products, which is equivalent to 9.6 billion US dollars. In 2013–2020, exports to China decreased by 44% – from 1.59 billion to 892 million US dollars, while during the year of the pandemic – by 26%. Exports of fertilizers showed negative dynamics (-45%, or -436 million US dollars), as well as exports of organic chemical compounds (-69%, or -376 million US dollars). There was an increase in exports of inorganic chemistry products (+117%, or +47 million US dollars) and other chemical products (7.8-fold, or +71 million US dollars). In 2020, due to the coronavirus, China has optimized its imports as much as possible. The country refused to purchase goods that it could produce on its own. The Government of the People's Republic of China has actively expressed this, pursuing zero tolerance policy<sup>8</sup>.

Exports of chemical products to Finland decreased by 31%, from 1.41 billion to 971 million US dollars by 2020. This had the most significant impact on the supply of organic chemical compounds (-57%, or -632 million US dollars), as well as inorganic chemistry products (-28%, or -38 million US dollars). At the same time, exports of fertilizers showed positive dynamics (2.9 times, or +228 million US dollars). In just eight years, supplies of chemical products to Finland amounted to 9.13 billion US dollars (6.3% of total exports).

Deliveries to Kazakhstan in 2013–2020 increased by 16% (from 1.06 to 1.23 billion US dollars); trade did not decrease even in the COVID year (+5% by

2019). Export was growing due to supplies of other chemical products (+78%, or +91 million US dollars), pharmaceuticals (+26%, or +36 million US dollars), essential oils and perfumes (+27%, or +32 million US dollars), as well as paints and varnishes (+38%, or +25 million US dollars) and fertilizers (+52%, or +40 million US dollars). There was a decrease in exports of inorganic chemical products (-21%, or -46 million US dollars), organic chemical compounds (-10%, or -10 million US dollars) and explosives (-24%, or -9 million US dollars). Kazakhstan ranks fifth in the structure of Russian exports of chemical products with a share of 5.8% and a volume of 8.47 billion US dollars.

Thus, exports of chemical industry products from Russia to 20 key countries in 2013–2020 decreased by 31% – from 16.4 to 11.4 billion US dollars, and the decline in trade during the pandemic amounted to 19% (relative to 2019).

As for exports of chemical products in the context of RF constituent entities, the three leading regions include the Perm Territory (17%), city of Moscow (11%), and the Vologda Region (7.1%). They account for 35.1% of the total volume of supplies from Russian regions amounting to 51.1 billion US dollars over eight years.

Fertilizers are key exported products from the Perm Territory; they go to Brazil (26.3%), China (19.9%), India (8%), the USA (7.2%) and Indonesia (4.8%). In 2013–2020, fertilizers exports shrank to 2.02 billion US dollars (-24%), mainly due to cessation of supplies of potassium chloride and sulfate. Total exports from the Perm Territory in 2020 amounted to 2.4 billion US dollars (-29% by 2013 and -23% by 2019). Exports of chemical products from Moscow in 2020 reached 1.89 billion US dollars (-22%). Supplies of inorganic chemistry products, primarily precious metals in the colloidal state, demonstrated a negative trend (3,273-fold decrease – from 1.08 billion to 330 thousand US dollars). At the same time, there was an increase in supplies of organic chemical compounds (+17%, or +76 million US dollars), essential oils

<sup>8</sup> China has been called a model for fighting COVID-19. Available at: <https://tass.ru/obschestvo/13510041>

and perfumes (+37%, or +92 million US dollars), pharmaceuticals (2-fold, or +166 million US dollars), detergents and lubricants (2.6-fold, or +103 million US dollars), as well as other chemical products (3.3-fold, or +131 million US dollars). Sanitary restrictions reduced export volumes by 8% compared to 2019. The Vologda Region, whose chemical exports consist of mineral fertilizers by 98.6%, limited supplies abroad in 2020 to 1.36 billion US dollars (-6% by 2019); however, positive dynamics were noted in 2013–2019 (+3%, up to 1.45 billion US dollars). Key countries purchasing mineral fertilizers from the Vologda Region include Brazil (10.9%), India (10.2%), USA (6.9%),

Finland (6.5%), Poland (5.2%), Ukraine (3.8%), Türkiye (3.7%), Belgium (3.6%), France (3%) and Romania (2.6%). Main drop in exports was due to Brazil's refusal to purchase certain amount of mixed mineral fertilizers (-68%, or -100 million US dollars) and a complete halt in supplies to Ukraine.

Thus, chemical industry exports from 20 key regions of the Russian Federation in 2013–2020 decreased by 26% – from 19 to 14.1 billion US dollars, by 16% – during the pandemic (*Tab. 3*).

In 2013–2020, pharmaceuticals (39.2%, or 91.2 billion US dollars); organic compounds (12.2%, or 28.4 billion US dollars) and inorganic chemistry products (11.2%, or 26.1 billion US dollars) had

Table 3. Structure of chemical products exports from Russian regions in 2013–2020

| No.  | RF constituent entity     | 2013        | 2014        | 2015        | 2016        | 2017        | 2018        | 2019        | 2020        | Total for 2013–2020, billion USD | Share, %* | 2019 to 2013 | 2020 to 2019 |
|--|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------------------|-----------|--------------|--------------|
|  |                           | million USD |             |             |             |             |             |             |             |                                  |           | fold         |              |
| 1  | Perm Territory            | 3370        | 3780        | 3850        | 2490        | 2860        | 2960        | 3100        | 2400        | <b>24.8</b>                      | 17.0      | 0.92         | 0.77         |
| 2  | Moscow                    | 2420        | 2790        | 1790        | 1230        | 1940        | 1920        | 2050        | 1890        | <b>16.0</b>                      | 11.0      | 0.85         | 0.92         |
| 3  | Vologda Region            | 1410        | 1270        | 1330        | 1010        | 940         | 1540        | 1450        | 1360        | <b>10.3</b>                      | 7.1       | 1.03         | 0.94         |
| 4  | Samara Region             | 1800        | 1720        | 1260        | 739         | 775         | 1290        | 1170        | 882         | <b>9.6</b>                       | 6.6       | 0.65         | 0.75         |
| 5  | Tula Region               | 1240        | 1250        | 946         | 737         | 889         | 1150        | 1070        | 819         | <b>8.1</b>                       | 5.6       | 0.86         | 0.77         |
| 6  | Novgorod Region           | 848         | 868         | 674         | 548         | 724         | 916         | 1230        | 996         | <b>6.8</b>                       | 4.7       | 1.45         | 0.81         |
| 7  | Leningrad Region          | 722         | 758         | 661         | 522         | 630         | 799         | 852         | 745         | <b>5.7</b>                       | 3.9       | 1.18         | 0.87         |
| 8  | Saratov Region            | 779         | 646         | 719         | 466         | 524         | 770         | 697         | 567         | <b>5.2</b>                       | 3.5       | 0.89         | 0.81         |
| 9  | Moscow Region             | 538         | 415         | 371         | 468         | 589         | 690         | 804         | 831         | <b>4.7</b>                       | 3.2       | 1.49         | 1.03         |
| 10   | Tyumen Region             | 731         | 616         | 476         | 503         | 566         | 837         | 505         | 179         | <b>4.4</b>                       | 3.0       | 0.69         | 0.35         |
| 11   | Republic of Bashkortostan | 728         | 583         | 475         | 408         | 533         | 606         | 540         | 459         | <b>4.3</b>                       | 3.0       | 0.74         | 0.85         |
| 12   | Stavropol Territory       | 615         | 573         | 487         | 405         | 424         | 442         | 587         | 477         | <b>4.0</b>                       | 2.8       | 0.95         | 0.81         |
| 13   | Kirov Region              | 645         | 683         | 562         | 372         | 453         | 442         | 372         | 384         | <b>3.9</b>                       | 2.7       | 0.58         | 1.03         |
| 14   | Voronezh Region           | 718         | 632         | 590         | 433         | 364         | 467         | 235         | 151         | <b>3.6</b>                       | 2.5       | 0.33         | 0.64         |
| 15   | Nizhny Novgorod Region    | 410         | 375         | 372         | 327         | 405         | 457         | 509         | 475         | <b>3.3</b>                       | 2.3       | 1.24         | 0.93         |
| 16   | Saint Petersburg          | 335         | 627         | 444         | 298         | 422         | 370         | 380         | 362         | <b>3.2</b>                       | 2.2       | 1.13         | 0.95         |
| 17   | Kemerovo Region           | 554         | 437         | 325         | 327         | 380         | 359         | 344         | 277         | <b>3.0</b>                       | 2.1       | 0.62         | 0.81         |
| 18   | Republic of Tatarstan     | 369         | 331         | 250         | 254         | 375         | 492         | 401         | 363         | <b>2.8</b>                       | 1.9       | 1.09         | 0.91         |
| 19   | Volgograd Region          | 363         | 310         | 240         | 212         | 281         | 339         | 315         | 298         | <b>2.4</b>                       | 1.6       | 0.87         | 0.95         |
| 20   | Smolensk Region           | 387         | 293         | 305         | 265         | 323         | 315         | 221         | 171         | <b>2.3</b>                       | 1.6       | 0.57         | 0.77         |
| <b>Total for 20 RF constituent entities, billion USD</b> |                           | <b>19.0</b> | <b>19.0</b> | <b>16.1</b> | <b>12.0</b> | <b>14.4</b> | <b>17.2</b> | <b>16.8</b> | <b>14.1</b> | <b>128.6</b>                     | 88.3      | 0.89         | 0.84         |
| <b>Total for RF constituent entities, billion USD</b>    |                           | <b>21.4</b> | <b>21.3</b> | <b>18.0</b> | <b>13.6</b> | <b>16.4</b> | <b>19.5</b> | <b>19.3</b> | <b>16.1</b> | <b>145.6</b>                     | 100.0     | 0.90         | 0.83         |
| Share, %**   |                           | 88.7        | 89.0        | 89.6        | 88.3        | 87.8        | 88.0        | 87.2        | 87.5        | 88.3                             | x         | -1.5         | 0.3          |

\* Region's share in total exports of chemical products from Russia for 2013–2020.  
\*\* Share of 20 leading regions in chemical products exports from Russia by year.  
Source: Export of chemical products from Russian regions. Available at: <https://ru-stat.su/date-Y2013-2022/RU/export/world/06>

the largest share in the structure of chemical imports to the Russian Federation. Other chemical products imported into Russia include essential oils and perfumes, paints, varnishes, mastics, putties, detergents, lubricants, waxes, candles, pastes, plasticine, protein substances, modified starches, adhesives, enzymes, explosives, pyrotechnics and matches. Their total share in imports is 37.4%. Purchases of pharmaceutical products, which rank first in the structure of imports, decreased by 26% (from 14.6 to 10.8 billion US dollars) due to partial reduction in drug purchases (-38%, or -4.4 billion US dollars), in particular penicillins, antibiotics, drugs containing insulin, as well as corticosteroid hormones and their derivatives. In volume terms, the amount of imported drugs decreased to 140 thousand tons, and the cost of one ton decreased by 10% – from 85.9 to 77.1 thousand US dollars. Purchases of organic chemical compounds increased by 37% (from 3.33 to 4.57 billion US dollars) due to an increase in imports of heterocyclic compounds with nitrogen atoms (2.2-fold, or +457 million US dollars), nucleic acids and their salts (4.6-fold, or +369 million US dollars), amino compounds (+42%, or +84 million US dollars), provitamins and vitamins (+30%, or +41 million US dollars), carboxylic acids (+64%, or +71 million US dollars), hormones and their derivatives (+43%, or +68 million US dollars), antibiotics (2-fold, or +94 million US dollars) and organosulfur compounds (+66%, or +54 million US dollars). Total volume of imported organic compounds increased by 23%, to 1.6 million tons, and their average cost increased by 11%, to 2,892 US dollars per ton. Imports of inorganic chemistry products in monetary terms decreased by 10% (from 3.4 to 3.07 billion US dollars), in weight terms – by 6% (to 5.77 million tons). In this regard, the price of an import ton fell by only 4%, to 532 US dollars. Negative purchase dynamics were observed in radioactive elements and isotopes (-30%, or -232 million US dollars), carbonates (-56%, or -106 million US dollars), fluorides (-23%, or -14 million US dollars), alkali

and rare earth metals (-63%, or 16 million US dollars), and also cyanides (-69%, or -82 million US dollars).

Thus, in 2013–2020, imports of chemical products to the Russian Federation decreased by 13% (from 33.7 to 29.4 billion US dollars), in physical terms – by 3% (to 10.9 million tons), and the average cost of a ton of chemical products imported into Russia – by 10%, to 2,696 US dollars per ton (*Tab. 4*).

In 2013–2020, major suppliers of chemical industry products worth more than 10 billion US dollars to Russia included Germany (38.6 billion US dollars), France (21.7 billion US dollars), China (19 billion US dollars), USA (14.3 billion US dollars) and Italy (12.2 billion US dollars).

A decrease in imports from Germany to the Russian Federation by 28% (from 6.09 to 4.41 billion US dollars) is due to a drop in purchases of pharmaceutical products (-32%, or -1 billion US dollars), other chemical products (-10%, or -65 million US dollars), organic chemical compounds (-24%, or -158 million US dollars), essential oils, perfumes and cosmetics (-38%, or -212 million US dollars), as well as paints, mastics and putties (-33%, or -159 million US dollars). In 2019–2020 purchases from Germany dropped by 20%. The volume of imported chemical industry products from France decreased to 2.17 billion US dollars (-38%). Negative dynamics were observed in pharmaceuticals (-59%, or -834 million US dollars), essential oils (-40%, or -428 million US dollars) and organic chemical compounds (-19%, or -59 million US dollars). The coronavirus pandemic has reduced shipments from France to Russia by 690 million US dollars (-24%). In contrast to the drop in imports from Western European countries, China increased supplies to Russia by 80% in 2013–2020 – from 1.86 billion to 3.35 billion US dollars. Major growth was observed in organic chemical compounds (2.4-fold, or +1 billion US dollars), insecticides, herbicides, plant growth regulators, binders for the production of molds, refractory

Table 4. Import of chemical products to Russia in the context of key commodity groups for 2013–2020\*

| Period                     | Pharmaceuticals |              |              | Organic chemical compounds |              |             | Inorganic chemistry products |              |             | Total imports of chemical industry products to the Russian Federation |              |             |
|----------------------------|-----------------|--------------|--------------|----------------------------|--------------|-------------|------------------------------|--------------|-------------|---|--------------|-------------|
|                            | million USD     | million tons | USD per ton  | million USD                | million tons | USD per ton | million USD                  | million tons | USD per ton | million USD   | million tons | USD per ton |
| 2013                       | 14600           | 0.17         | 85882        | 3330                       | 1.28         | 2602        | 3400                         | 6.13         | 555         | 33738   | 11.28        | 2991        |
| 2014                       | 12800           | 0.17         | 75294        | 3090                       | 1.19         | 2597        | 3290                         | 5.54         | 594         | 31200   | 10.59        | 2946        |
| 2015                       | 8700            | 0.16         | 54375        | 2650                       | 1.14         | 2325        | 3250                         | 5.52         | 589         | 23600   | 9.78         | 2413        |
| 2016                       | 8840            | 0.16         | 55250        | 2710                       | 1.28         | 2117        | 2540                         | 5.79         | 439         | 23100   | 10.09        | 2289        |
| 2017                       | 10800           | 0.17         | 63529        | 3520                       | 1.39         | 2532        | 2940                         | 5.76         | 510         | 27900   | 10.74        | 2598        |
| 2018                       | 10600           | 0.16         | 66250        | 4110                       | 1.41         | 2915        | 3820                         | 5.76         | 663         | 29800   | 10.74        | 2775        |
| 2019                       | 14100           | 0.2          | 70500        | 4450                       | 1.66         | 2681        | 3820                         | 6.08         | 628         | 33900   | 11.48        | 2953        |
| 2020                       | 10800           | 0.14         | 77143        | 4570                       | 1.58         | 2892        | 3070                         | 5.77         | 532         | 29360   | 10.89        | 2696        |
| <b>Total for 2013–2020</b> | <b>91200</b>    | <b>1.31</b>  | <b>69618</b> | <b>28400</b>               | <b>10.95</b> | <b>2594</b> | <b>26100</b>                 | <b>46.34</b> | <b>563</b>  | <b>232509</b>   | <b>85.61</b> | <b>2716</b> |
| 2020 to 2013, fold         | 0.74            | 0.82         | 0.90         | 1.37                       | 1.23         | 1.11        | 0.90                         | 0.94         | 0.96        | 0.87  | 0.97         | 0.90        |
| Share, %**                 | 39.2            | 1.5          | x            | 12.2                       | 12.8         | x           | 11.2                         | 54.1         | x           | 100   | 100          | x           |

\* According to data available for 2021, Russia's imports of chemical products after the 2020 pandemic increased by 22.1%, to 35.9 billion USD: pharmaceutical products (+27.8%, to 13.8 billion USD); organic chemical compounds (+27.8%, to 5.84 billion USD); inorganic chemical products (+11.4%, to 3.42 billion USD).

\*\* Share in total imports of chemical industry products to the Russian Federation.

Source: Imports of chemical industry products to Russia. Available at: <https://ru-stat.su/date-Y2013-2022/RU/import/world/06>

cements, building mortars (+95%, or +203 million US dollars), essential oils, perfumes, cosmetics and toiletries (+24%, or +30 million US dollars), pharmaceutical products (3.1-fold, or +184 million US dollars).

Supplies of chemical products from the United States to Russia have not changed and amounted to 1.97 billion US dollars in 2013 and 2020; however, in 2013–2019 they showed an increase (+15%, to 2.26 billion US dollars). The structure of imports of chemical products from the USA to the Russian Federation includes pharmaceuticals (41.2%), other chemical products (21.5%), essential oils, perfumes and cosmetics (11.5%), organic chemical compounds (7.2%) and inorganic chemical products (6.5%). Similar dynamics are observed in the import of products from Italy: for 2013–2019 purchases increased by 3% and trade restrictions by 13% in 2020 (by 2019), due to changes in the volume of purchases of drugs (-24%, or -211 million US dollars by 2013).

Imports of chemical industry products in 2013–2019 (excluding the pandemic year) to all countries as a whole increased by less than 1% (from 33.7 to 33.9 billion US dollars), while restrictive measures in the world led to a 13% (29.4 billion US dollars) reduction in imports to Russia (*Tab. 5*).

During 2013–2020 the bulk of imports of foreign chemical industry products fell on Moscow (60.4%, or 140.5 billion US dollars), the Moscow Region ranks second (9.3%), Saint Petersburg ranks third (5.5%). Thus, these three regions of the Russian Federation account for 75.2% of imports. However, Moscow's leadership in procurement is not related to the real need of its population for such a volume of products, but to the presence of logistics centers at the initial reception points for foreign goods.

In 2013–2019 imports to Moscow increased by only 2%, to 21.1 billion US dollars, while the coronavirus pandemic reduced this figure by 18%, to 17.3 billion US dollars. For all eight years,

Table 5. Structure of imports of chemical products to Russia in 2013–2020

| No.  | Country     | 2013        | 2014        | 2015        | 2016        | 2017        | 2018        | 2019        | 2020        | Total for 2013–2020, Billion USD | Share, %** | 2019 | 2020 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------------------|------------|------|------|
|  |             | million USD |             |             |             |             |             |             |             |                                  |            | fold |      |
| 1  | Germany     | 6090        | 5580        | 3870        | 3830        | 4580        | 4720        | 5510        | 4410        | <b>38.6</b>                      | 16.6       | 0.90 | 0.80 |
| 2  | France      | 3510        | 3200        | 2150        | 2260        | 2800        | 2720        | 2860        | 2170        | <b>21.7</b>                      | 9.3        | 0.81 | 0.76 |
| 3  | China       | 1860        | 1910        | 1760        | 1890        | 2350        | 2840        | 3000        | 3350        | <b>19.0</b>                      | 8.2        | 1.61 | 1.12 |
| 4  | USA         | 1970        | 1730        | 1650        | 1370        | 1640        | 1700        | 2260        | 1970        | <b>14.3</b>                      | 6.1        | 1.15 | 0.87 |
| 5  | Italy       | 1800        | 1540        | 1140        | 1230        | 1480        | 1560        | 1860        | 1620        | <b>12.2</b>                      | 5.3        | 1.03 | 0.87 |
| 6  | England     | 1470        | 1090        | 905         | 911         | 1140        | 1030        | 1130        | 839         | <b>8.5</b>                       | 3.7        | 0.77 | 0.74 |
| 7  | Switzerland | 867         | 855         | 705         | 741         | 832         | 1000        | 1390        | 1230        | <b>7.6</b>                       | 3.3        | 1.60 | 0.88 |
| 8  | Ukraine     | 1210        | 1200        | 861         | 595         | 776         | 1030        | 939         | 743         | <b>7.4</b>                       | 3.2        | 0.78 | 0.79 |
| 9  | India       | 984         | 881         | 689         | 701         | 902         | 883         | 1080        | 1040        | <b>7.2</b>                       | 3.1        | 1.10 | 0.96 |
| 10   | Belgium     | 999         | 983         | 729         | 750         | 855         | 810         | 851         | 740         | <b>6.7</b>                       | 2.9        | 0.85 | 0.87 |
| 11   | Netherlands | 1070        | 1040        | 704         | 661         | 739         | 710         | 783         | 678         | <b>6.4</b>                       | 2.7        | 0.73 | 0.87 |
| 12   | Kazakhstan  | 744         | 780         | 897         | 608         | 626         | 828         | 762         | 730         | <b>6.0</b>                       | 2.6        | 1.02 | 0.96 |
| 13   | Poland      | 1030        | 817         | 588         | 584         | 696         | 679         | 732         | 615         | <b>5.7</b>                       | 2.5        | 0.71 | 0.84 |
| 14   | Ireland     | 610         | 699         | 391         | 446         | 579         | 765         | 1070        | 1040        | <b>5.6</b>                       | 2.4        | 1.75 | 0.97 |
| 15   | Spain       | 670         | 709         | 503         | 538         | 676         | 712         | 747         | 625         | <b>5.2</b>                       | 2.2        | 1.11 | 0.84 |
| 16   | Hungary     | 781         | 666         | 488         | 469         | 610         | 528         | 555         | 450         | <b>4.5</b>                       | 2.0        | 0.71 | 0.81 |
| 17   | Slovenia    | 734         | 690         | 452         | 438         | 538         | 514         | 561         | 509         | <b>4.4</b>                       | 1.9        | 0.76 | 0.91 |
| 18   | Belarus     | 447         | 464         | 347         | 393         | 555         | 613         | 724         | 696         | <b>4.2</b>                       | 1.8        | 1.62 | 0.96 |
| 19   | Austria     | 595         | 488         | 283         | 308         | 383         | 406         | 467         | 380         | <b>3.3</b>                       | 1.4        | 0.78 | 0.81 |
| 20   | Australia   | 303         | 381         | 391         | 319         | 383         | 464         | 530         | 500         | <b>3.3</b>                       | 1.4        | 1.75 | 0.94 |
| <b>Total for 20 countries, billion USD</b> |             | 27.7        | 25.7        | 19.5        | 19.0        | 23.1        | 24.5        | 27.8        | 24.3        | <b>191.8</b>                     | 82.5       | 1.00 | 0.88 |
| <b>Total for the world, billion USD</b>    |             | <b>33.7</b> | <b>31.2</b> | <b>23.6</b> | <b>23.1</b> | <b>27.9</b> | <b>29.8</b> | <b>33.9</b> | <b>29.4</b> | <b>232.5</b>                     | 100.0      | 1.01 | 0.87 |
| Share, %*                                  |             | 82.3        | 82.4        | 82.6        | 82.4        | 82.9        | 82.3        | 82.0        | 82.8        | 82.5                             | x          | -0.3 | 0.7  |

\* Country's share in total imports of chemical products to Russia for 2013–2020.  
\*\* Share of 20 leading countries in imports of chemical products to Russia by year.  
Source: Import of chemical products from countries of the world to Russia. Available at: <https://ru-stat.su/date-Y2013-2022/RU/import/world/06>

negative dynamics were observed in pharmaceuticals (-28%, or -3.43 billion US dollars), essential oils, perfumes and cosmetics (-29%, or -850 million US dollars), as well as paints, varnishes and mastics (-36%, or -402 million US dollars). Imports of chemical products to the Moscow Region in 2013–2020 also showed a negative trend (-9%, to 2.94 billion US dollars) in the context of the same product groups as in the capital: pharmaceuticals (-25%, or -290 million US dollars), paints, varnishes (-24%, or -122 million US dollars) essential oils (-42%, or -137 million US dollars). Imports of other chemical products to Saint Petersburg decreased in the following areas: binders for the production of molds (-30%, or -36 million US

dollars), reaction initiators, accelerators, catalysts (-80%, or -19 million US dollars), activated carbon (-52%, or -13 million US dollars), anti-detonators and antioxidants (-81%, or -16 million US dollars), as well as rubber vulcanization accelerators (-47%, or -8 million US dollars). A 2.2-fold increase (from 346 to 758 million US dollars) in chemical products imports to the Irkutsk Region is associated with a twofold increase in purchases of inorganic chemistry products, namely artificial corundum and aluminum oxide (2.5-fold, or +354 million US dollars). The growth of organic chemical compounds amounted to 7.3 times (from 14 to 100 million US dollars). A 5% increase in imports to the Krasnoyarsk Territory (from 573 to 604

million US dollars) is also related to purchases of artificial corundum and aluminum oxide (+21%, or +85 million US dollars) due to the presence of large non-ferrous metallurgy corporations in the Irkutsk Region and in the Krasnoyarsk Territory – PJSC Rusal and PJSC Norilsk Nickel. The share of the remaining 15 regions in the import structure was at the level of 11.9%, and the total volume of purchases to these constituent entities of the Russian Federation in 2020 amounted to 3.56 billion US dollars (-10.3%).

Thus, aggregate imports of chemical industry products to 20 key regions increased by 1.63% in 2013–2019; and in 2020, due to sanitary restrictions, decreased to 26.7 billion US dollars (-14.1% of the 2019 level). The share of regions – key importers of chemical industry products among all RF constituent entities in 2013–2020 was about 90–92% (Tab. 6).

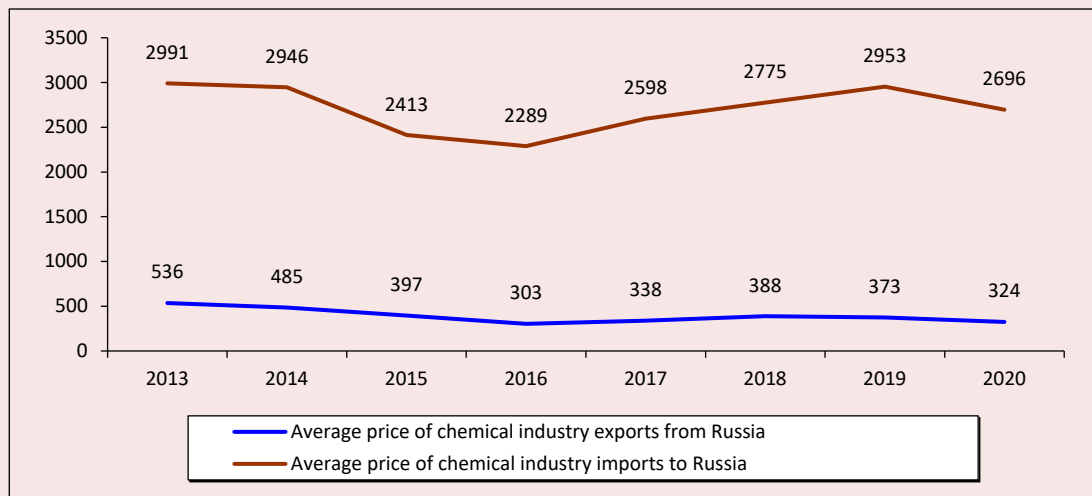
Touching upon the issue concerning the added value of imported and exported products of chemical industry, it is worth mentioning a significantly

Table 6. Structure of chemical products imports to Russia's regions in 2013–2020

| No.   | RF constituent entity     | 2013        | 2014        | 2015        | 2016        | 2017        | 2018        | 2019        | 2020        | Total for 2013–2020, billion USD | Share, %* | 2019 to 2013 | 2020 to 2019 |
|---|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------------------|-----------|--------------|--------------|
|   |                           | million USD |             |             |             |             |             |             |             |                                  |           | fold         |              |
| 1   | Moscow                    | 20600       | 19100       | 13400       | 14100       | 17100       | 17800       | 21100       | 17300       | <b>140.5</b>                     | 60.4      | 1.02         | 0.82         |
| 2   | Moscow Region             | 3220        | 2860        | 2120        | 2100        | 2660        | 2780        | 2950        | 2940        | <b>21.6</b>                      | 9.3       | 0.92         | 1.00         |
| 3   | Saint Petersburg          | 1900        | 1850        | 1390        | 1310        | 1510        | 1590        | 1590        | 1570        | <b>12.7</b>                      | 5.5       | 0.84         | 0.99         |
| 4   | Irkutsk Region            | 346         | 761         | 795         | 597         | 659         | 952         | 949         | 758         | <b>5.8</b>                       | 2.5       | 2.74         | 0.80         |
| 5   | Krasnoyarsk Territory     | 573         | 493         | 473         | 349         | 420         | 644         | 700         | 604         | <b>4.3</b>                       | 1.8       | 1.22         | 0.86         |
| 6   | Nizhny Novgorod Region    | 400         | 459         | 443         | 456         | 549         | 601         | 578         | 566         | <b>4.1</b>                       | 1.7       | 1.45         | 0.98         |
| 7   | Sverdlovsk Region         | 383         | 260         | 409         | 266         | 325         | 404         | 452         | 260         | <b>2.8</b>                       | 1.2       | 1.18         | 0.58         |
| 8   | Kaliningrad Region        | 364         | 308         | 256         | 212         | 270         | 317         | 340         | 238         | <b>2.3</b>                       | 1.0       | 0.93         | 0.70         |
| 9   | Republic of Khakassia     | 460         | 257         | 199         | 166         | 213         | 318         | 272         | 236         | <b>2.1</b>                       | 0.9       | 0.59         | 0.87         |
| 10  | Republic of Tatarstan     | 276         | 229         | 217         | 266         | 241         | 256         | 248         | 338         | <b>2.1</b>                       | 0.9       | 0.90         | 1.36         |
| 11  | Kaluga Region             | 126         | 158         | 109         | 161         | 283         | 282         | 406         | 355         | <b>1.9</b>                       | 0.8       | 3.22         | 0.87         |
| 12  | Leningrad Region          | 266         | 208         | 151         | 133         | 207         | 244         | 260         | 273         | <b>1.7</b>                       | 0.7       | 0.98         | 1.05         |
| 13  | Tomsk Region              | 257         | 276         | 449         | 141         | 165         | 117         | 187         | 108         | <b>1.7</b>                       | 0.7       | 0.73         | 0.58         |
| 14  | Samara Region             | 249         | 209         | 138         | 135         | 156         | 146         | 184         | 140         | <b>1.4</b>                       | 0.6       | 0.74         | 0.76         |
| 15  | Ryazan Region             | 168         | 201         | 133         | 183         | 178         | 148         | 127         | 212         | <b>1.4</b>                       | 0.6       | 0.76         | 1.67         |
| 16  | Belgorod Region           | 123         | 119         | 112         | 136         | 176         | 198         | 241         | 223         | <b>1.3</b>                       | 0.6       | 1.96         | 0.93         |
| 17  | Republic of Bashkortostan | 315         | 193         | 174         | 151         | 119         | 140         | 97.1        | 112         | <b>1.3</b>                       | 0.6       | 0.31         | 1.15         |
| 18  | Krasnodar Territory       | 168         | 170         | 139         | 137         | 164         | 159         | 166         | 195         | <b>1.3</b>                       | 0.6       | 0.99         | 1.17         |
| 19  | Tula Region               | 209         | 186         | 135         | 125         | 138         | 154         | 136         | 137         | <b>1.2</b>                       | 0.5       | 0.65         | 1.01         |
| 20  | Rostov Region             | 203         | 164         | 118         | 117         | 135         | 152         | 162         | 165         | <b>1.2</b>                       | 0.5       | 0.80         | 1.02         |
| Total for 20 RF constituent entities, billion USD |                           | <b>30.6</b> | <b>28.5</b> | <b>21.4</b> | <b>21.2</b> | <b>25.7</b> | <b>27.4</b> | <b>31.1</b> | <b>26.7</b> | <b>212.6</b>                     | 91.4      | 1.02         | 0.86         |
| Total for RF constituent entities, billion USD    |                           | <b>33.7</b> | <b>31.2</b> | <b>23.6</b> | <b>23.1</b> | <b>27.9</b> | <b>29.8</b> | <b>33.9</b> | <b>29.4</b> | <b>232.5</b>                     | 100.0     | 1.01         | 0.87         |
| Share, %**  |                           | 90.8        | 91.2        | 90.5        | 92.0        | 92.0        | 92.0        | 91.9        | 90.9        | 91.4                             | x         | 1.1          | -1.0         |

\* Region's share in total imports of chemical products to Russia for 2013–2020.  
\*\* Share of 20 leading regions in imports of chemical products to Russia by year.  
Source: Imports of chemical products to Russian regions. Available at: <https://ru-stat.su/date-Y2013-2022/RU/import/world/06>

Figure 2. Average price of export and import products of Russian chemical industry for 2013–2020, US dollars per ton



Source: own compilation.

higher price of import ton compared to export ton. At the same time, this difference increased in dynamics. Thus, in 2013, the price of products imported to the Russian Federation averaged 2,991 US dollars per ton, which is 5.6-fold higher than the cost of an export ton (536 US dollars per ton). However, by 2020, the difference between the price of import and export tons has increased to 8.3 times: imports – 2,696 US dollars per ton, exports – 324 US dollars per ton. A key contribution to the high cost of imports is made by expensive foreign pharmaceutical products, the average price of which is about 69.6 thousand US dollars per ton, i.e. 179 times more expensive than the average cost of exports. Thus, it is extremely important for Russia to focus on reducing dependence on foreign drugs (Fig. 2).

Since April 2022, Russia has become the leading supplier of nitrogen-phosphorus fertilizers to India, which should receive 350 thousand tons of diammonium phosphate fertilizers purchased at a reduced price of 920–925 US dollars per ton. Other Asian countries, for example Bangladesh, Indonesia and Thailand, indicate an average price

of 1,000–1,030 US dollars per ton in annual tenders for fertilizer imports, which is more profitable for Russia. However, the discount for India is due to larger shipments.

### Conclusions

Summing up our paper on the trends of export-import operations in Russia's chemical industry over an eight-year period (2013–2020) let us briefly list the main results obtained.

1. Over eight years 374.3 million tons of products worth 145.5 billion US dollars were exported, while 44% were mineral fertilizers (64.2 billion US dollars / 257.6 million tons), 19.7% – inorganic chemistry products (28.7 billion US dollars / 56.8 million tons), 19.3% – organic chemical compounds (28.1 billion US dollars / 47 million tons).

2. Top five countries which imported Russia's products during this period included Brazil (8.9% / 12.9 billion US dollars), Ukraine (8.7% / 12.7 billion US dollars), China (6.6% / 9.55 billion US dollars), Finland (6.3% / 9.13 billion US dollars) and Kazakhstan (5.8% / 8.47 billion US dollars). However, export growth was noted only

in Kazakhstan (+16%), while supplies to Ukraine decreased the most (-72%).

3. Chemical products imports to Russia over the same period amounted to 232.5 billion US dollars (85.6 million tons). The following products: pharmaceuticals (39.2%, 91.2 billion US dollars); organic compounds (12.2%, 28.4 billion US dollars) and inorganic chemistry products (11.2%, 26.1 billion US dollars) had the greatest share in the structure of chemical products imports to the Russian Federation. The main countries exporting products to Russia were Germany (16.6% / 38.6 billion US dollars); France (9.3% / 21.7 billion US dollars); China (8.2% / 19 billion US dollars); USA (6.2% / 14.3 billion US dollars) and Italy (5.2% / 12.2 billion US dollars).

4. Analysis of the pricing policy indicates a decrease in the price of exported products (by 40%, to 324 US dollars per ton), which is a negative trend, and a decrease in the cost of imported products (by 10%, to 2,696 US dollars per ton), which is a positive trend.

5. Foreign trade activity of Russian chemical industry was characterized by a consistently negative trade balance due to exports of cheap low-cost products, which were estimated to be 5–8 times cheaper than imports on average per ton, and

imports of expensive products with high added value. While the most expensive commodity item imported into the Russian Federation was pharmaceutical products, the average cost of which was 168–265 times higher than the price of the average export ton of Russian goods.

The results confirm the hypothesis of the study and indicate that Russia is exporting low-cost primary processing products on a system-wide basis, thus weakening the export-import potential of Russian chemical industry development. Reorientation of export and import commodity flows of the chemical industry from European countries to Asian markets, primarily China and India, is clearly demonstrated. The problem of low added value of Russian exports in comparison with the value of imported goods has also been identified.

The conclusions obtained can be useful in designing strategic guidelines for the development of Russian chemical industry, in scientific research of foreign trade in certain industries, and in educational process at educational institutions.

Promising aspects of the study are to investigate import substitution capacity of chemical industry products that are important for Russia, the possibility of using raw materials efficiently and preserve added value within the economy.

## References

- Bogachev A.I., Dorofeeva L.N. (2022). The Russian market of mineral fertilizers: Features of functioning in new realities and metamorphoses of development. *Vestnik OrelGAU*, 3(96), 78–92 (in Russian).
- Butsenko I.N., Ilyasova Yu.V., Kozhukhova N.N. (2017). Russia's foreign trade in chemical industry products: Trends, problems, prospects. *Rossiiskoe predprinimatel'stvo=Russian Entrepreneurship*, 4, 501–514 (in Russian).
- Chen Y., Jiang J., Wang L., Wang R. (2023). Impact assessment of energy sanctions in geo-conflict: Russian–Ukrainian war. *Energy Reports*, 9, 3082–3095.
- Clichici D., Iordachi V. (2019). Trade relations of the Republic of Moldova with the Russian Federation: From dependence to export reorientation. *Global Economic Observer*, 7(1), 28–36.
- Cormann M., Boone L. (2022). *Economic and Social Impacts and Policy Implications of the War in Ukraine*. Available at: <https://www.oecd-ilibrary.org/sites/4181d61ben/index.html?itemId=/content/publication/4181d61b-en> (accessed: March 26, 2022).
- Johnston R. (2022). *Supply of Critical Minerals amid the Russia-Ukraine War and Possible Sanctions*. Columbia SIPA Center on Global Energy Policy.



- Logina M.V., Rodygina N.Yu., Musikhin V.I. (2021). Development of Russian exports of pharmaceutical industry products to India. *Obrazovanie i pravo=Education and Law*, 3, 186–208 (in Russian).
- Malyshev M.K. (2021a). Assessing finance interaction of chemical industry corporations with state. *Vestnik Rossiiskogo ekonomicheskogo universiteta imeni G.V. Plekhanova=Vestnik of the Plekhanov Russian University of Economics*, 18(6)(120), 112–125. DOI: 10.21686/2413-2829-2021-6-112-125 (in Russian).
- Malyshev M.K. (2021b). The role of chemical corporations in the formation of territorial budgets. *Voprosy territorial'nogo razvitiya=Territorial Development Issues*, 9(1). DOI: 10.15838/tdi.2021.1.56.4 Available at: <http://vtr.isert-ran.ru/article/28842> (in Russian).
- Ovod A.I., Solyanina V.A., Nozdracheva E.N., Pasechko V.V. (2023). Export-import operations in the field of drug supply in Russia. *ANI: ekonomika i upravlenie*, 1(42), 88–92 (in Russian).
- Provorova I.P., Zhemerikin O.I. (2020). The results of import substitution in the chemical complex of Russia. *Bol'shaya Evraziya: razvitie, bezopasnost', sotrudnichestvo=Greater Eurasia: Development, Security, Cooperation*, 3-1, 374–377 (in Russian).
- Razgulina E.D. (2015). Impact of the work of the largest chemical enterprises on regional economic development. *Problemy razvitiya territorii=Problems of Territory's Development*, 6(80), 73–92 (in Russian).
- Razgulina E.D., Barabanov A.S. (2014). The influence of the largest enterprises of the chemical industry on regional development. *Izvestiya vysshikh uchebnykh zavedenii. Seriya: Ekonomika, finansy i upravlenie proizvodstvom*, 2(20), 146–152 (in Russian).
- Savelieva N.K., Sozinova A.A., Ganebnykh E.V. et al. (2022). Prospects for import substitution in small-tonnage chemistry. *Zhurnal prikladnykh issledovaniy=Journal of Applied Studies*, 3, 59–64 (in Russian).
- Shirokova E.Yu. (2021). Chemical industry as an economic growth driver of the country and the region. *Problemy razvitiya territorii=Problems of Territory's Development*, 2, 59–72 (in Russian).
- Smagulova S.M., Fetisova L.Yu. (2023). The impact of anti-Russian sanctions on the foreign trade activities of enterprises of the Russian chemical industry. *Innovatsii i investitsii=Innovations and Investments*, 7, 406–409 (in Russian).
- Volkov S.N., Konstantinova O.V. (2023). African continental integration – a new step towards a multipolar world. *Vestnik RUDN. Seriya: Mezhdunarodnye otnosheniya*, 1, 157–167 (in Russian).
- Weremczuk A., Malitka G. (2022). Influence of changes in the prices of fertilizers and fuels on the profitability of production of selected agricultural crops. *Problems of World Agriculture/Problemy Rolnictwa Światowego*, 22(1827-2022-1209), 43–55.
- Yui X. (2022). The economic effects of the sanctions imposed on the Russian Federation. *Yearbook of European Union and Comparative Law*, 1(1), 234–264.
- Zvorykina Yu.V., Tikhonova A.A. (2022). Chemical companies under current market conditions. *Rossiiskii vneshneekonomicheskii vestnik=Russian Foreign Economic Journal*, 6, 90–98 (in Russian).

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