Andrew Fink

Vulnerabilities in the Russian Chemical Industry

for the DeKleptocracy Project

DKP

Feb 2026

Table of Contents

Key Findings

01/ There are key vulnerabilities in the Russian chemical sector related to rubber, refining, lubricants, and plastics production, among others.

02/ Most Russian enterprises that previously relied on chemical inputs from Europe, America, or other countries that support Ukraine have switched to Chinese providers. China appears to be able to replace almost any chemical industry input from Europe or North America, with some important exceptions.

03/ Russia has serious vulnerabilities in its rubber / tire production sector, mostly related to the supply of vulcanization accelerator and anti-scorching chemicals. The Italian company Pirelli still plays an important role in Russian rubber / tire production, and a Pirelli-owned factory may be currently producing or assisting in the production of tires for the Russian military.

04/ The Bashkir Soda Company, a major Russian chemical enterprise involved in Russian military production, is continuing to import European chemical inputs via the UAE.

05/ Starting in late December 2023, Russia has been manipulating its import data related to catalysts, and has progressively shut off information about different kinds or sources of catalysts, before totally cutting off information from bills of lading in October 2024.

06/ Russia is dependent on exporters in India and China for catalysts related to oil refining.

07/ The Russian state is aware of its weaknesses in the chemical industry and launched a national-level project in 2025 to build up this sector and reduce its dependence on imported inputs.

Summary of Recommendations

01/ Add lubricant additives and lubricant additive packages, precious metal catalysts, oil refining catalysts (including hydrotreating and hydrocracking catalysts), polyethylene catalysts, natural rubber, rubber vulcanization accelerators and other rubber-related chemicals to the Treasury Department determination Regarding Certain Items or Class of Items of December 22, 2023, pursuant to E.O. 14024, Sec. 11 (a)(ii) (1). Currently, any foreign financial institution that conducts or facilitates the export of items on the list into Russia is potentially subject to sanctions.

02/ Explicitly add, by name, all entities on the leaked 2025 “OPK list” of all 6,088 enterprises that supply the Russian military or military industry, to US Sanctions lists to enable their effective screening by due diligence systems. This should include ostensibly civilian enterprises like the Bashkir Soda Company.

03/ Sanction Russian rubber and tire producers, especially any that have known connections to military production such as Balakovorezinotekhnika. Non-Russian producers of specialty rubbers such as ethylene propylene diene monomer (EPDM) should be educated about its possible role in Russian military production.

04/ Intelligence agencies, investigative researchers, and allied governments should be extra vigilant for secret shipments of oil refining catalysts to Russia. The chinese company Haihua and its subsidiaries may be a candidate for sanctions or other trade-control measures. The Indian company Reliance Industries, revealed to have been a major provider of oil refining catalysts to Russia, might be influenced to halt its exports of oil refining catalysts to Russia. Ukrainian allies should communicate with Reliance and other manufacturers of oil refining catalysts, and threaten them with sanctions if they continue exports to Russia.

05/ Threaten sanctions on the Chinese company the Xinxiang Richful Lubricant Additive Co., Ltd., to include loss of access to Western export markets, if it does not immediately cease export of lubricant additive packages to Russia. Increase surveillance of Richful and of the Chinese lubricant additive trade.

Introduction

When most American analysts discuss sanctions, trade controls, and other actions to punish Russia for aggression or degrade its ability to make war, they tend to focus on either high-technology electronics (such as advanced computer chips) or sometimes minerals (e.g. rhenium or lithium). However, Russia is well-endowed with minerals (and has many access points to major miners or refiners of minerals in China and Central Asia). Significant resources have been put into blocking high-technology electronics from reaching Russia, with some effect, but unfortunately many high-technology electronics items are quite small and openly available in China, where Russians can buy them off-the-shelf.

There has been relatively little attention paid to the Russian chemicals sector. In the author's opinion, the two main reasons for this inattention appear to be 1. Russia is very well-endowed with some major feedstocks for chemical synthesis (such as natural gas and oil) and has several industrial chemical giants that have cheap and easy access to this raw material; and 2. Many of the products of the chemical industry are considered "low tech" products that anyone can produce and are therefore undeserving of attention: synthetic rubber, additives for mechanical lubricants, PVC, etc.

Both of these attitudes are mistaken. Russia does have an enormous amount of feedstock for chemical enterprises, but it sorely lacks many of the precursor chemicals or other technologies needed to transform these feedstocks into actual instruments of war. As for the "low tech" nature of the major outputs of the chemical industry – this may be partially true for some substances, but for many others producing them at scale still requires significant industrial know-how, know-how that Russia lacks.

This research project is an attempt to partially close this analytic gap. The chemical industry is known as the "industry of industries" because it is upstream of many final products. The case studies selected for this report are examples of when major Russian enterprises which produce large volumes of some important chemical or product are still dependent on imported chemical precursors, precursors which might be disrupted or degraded. This study takes an imported-input-centric approach to studying the Russian chemical industry, and combines information from bills of lading with public Russian information about major chemical enterprises, particularly ones that have a nexus with Russian military production. By identifying these enterprises and their suppliers and observing from where they source their imported inputs, and how their import patterns changed over time, analysts can shed light on potential vulnerabilities that could be exploited by sanctions or trade controls.

Even if one cannot halt the import of certain chemicals to Russia, degrading the quality, quantity, or even just the reliability of delivery of important chemicals could have significant knock-on effects to other areas of Russian industry. These knock-on effects may not be sudden or dramatic, but they could be significant. For example, imagine if a decline in the quality of additives for Russian mechanical lubricants could decrease the efficiency of Russian engines by 10%. On the one hand, this is hardly a war-winning change. On the other hand – a 10% decrease in efficiency would have serious, though initially subtle, effects on Russian logistics and combat power, with Russian military units going through more fuel, spare parts, and replacement engines.

In this study special attention was given to how these sourcing patterns changed due to many European and some Asian businesses pulling out of Russia after its massive invasion of Ukraine in 2022. While the general pattern observed is a rapid switch to Chinese suppliers after February 2022, this is not always the case, and Chinese enterprises have their own exploitable weaknesses. They are sometimes themselves dependent on inputs from Ukrainian allies, or must export to the US and Europe to remain profitable, and are vulnerable to sanctions and trade restrictions themselves. Furthermore, Chinese inputs may be at a lower quantity or quality than Russian military industry requires, or in any case would usually have to be transported (probably via rail) across large distances to reach the Russian enterprises that require them. This alone would put larger demands on Russian railways, increase transport costs, and possibly expose Chinese firms to international sanctions, which may dampen their enthusiasm to trade with Russia.

In addition to describing Russian industrial weaknesses in the Chemical sector, this report will occasionally make interventions, with the heading of either “Recommendation”, describing actions that the US or other allied governments could take immediately to harm Russia’s war effort, or “Missed Opportunity” describing sanctions or trade-control actions that could have been taken by Ukraine’s allies at an earlier date, and which may have harmed Russia’s ability or determination to make war. The use of “Missed Opportunity” should not imply that these actions have not already been contemplated by Ukrainian-allied governments. They may have already been considered and rejected for a variety of reasons, such as fear of retaliation or difficulty in enforcement, reasons that the author of this report is ignorant of.

Data Sources

The core of the input-centric analysis in these case studies is from bill of lading data. With a few exceptions, all the bill of lading data used in the creation of the charts and figures in this report are from Import Genius. Anyone should be able to get a subscription to Import Genius or other data providers who provide Russian bills of lading and recreate the charts in this report. When this report references data tables, it uses a source number in the thousands, such as “Source 10003”. If you would like to see the data please contact us, preferably via the Substack account of our associated 501(c)(4): @dekleptocracy, and we may be able to provide you with a copy of the relevant underlying data.

In addition to analysis from this data that is accessible by subscription, this study uses only publicly-available data from the internet, to include news reports, Russian public tax data and official documents, and trade publications.

This study was gifted with two recently-available Russian information sources that had a significant impact on the research and guided the selection of targets:

01/ The “OPK List”: A leaked list of enterprises involved in the Russian military-industrial complex (оборонно-промышленный комплекс – acronym “OPK”) maintained by the Russian ministry of Industry and Trade. The Russian dissident organization the Dossier Center publicized this list in the spring of 2025. It includes 6,088 enterprises, identified by official name and Russian tax ID number. It appears to be genuine. This list significantly simplified the task of identifying if a Russian chemical enterprise, or one of its customers, is involved in Russia’s war effort.

02/ The Russian “Priority Chemical List”: a list released by the Russian Agency for Technological Development (ATD) as part of a grant program for the Russian national project “New Materials and Chemistry”. This grant program offers up to 150 million rubles for enterprises attempting to create specific chemicals within Russia. The chemicals included on the list give important indicators about the kind of chemicals that the Russian government and industry is worried about. Some of the items included on this list are specific brands of chemicals produced by Western and Japanese companies. A translation of the latest version of this list is included in an appendix at the end of this report.

The Russian “New Materials and Chemistry” Project

The new Russian national project “New Materials and Chemistry”, where the Priority Chemical List comes from, was first announced in late 2024. It is a strong indicator that the Russian leadership is aware of its chemical industry vulnerability. This project, launched in January 2025, is an attempt to re-invigorate Russia’s rare earth and chemical industries and eventually, according to Minister of Industry and Trade Anton Alikhanov, reach “100% technological independence in the chemical sector and in the new materials production sphere.”(2) On the chemical industry side, the national project emphasizes smaller-scale chemical production, i.e. the production of specialized chemicals, precursors, and catalysts that have a role to play in subsequent much larger-tonnage production.(3) Again, Russia has ample feedstock and very large enterprises, what it must import are things like the catalysts that can turn these feedstocks into actual useful products. As Russian President Putin put it when he announced the New Materials and Chemistry project in 2025:

> “***Catalysts also represent a cross-cutting priority. These are indeed the very foundation of chemistry – substances that determine reaction rates. It is imperative to ensure not only their development, but also subsequent testing, pilot production, and ultimately the broad industrial utilisation and scaling-up of domestic solutions.***(4)”

In an event later in 2025 connected to the “New Materials and Chemistry” project Eduard Davydov, the General Director of the Bashkir Soda and of the Roskhim, gave a short history of the Soviet/Russian chemical industry: The “golden age” of Soviet chemistry was in the 60s and 70s, but Russia’s “low volume” chemistry production was destroyed after the collapse of the USSR, and without low-volume chemistry production Russia cannot achieve independence.(5)

The “New Materials and Chemistry” project is supposed to create 55 “critically important process chains” by 2030 with 2 trillion rubles of total funding (about USD $25 billion), 75% of which comes from “extra-budgetary sources” (i.e. from the coffers of state enterprises).(6) By initiating this project, the Russian state has not only given an unmistakable signal that their chemical industry is in trouble, in the materials related to the project they are also providing interesting clues about what, exactly, parts of the chemical industry the government is most worried about. In addition to disrupting inputs related to military production, by denying or degrading Russia’s attempt to re-tool and re-start their chemical industry and linking this activity to Russia’s invasion, Ukrainian allies can increase Russia’s long-term cost of aggression and help deter similar aggression in the future. If Russia does not want to become a satrapy of China, especially with regards to the chemical industry, its choice may be between re-integrating with the Euro-Atlantic world and eventual de-industrialization.

This report was drafted before the start of hostilities between Iran and the US and Israel. The massive changes in the global petrochemical industry as the result of this conflict, to include likely disruption in the chemical supply chains from the UAE to Russia, are not addressed in this research.

The Rubber / Tire Industry

Out of the 99 items on Russia's 2025 priority chemical list, 23 of them are connected to the production of rubber and/or tires. They include vulcanization accelerators, silicon fillers, and chemicals to prevent rubber from degrading. This disproportionate emphasis prompted a closer look at Russian enterprises related to rubber in this study, especially the tire industry. Russia is a major producer of synthetic rubber, but not all rubber, or all synthetic rubber, is created equal. Without the proper vulcanization accelerators, other chemicals, polymer ropes, and even certain grades of synthetic rubber which Russia does not produce at a sufficient scale, Russian industry may have difficulty satisfying its military needs for tires, sealants, gaskets, and other essential components of modern military equipment.

On the one hand, Russia should be relatively insulated from threats to its rubber industry emanating from the US and its allies, as Russia's ally China is the global leader in producing rubber-related chemicals, including various kinds of vulcanization accelerators.(7)(8) Part of the motivation for including these chemicals on the priority chemical list may not rise from strategic concerns, but from business concerns. Several well-connected Russian companies recently took over tire-manufacturing operations in Russia that were abandoned by Western companies in 2022. Tatneft, for example, took over the large Russian operations of the Finnish tire maker Nokian. Tatneft may be looking for cheaper, Russian-made alternatives to chemicals formerly sourced abroad by the much better supply chains of Nokian, and is using this priority chemical list as an attempt to generate some local alternatives.(9) On the other hand, there may be particular rubber-related chemicals that cannot be sourced in China, or cannot be sourced reliably and at a reasonable cost, or that might conceivably be restricted by Chinese fears of Western sanctions.

Recommendation: *Despite Chinese strength in this industry, the US Treasury may consider adding vulcanization accelerators and other rubber-related chemicals, including natural rubber, to its Regarding Certain Items or Class of Items of December 22, 2023, pursuant to E.O. 14024, Sec. 11 (a)(ii).(10) Any foreign financial institution that conducts or facilitates the export of items on the list into Russia, which currently includes advanced machine tools, turbine lubricants, and high-precision ball bearings, is potentially subject to sanctions. As vulcanization accelerators and other rubber-related chemicals are important inputs for tires, including tires for armored cars and military transport trucks, as well as other rubber items in military equipment, adding them to the list and threatening and imposing sanctions on firms, even Chinese firms, that help Russia source these chemicals could degrade Russia's ability to wage mechanized warfare.*

One commodity that Russia requires for several types of rubber production, but cannot source within Russia, is natural rubber. This is a globally traded commodity, though, and it may not be practical to attempt to sanction or interdict Russia's providers of natural rubber. In any case, as it is an agricultural product, it is not in the scope of this study, but threatening sanctions to providers and traders of natural rubber that trade with Russia may also have an effect on Russia's rubber-related military production.

A search through exporters of vulcanization accelerators to Russia since 2022 did not reveal any easily-interdicted non-Chinese suppliers that could have a strategic effect. However, the review did reveal two potential leverage points for sanctions or other trade-related activity, which are not directly related to vulcanization accelerators. The remainder of this section will take a closer look at these two Russian enterprises involved in the production of rubber items, both with military links: the Russian subsidiary of the Italian tiremaking giant Pirelli and the rubber component manufacturer Balakovorezinotekhnika.

In the first case, getting Pirelli to finally exit Russia may disrupt Russia's ongoing production of military items that are likely taking place at Pirelli's Russian plant. While Pirelli's departure may not permanently disable Russia's access to rubber-related chemicals currently sourced from Pirelli, it would still cause a temporary disruption and possibly deprive Russia of long-term intellectual property and expertise in tire manufacturing. In any case, Pirelli's ongoing activities in military-related production since 2014 represent a major overlooked area where sanctions or other trade-related actions could have impacted the Russian war machine much earlier, if more analytical efforts and political capital had been invested.

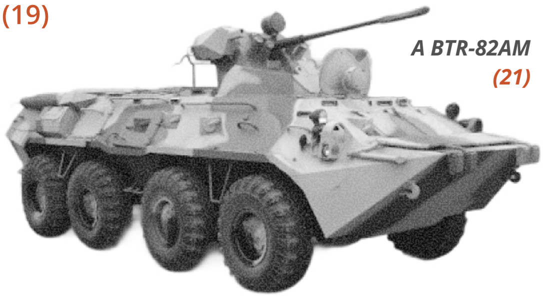
In the second case, it appears that the Russian military-related rubber component manufacturer Balakovorezinotekhnika is dependent on imports of a specific kind of synthetic rubber from South Korea. Asking the South Korean authorities to end this trade could have an immediate effect on Russia's ability to manufacture rubber items for its military.

Pirelli's Continuing Production in Russia

There was a massive drop in Russian tire imports from Europe, Japan, and Korea and a climb in imports from China, following the 2022 invasion.(11) Russia has a significant internal tire manufacturing base, and in the years between the fall of the USSR and the 2022 invasion, several large Western and Asian tire firms moved into the Russian tire manufacturing market. After February 2022, most foreign firms that had set up operations in Russia, like Michelin and Bridgestone, pulled out, with one notable exception - Italy's tire giant Pirelli.(12)(13)

Pirelli entered the Russian tire manufacturing market in 2010, after it signed a joint agreement on technology collaboration and tire production with SIBUR and Rostec, Russia's main state-owned defense and high technology holding company.(14) At present, Pirelli's main corporate vehicle in Russia is "Pirelli Tire Russia", which is only 65% owned by Pirelli (via its South African Subsidiary). As of September 2025, the rest of Pirelli Tire Russia is held by "Panaland" (10%), an obscure company previously linked to an anonymous Cyprus company, and the Scientific Research Institute of Rubber and Polymer Products (JSC NIIR) (25%), a subsidiary of Rostec.(15)

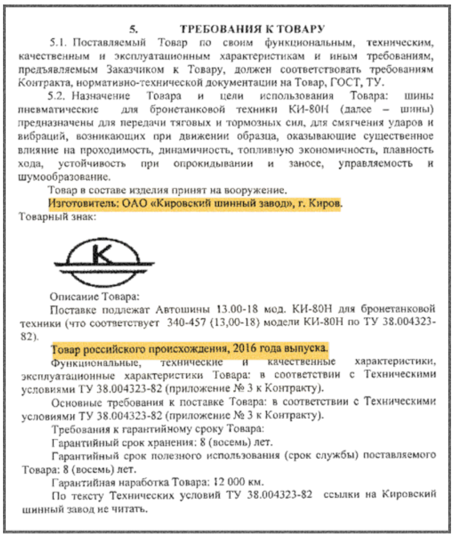
Through Pirelli Tire Russia, Pirelli and Rostec jointly purchased the Kirov Tire Plant (KShZ) in 2011 and the Voronezh Tire Plant in 2012.(16)(17) The KShZ was founded during WWII to provide tires for the Soviet military.(18) Despite the claim that the Kirov Tire Plant has "undergone a successful conversion from the defense sector," there are ongoing indications that the plant, or a division of the plant, continues to produce tires for the Russian military and security services.(19)



A BTR-82AM (21)

Based on surviving publicly available business records, Pirelli Tire Russia created the entity, the "Kirov Tire Factory" (Кировский Шинный Завод - Russian tax ID 4345300838) in 2011.(20) This corporate entity participated directly in at least one public tender for military vehicle tires.

In 2016, the Russian Ministry of Defense ordered 2,584 KI-126 tires as part of a project to modernize Russian BTR-80 armored cars to the new BTR-82AM version.(22) KI-126 tires are special bullet-proof cross-country tires for use on heavy military vehicles, like BTRs.(23)(24) The supplier for this contract was the "AMTEL Investment Company", but a public tender document makes clear that the tires would actually be produced at the Kirov Tire Factory, owned by Pirelli Tire Russia.



5. ТРЕБОВАНИЯ К ТОВАРУ

5.1. Поставляемый Товар по своим функциональным, техническим, качественным и эксплуатационным характеристикам и иным требованиям, предъявляемым Заказчиком к Товару, должен соответствовать требованиям Контракта, нормативно-технической документации на Товар, ГОСТ, ТУ.

5.2. Назначение Товара и цели использования Товара: шины пневматические для бронетанковой техники КИ-80Н (далее – шины) предназначены для передачи тяговых и тормозных сил, для смягчения ударов и вибраций, возникающих при движении образца, оказывающие существенное влияние на проходимость, динамичность, топливную экономичность, плавность хода, устойчивость при опрокидывании и заносе, управляемость и шумообразование.

Товар в составе изделия принят на вооружение.

Изготовитель: ОАО «Кировский шинный завод», г. Киров.

Товарный знак:

Описание Товара:

Поставке подлежат Автошины 13.00-18 мод. КИ-80Н для бронетанковой техники (что соответствует 340-457 (13,00-18) модели КИ-80Н по ТУ 38.004323-82).

Товар российского происхождения, 2016 года выпуска.

Функциональные, технические и качественные характеристики, эксплуатационные характеристики Товара: в соответствии с Техническими условиями ТУ 38.004323-82 (приложение № 3 к Контракту).

Основные требования к поставке Товара: в соответствии с Техническими условиями ТУ 38.004323-82 (приложение № 3 к Контракту).

Требования к гарантийному сроку Товара:

Гарантийный срок хранения: 8 (восемь) лет.

Гарантийный срок полезного использования (срок службы) поставляемого Товара: 8 (восемь) лет.

Гарантийная наработка Товара: 12 000 км.

По тексту Технических условий ТУ 38.004323-82 ссылки на Кировский шинный завод не читать.

Scan from page 7 of the contract no. 1770425226116001155 for the Russian Ministry of Defense for the supply of 2,584 KI-126 tires for armored vehicles, dated 20 September 2016. The manufacturer ("изготовитель") is clearly the Kirov Tire Factory, which was then-owned by Pirelli Tire Russia. Note that the tires were made in 2016 (25)

This curious shell game, where an investment company satisfies a military tender but the manufacturing is conducted by a company that is majority-foreign owned, might make sense as an exercise in legal/bureaucratic work-arounds, allowing a non-defense company to produce tires for the military. However it is probably a method to enable the plant to receive technology and chemicals from abroad from Pirelli Tire Russia, without drawing attention to the fact that it was, in fact, supporting the Russian military.

The Kirov Tire Factory does not appear on the 2025 Russian "OPK" list of all defense-related enterprises. The Russian OPK does list the "Territorially separate structural division 'Kirov Tire Plant' of JSC 'Scientific Research Institute of Rubber and Polymer Products', Kirov"(26) as a provider to the Russian military, and its website offers a number of tires for sale that are suitable for military transport vehicles.(27) However, the Scientific Research Institute of Rubber and Polymer Products (Russian acronym: NIIR) is a research institution, not a manufacturer, and has only about 80 employees officially- though this may only refer to staff in Moscow.(28) Compare this to the 1225 employees claimed by the Pirelli. Tire Russia-owned entity "Kirov Tire Production Complex", the latest corporate entity that appears to manage the Kirov Tire Factory.(29) The NIIR continues to post jobs for tire manufacturers, but it appears that these jobs are co-located with the Pirelli Tire plant, and the division between the companies may be a fiction. Most importantly, NIIR does not import anything, not vulcanization chemicals, not equipment, not anything.

A recent arbitration case in Russia demonstrated the closeness of the Russian military supplier the NIIR and the factory owned by Pirelli Tire Russia. According to the 2022/23 case no A28-7344/2022 of the Second Appellate Arbitration court in Kirov, the Kirov tire plant made a complaint that their provider of steam for heating, a Russian company named PAO T Plus, let the steam pressure fall on two occasions in November 2021 and in April 2022. In the November 2021 incident this drop in steam pressure led to a drop in temperature at a workshop of the Kirov Tire Plant, which disrupted the vulcanization process of two KI-80N tires. These tires are used on Russian BTR armored cars.(30) The Kirov Tire Plant demanded a total of 40,714 rubles in damages.

In the April 2022 incident (which took place after the full-scale invasion of Ukraine by Russia), there was, again, a drop in steam pressure in a workshop of the Kirov Tire plant, which, again, resulted in the interruption of the vulcanization process of a VI-203 tire cover, two KI-126 tire covers, a VI-203 inner tube, and a KI-80N spacer ring, valued in total at 150,134 rubles.

The plantiff entity Kirov Tire Plant was replaced with NIIR based on an order of the Kirov Arbitration Court in February 2023. In any case, the steam supply company T Plus refused to pay the damages requested, as they argued they had no contractual relationship between the Kirov Tire Plant or NIIR. Their contract to supply steam was with PK Kirov Tire, the entity owned by Pirelli Tire Russia. In the end, the arbitration court decided that the steam provider had to pay. Even if this court case maintained the idea that NIIR and PK Kirov Tire are separate entities – with one producing military items and the other just nearby, it establishes that the two institutions are so close that the production of military tires on the site uses the same heating system as the one owned by the facility of Pirelli Tire Russia.

In sum, at the very least, we have the manufacturing facility of a major European tire maker co-located with, and probably working with, a manufacturer of tires for the Russian military. Its business partner and part-owner of Pirelli Tire Russia, NIIR, is a manufacturer of tires for the Russian military and a subsidiary of Rostec.

Missed Opportunity: *All corporate public partners of Rostec, to include Pirelli Tire Russia, should have been identified and warned/sanctioned at an early date, long before 2022. This activity of Pirelli appears to have slipped by mostly unnoticed, possibly because tires/rubber production are not considered "high tech", even though they are of great importance to mechanized warfare.*

Pirelli Tire Russia Imports Case Study – "OT 33"

The pattern of imports for these three entities is even more interesting. The KShZ has not imported anything since 2019, while the NIIR appears to have never imported anything. Where are these entities getting their vulcanization accelerators, natural rubber, tools, and other key inputs? It is possible they get essential chemicals and tools from Russian secondary markets, but it is more likely they can source them from Pirelli Tire Russia.

Pirelli Tire Russia has been importing briskly since February 2022. Pirelli Tire Russia is an importer of a variety of vulcanization accelerants, including N-tert-butyl-2-benzothiazole sulfenamide (TBBS), which is No. 9 on the Priority Chemical List. In recent years, Pirelli Tire Russia primarily sourced its TBBS from China, and entirely from China since March 2022.(31) It also imports various other vulcanization accelerators, mostly from China, though it does continue to import Hexamethylenetetramine (HMT) from Brazil.(32)

A closer examination of Pirelli Tire Russia's Import records shows that it is getting its natural rubber from Pirelli Tires Romania. It imports other accelerators (Methenamine, possibly others) from Pirelli's Brazilian subsidiary.(33)

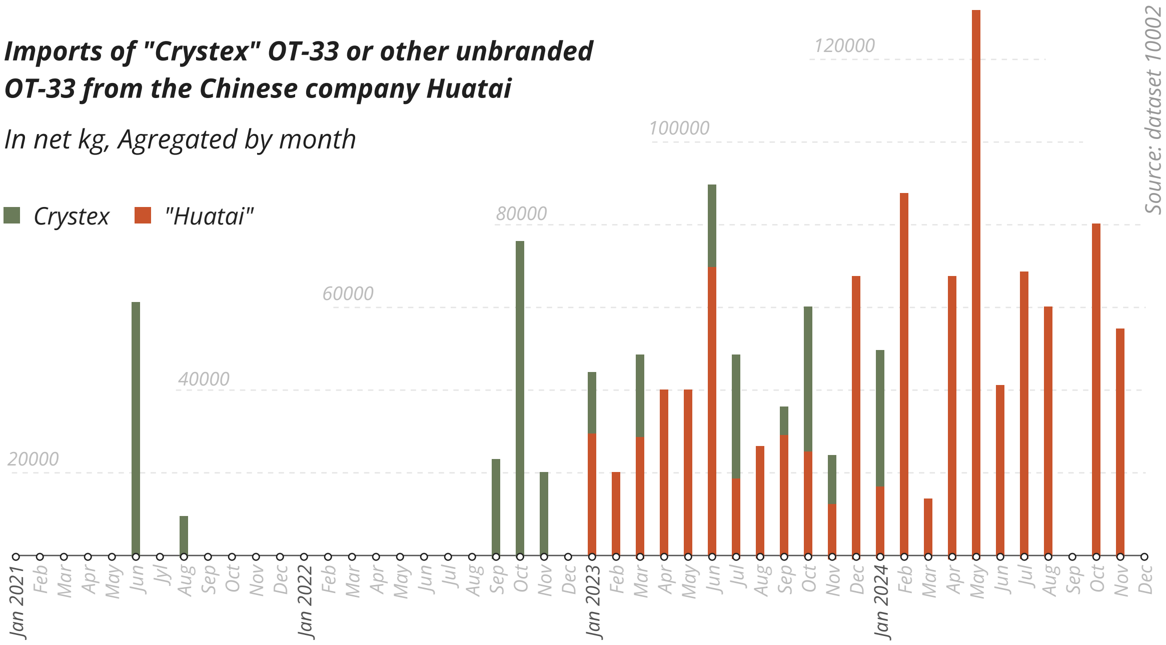
Before 2022, Pirelli Tire Russia imported significant quantities of the chemical Crystex OT-33 AS, an oil-treated insoluble sulfur vulcanizing agent produced by the US company Flexsys of Akron, Ohio, a major global player in the rubber chemicals space.(34)(35)(36) The "OT" stands for "oil treatment" and the "33" appears to represent what percentage of the product is made of oil.(37)(38)(39)

In industrial processes for making tires or other rubber products, insoluble sulfur is mixed with rubber, but it does not dissolve into the rubber. This means that sulfur does not build up on the surface of uncured rubber, as soluble sulfur tends to do, which results in a phenomenon called sulfur "bloom", which makes it difficult to form multi-ply rubber products that use different rubber layers - like tires.(40)(41)(42)

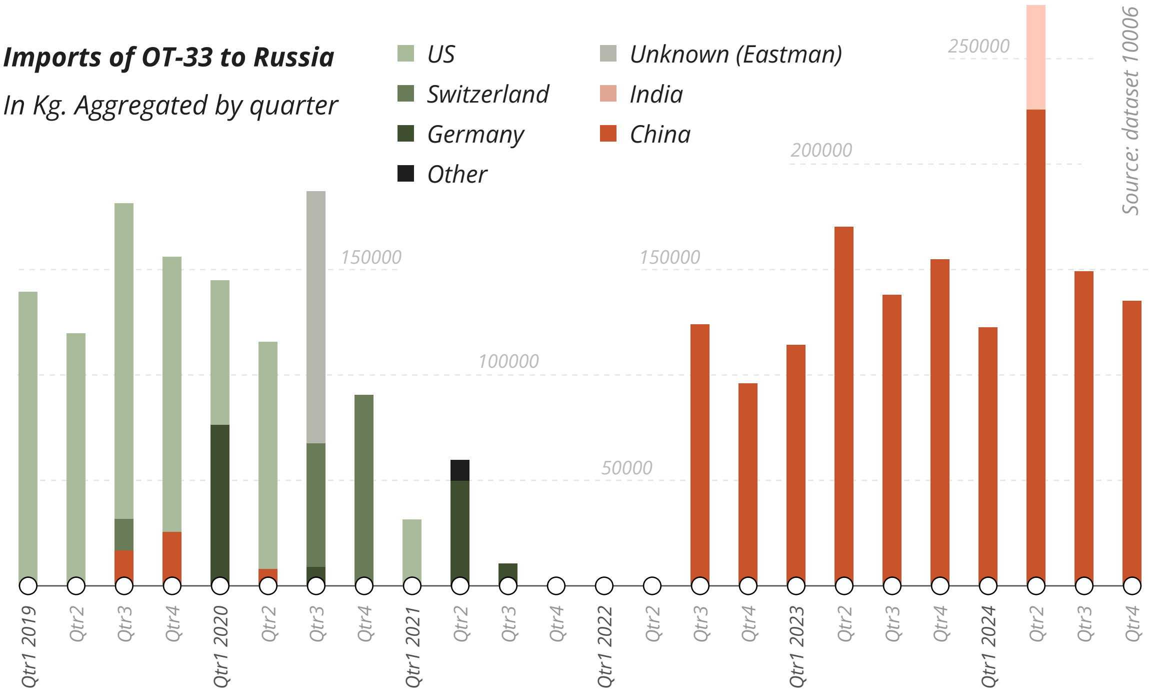
Bill of lading data shows that Pirelli Tire Russia imported Crystex OT-33 in more limited quantities before February 2022, but the shipments significantly increased in frequency starting in late 2022, and in early 2023, a new provider appeared, the Chinese Shandong Yanggu Huatai Chemical Company.

Imports of "Crystex" OT-33 or other unbranded OT-33 from the Chinese company Huatai

In net kg, Agregated by month



First, the increase in OT-33 is interesting and suggests a ramp-up in Pirelli Tire Russia's production since 2021. A broader look at import patterns indicates that this is more of a return to pre-2021 levels of OT-33 imports than an unprecedented ramp-up. Since 2018, virtually no other Russian entity has imported OT-33. It is also interesting that the sourcing for the OT-33 changed from the United States, to Europe, to China between 2019 and 2024. Instead of winding down operations or imports after Russia initiated its massive invasion of Ukraine, Pirelli's Russian subsidiary ramped up from a lower level and continues to receive material assistance from other Pirelli subsidiaries.



The source for most of the OT-33 from China is listed in Russian import data as "Huatai", referring to the Shandong Yanggu Huatai Chemical Co. However, based on publicly available sources, it does not appear that Shandong Yanggu Huatai Chemical Co. produces any OT-33. Huatai does make other grades of this substance, and its website does state that oil treatment levels can be "customized" in its products, but there is a possibility, even a likelihood of reselling OT-33 from other manufacturers, and labeling it as "Huatai" in order to evade scrutiny.(43) The Eastman Chemical Company (which acquired Flexsys) did have several facilities in Asia that manufactured its products (though there is no information on OT-33 manufacture), and there are several other Chinese companies that market OT-33.(44)(45)(46)(47) One of these plants may be producing OT-33 for resale under the "Huatai" brand. Alternatively, Huatai or another Chinese company may be making Crystex OT-33 under license, or counterfeiting it for export to Russia.

Pirelli Tire Russia - Conclusion

Pirelli Tire’s continued assistance to its Russian subsidiary, which is directly linked to Russian military production, is a major missed opportunity for disrupting Russian military production. In addition, the direct trade between Pirelli Tire Russia and the American producer of OT-33, which continued until at least 2021 and may still be ongoing, represents another missed opportunity to disrupt and degrade Russian military production.

Chemical precursors for Russian military-related items are important, but perhaps even more crucial are the intellectual capital, access to international expertise and logistics, and the “safe” brand name provided by Pirelli.

Balakovorezinotekhnika: A Vulnerable Producer of Rubber Military Components

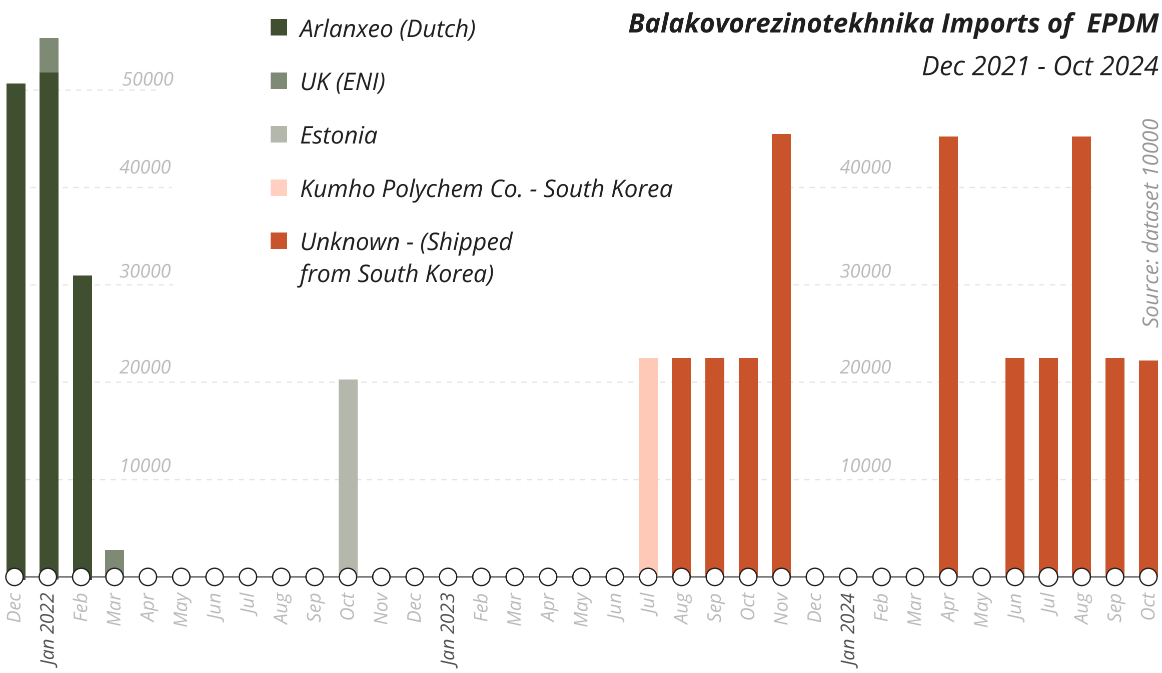
Balakovorezinotekhnika [БалаковоРезиноТехника - literally "Balakovo Rubber Equipment"] is known for its production of rubber components for automobiles, but it is also a supplier of rubber components for Russian military equipment.(48)(49) The kind of rubber components it makes are not tires, but rather hoses, seals, drive belts for engines, etc., critical components not just for the production of new vehicles but also for refurbishing old vehicles in storage.

Balakovorezinotekhnika is still unsanctioned as of February 2026. It continues to import critical chemicals for the production of rubber components. These include CBS (CZ) / N-cyclohexyl-2-benzothiazyl sulfenamide, MBS (N-Oxydiethylene-2-benzothiazole sulfonamide), and Tetramethylthiuram Disulfide (TMTD). Before 2023, Balakovorezinotekhnika sourced these and other accelerants from a few European companies, including the Italian company Performance Additives Italy S.P.A. (final known shipment in May 2023), and one Chinese company, The Dalian Richon Chemical Company. However, while shipments from China have regularly continued since June 2023, information about the producer of the chemicals has been redacted from bill of lading records, a likely attempt at avoiding scrutiny.(50)

Examination of Balakovorezinotekhnika's imported inputs reveals another important dependency that might be more easily interdicted than vulcanization accelerants from China: the synthetic rubber ethylene-propylene diene (EPDM), a special kind of synthetic rubber with strong outdoor resistance used in O-rings, gaskets, etc. There is only one EPDM producer in Russia: Bashneft's Ufaorgsintez.(51) It is not known how much EPDM Ufaorgsintez produces every year. A review of Russian import records shows that Ufaorgsintez cannot satisfy Russian demand, and the enterprises that import EPDM to Russia include Balakovorezinotekhnika.

Balakovorezinotekhnika has sourced EPDM from South Korea since the summer of 2023. An analysis of bill of lading records shows a similar pattern to that observed with Balakovorezinotekhnika's vulcanization accelerator imports: Before 2023, the plant sourced EPDM from Europe (specifically the Dutch company ARLANXEO). In 2023, after a 9-month pause in imports of EPDM, the plant resumed importing the same substance, but from the South Korean company Kumho Polychem. Then, after the summer of 2023, shipments from South Korea continued, but the producer of the EPDM is not listed in bills of lading after this point, and the only origin listed is the South Korean chemical logistics firm UNID Global.(52)(53) Shipments are regular, indicating ongoing production.

It is likely that Kumho Polychem is continuing to supply EPDM to the Balakovorezinotekhnika plant, though its origin is obscured in documentation. There are a limited number of places on earth capable of producing EPDM at scale, in South Korea, these appear to be only Kumho Polychem or Lotte Versalis Elastomers.(54) Pressure and observation of Kumho Polychem, Lotte Versalis Elastomers, and other global producers of EPDM (which are limited) to limit exports to Russia could directly affect Balakovorezinotekhnika's ability to continue production.



Global producers of EPDM and other high-end synthetic rubber products should be monitored by analysts seeking new ways to disrupt or degrade Russia's military production.

Missed Opportunity: *Exports of EPDM from South Korea to Balakovorezinotekhnika should have been detected and mitigated significantly earlier. Perhaps a Western or allied government could have produced the equivalent of the OPK list significantly earlier. A catch-all sanction against all parts of the Russian military-industrial complex, without naming entities or locations, is not usually sufficient for due diligence researchers.*

Recommendation: *In addition to adding Balakovorezinotekhnika to sanctions lists, EPDM producers should be educated about its role in Russian military procurement. Ukrainian allies might also consider sanctioning Ufaorgsintez to prevent Russian production of EPDM or acquisition of equipment and precursors.*

The Bashkir Soda Company (BSK)

The Bashkir Soda Company (Башкирская Содовая Компания, "БСК", hereafter "BSK") is one of the largest chemical companies in Russia. It is located just to the West of the Urals, north of Kazakhstan, and produces a wide variety of chemicals, including calcium chloride, polyvinyl chloride (PVC), and sodium carbonate (Na_2CO_3) a.k.a. "soda ash" and sodium hydroxide (NaOH) a.k.a. "caustic soda" - the core products that give the company its name.

The BSK is on the leaked OPK list of all companies involved in the Russian military-industrial complex.(55) What does it contribute to the Russian military production effort? This is not clear, but its products are critical chemicals for a wide variety of industrial processes. Caustic soda, for example, can be used in the manufacture of explosives and plastics, as well as in oil refining. The US provided 100,000 US tons of caustic soda to the USSR during WWII as part of the Lend-Lease program. BSK is also the only Russian manufacturer of terephthaloyl chloride, a precursor of Kevlar and its Russian-made equivalents.

Missed opportunity: *Pro-Ukrainian governments might have revealed BSK's role in Russian military production earlier. This may have taken the form of sanctioning it and pointing out its Russian monopoly on the production of a chemical essential to modern body armor. There have been blanket sanctions on Russian military-production-related entities, but the only country to have sanctioned BSK specifically is Ukraine, since January 2023. Due diligence and compliance workers at financial institutions may stop at a simple name check.*

A review of import records for BSK does not reveal any obvious chokepoints for the production of soda ash, caustic soda or terephthaloyl chloride. Further research and analysis should be conducted as more data become available. However, available data does indicate that BSK may be dependent on European exporters for producing PVC.

Russian PVC production and BSK

PVC is mainly known as the material used to manufacture modern plastic pipes. However, PVC is also used in flame-retardant coatings, wire insulation on military vessels, the soles of boots, and other military-related applications.

As of 2019, the total Russian PVC production capacity was about 975,000 metric tons a year, with most of that being suspension-type PVC, and only 27,000 metric tons being emulsion-type. Suspension-type PVC is used for rigid plastic items like pipes or wire coatings, while emulsion-type PVC is used more for fine coatings, vinyl flooring, artificial leather, and similar applications. Russia is still mostly import-dependent for emulsion-type PVC.

Russian PVC production is highly consolidated, with three entities accounting for about 90% of total capacity (around 1 million tons a year). They are: RusVynil (32%), SayanskKhimPlast (31%), BSK (26%)

Of these three companies, **only BSK is on the OPK list of Russian defense-manufacturing companies**. This suggests that if any of these three companies are supplying PVC to Russian weapons manufacturers, it is BSK.

A review of the import records from these three enterprises shows that the Bashkir Soda Company is unusually dependent on imports from Europe. The other two have successfully switched from European to Chinese suppliers, though there may be an equipment dependency connected to Germany.

Bashkir Soda Company and PVC precursors

The import records for BSK show that it continues to import several important PVC precursors from Europe. In fact, the imports from Europe have started relatively recently, in late 2024, enabled by traffic through the Dubai Jebel Ali Free Zone, and specifically by a company named Effexio Trading FZE. These chemicals are: Alcotex-brand polyvinyl alcohol, a PVC suspending agent from the UK; ARBOCEL 50-brand Hydroxypropyl Methylcellulose, a PVC additive from Germany; and sorbitan monolaurate from Belgium, an anti-fogging agent for PVC.

Alcotex-brand polyvinyl alcohol

The import activity for BSK shows that polyvinyl alcohol imports were mainly from China before March 2023, when shipments halted. In late 2024, they started again, this time primarily originating from the UK, according to bill of lading data. It is possible that all the recent shipments are from the UK, and the “China” listed origin of the chemicals is a lie or denotes where they were first transshipped, as opposed to where they were produced.

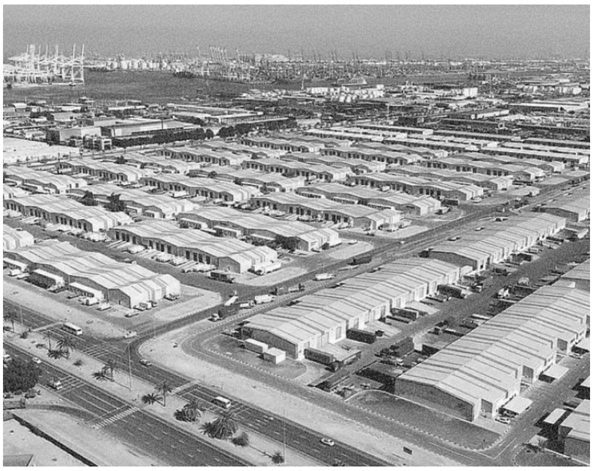
Shipments of Alcotex-brand polyvinyl alcohol to BSK

Source: dataset 3000

Shipment	Net KG	Shipper	Listed Origin of Chemicals
2025-03-18	14600	Effexio, UAE	China
2025-03-03	20000	Effexio, UAE	UK
2025-02-20	5000	Effexio, UAE	China
2025-02-18	20000	LTL Co., UAE	UK
2024-11-11	20000	Effexio, UAE	UK
2024-11-02	10000	Effexio, UAE	UK
2023-03-01	20000	Shandong Longhui Chemical, China	Kazakhstan
2023-02-27	20000	Shandong Longhui Chemical, China	China
2022-09-28	20000	Shandong Longhui Chemical, China	China
2022-09-12	20000	Shandong Longhui Chemical, China	China
2022-09-05	20000	Shandong Longhui Chemical, China	China
2022-08-01	12000	Chemical International Trade, China	China
2022-07-25	12000	Chemical International Trade, China	China

These shipments of chemicals from the UK are not the only European chemicals BSK imported in 2025. In February 2025, BSK received a 20,000 kg shipment of sorbitan monolaurate, a surfactant, produced in Belgium. In March 2025, BSK also received a shipment of 20,000 kg of Arbocel-branded hydroxypropyl methylcellulose. Arbocel is a type of cellulose fiber produced by the German company JRS Rettenmaier.

All but one of these recent deliveries to BSK from Europe (and also many other shipments from China) were shipped by the Dubai-based company Effexio Trading FZE. Effexio has a plain website that offers equipment, lubricants, spare parts, food ingredients, and other industrial inputs. A search for this company in Dubai business registries reveals a license number (82980479) and the entity's English and Arabic names, but little else. There is no further information in public registries for KYC.

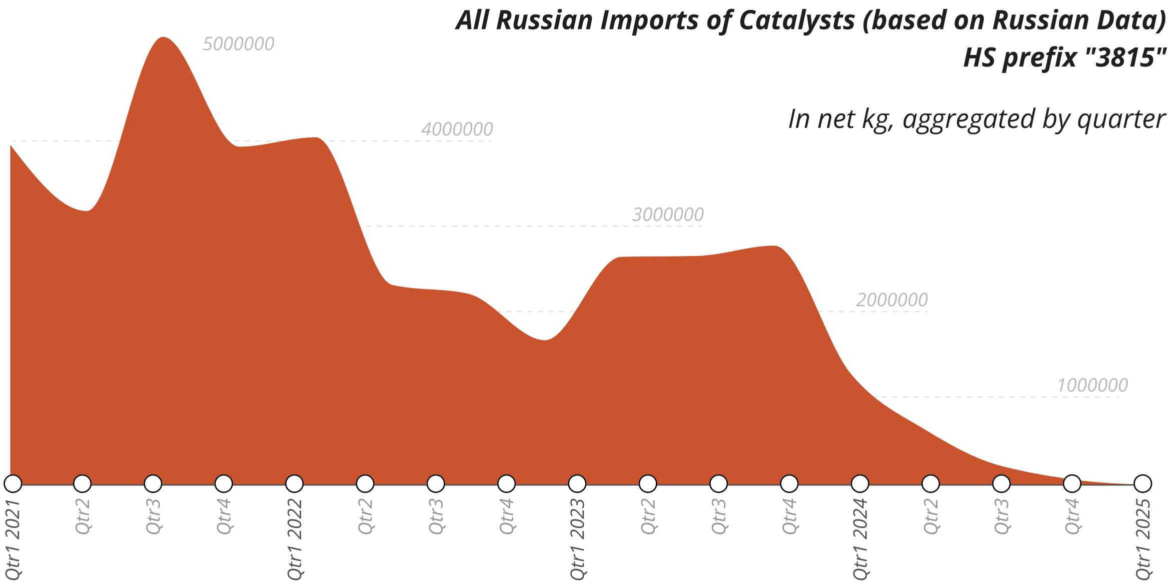


The Jebel Ali Free Zone makes company registration very easy. There are no restrictions on foreign ownership, and while a potential founder of a new company in Jebel Ali must present a passport, a KYC form, and some other documents, there is a limited ability for outside observers to determine that the Free Zone company is not trading with risky entities. One could imagine a kind of company carousel, where Russians or their fronts set up companies to trans-ship chemicals or other inputs to Russia (or Iran, for example), expecting them to be discovered or wound down before shipping data is available. The free zones of the Gulf deserve greater scrutiny, particularly with regard to the Russian chemicals sector.

Catalysts – Russia hides the data

President Putin declared that catalysts were a “cross-cutting priority” for Russia in February 2025.(56) Catalysts encompass a huge variety of chemicals, everything from enzymes to minerals to specialty chemicals. The subsequent section will deal with oil refining catalysts in more detail.

Discrepancies and anomalies emerged during an examination of Russian data on imports of various kinds of catalysts. Instead of looking at specific catalysts or specific enterprises that import them, it is instructive to take an overall look at Russian data on all catalyst imports, defined by the four number prefix “3815” in bill of lading HS codes. This data appears to show a catastrophic collapse of Russian catalyst imports in late 2023, going to 0 imports by the start of 2025.



Of course, this data is manipulated. Russian enterprises that require catalysts are still operating and there have been no reports of the catastrophic collapse of the entire Russian economy. It appears that Russia began hiding shipment data of catalysts sometime in late 2023, likely based on keywords, company names, and eventually whole HS codes. This activity began with some data in late 2023, and over time one can observe new classes of product or keywords getting added to the list of catalyst shipments over the subsequent year. Finally in October 2024 Russian authorities evidently ended all shipment information about catalysts, likely based on not publishing any bill of lading with the 4 digit HS code prefix for catalysts: “3815”. The last published shipment with this HS code prefix took place on October 11, 2024.

Source: dataset 22100

Final Appearance	What	Final Record No.
December 12, 2023	Catalysts from Finland	10317120/131223/3202823
December 22, 2023	Sinopec catalysts	10131010/221223/3419573
January 9, 2024	Catalysts from India	10317120/090124/3004304
January 16, 2024	Catalysts from S Korea	10228020/160124/5006054
January 25, 2024	Aviation-related catalysts	10228010/250124/5017729
January 26, 2024	Precious metal catalysts	10005030/260124/3018558
May 3, 2024	Ammonia catalysts	10013160/030524/5024587
May 15, 2024	Polyethylene catalysts	10013160/150524/3165161
October 11, 2024	All catalysts	10013160/111024/3293478

Based on observation of the data from other non-Western providers of Russian import data, this obfuscation is consistent, indicating that the Russians are hiding this data globally and not just targeting Import Genius or other Western data providers.

This analysis of published Russian trade data suggests four decisions or clusters of decisions to obfuscate data, which may suggest the priority of these catalysts to the Russian government or just the creeping awareness of how this data highlights Russia's vulnerabilities. The clusters are:

December 2023: Import data about catalysts from Finland and the catalyst specialist subsidiary of the Chinese state-owned oil company Sinopec disappears.

01/ The cutoff of all Finland-related catalyst import data may be related to the US Treasury sanctions enacted against the Finnish company Luminor OY in September 2023. Luminor OY was involved in supplying the Russian electronics industry (which is one of the reasons it was sanctioned), but its wider network also was involved in supplying catalysts.(57)

02/ Before the data cutoff, Sinopec Catalysts was a major supplier of oil refining and polyolefin catalysts to Russia, primarily to SIBUR.(58) The Russian authorities likely removed it from import data to reduce its signature and protect this strategic supplier from possible Western sanctions.

January 2024: Import data about catalysts from India, S Korea, and information about precious metal catalysts disappears.

01/ As discussed in the subsequent section on oil refining catalysts, the Indian catalyst supplier for oil refining is Reliance, known as one of the main importers of Russian oil to India.

02/ The South Korean company Annamoon Co. LTD, dominates exports of catalysts to Russia post-2022. Based on Russian import data, before the information cutoff it was primarily supplying polyethylene-related catalysts to the Russian chemical giant SIBUR. As with Sinopec, this was likely removed from import data to protect this strategic supplier.

03/ Precious metal catalysts (HS 3815120000) cover a variety of catalysts that contain platinum, palladium, rhodium, or other precious metals. They are used in a variety of applications, including for refining oil and as catalytic converters for cars. Russian data shows that the main importers of these kinds of catalysts before the information cut-off were Sibur (for producing polyolefins), oil refiners such as Gazprom Neft and the Irkutsk Oil Company, and most of all Haval Motor Manufacturing Rus, a Chinese auto company that has set up shop in Russia.(59)(60) The cutoff of information could have been to protect one or all of these enterprises.

May 2024: Import data about Ammonia and polyethylene catalysts

October 2024: All import data about catalysts

Recommendation: *As a good first step, precious metal catalysts, oil refining catalysts, and polyethylene catalysts, at minimum, should be added to the US Treasury's determination "Regarding Certain Items or Class of Items of December 22, 2023, pursuant to E.O. 14024, Sec. 11 (a)(ii).(61) Analysts should pay special attention to catalysts exports to Russia, possibly by re-creating Russian import data via the export data of key countries, such as India, Finland, and South Korea. Chinese exports to Russia are a particularly intractable problem that may not be able to be addressed using an open-source approach.*

Oil Refining Catalysts

Modern oil refining uses a variety of catalysts for different processes, including removing impurities or breaking down large hydrocarbon molecules.(62) While Russia is an oil-exporting superpower, it is still surprisingly dependent on imported catalysts for its own oil refining needs.

As of 2014, Russia was reportedly 100% dependent on imported catalysts for oil refining for hydrocracking (breaking down hydrocarbon molecules) and hydrotreatment (removing impurities).(63) Since the initial invasion of Ukraine in 2014 and the start of serious Western sanctions, Russian firms have attempted to free Russian refining from a dependency on imported oil refining catalysts, or at least catalysts from Europe and North America. Rosneft launched a plant that it claimed can meet 50% of its hydrotreating and hydrocracking catalyst needs by 2024.(64) Gazprom Neft claims it opened a catalyst plant in 2022, which the company says will meet domestic needs of 21,000 metric tons a year.(65) However, these statements might be false. In March 2025, the Russian analysis firm Rupec reported that the launch date for Gazprom Neft's Omsk catalyst plant had in fact been "repeatedly postponed", and still did not have a solid launch date scheduled in the future.(66)

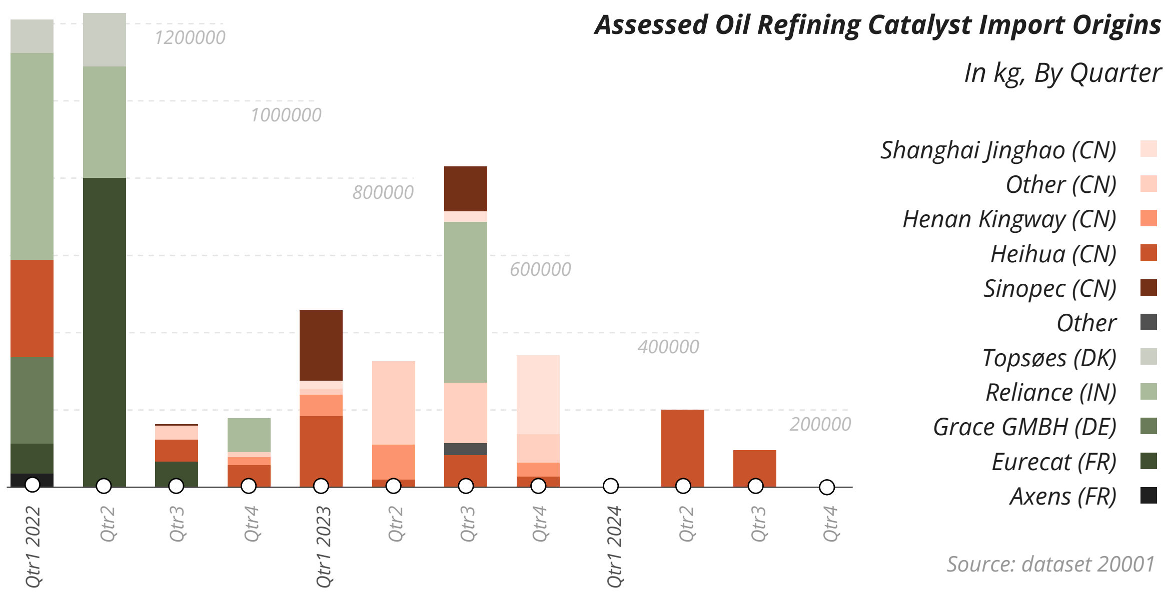
Sure enough, an inspection of the 2025 Russian Priority Chemical List shows it contains three kinds of catalysts for oil refining: HR 841, HR 845, and HR 846. These are catalysts that help remove sulphur from gasoline, and all are made by the French catalyst-making giant Axens.(67)

Shipments of Axens catalysts to Russia more-or-less halted in August 2022.(68) How has Russia been doing on importing other oil refining catalysts since then?

Analyzing Russian trade data on oil refining catalysts

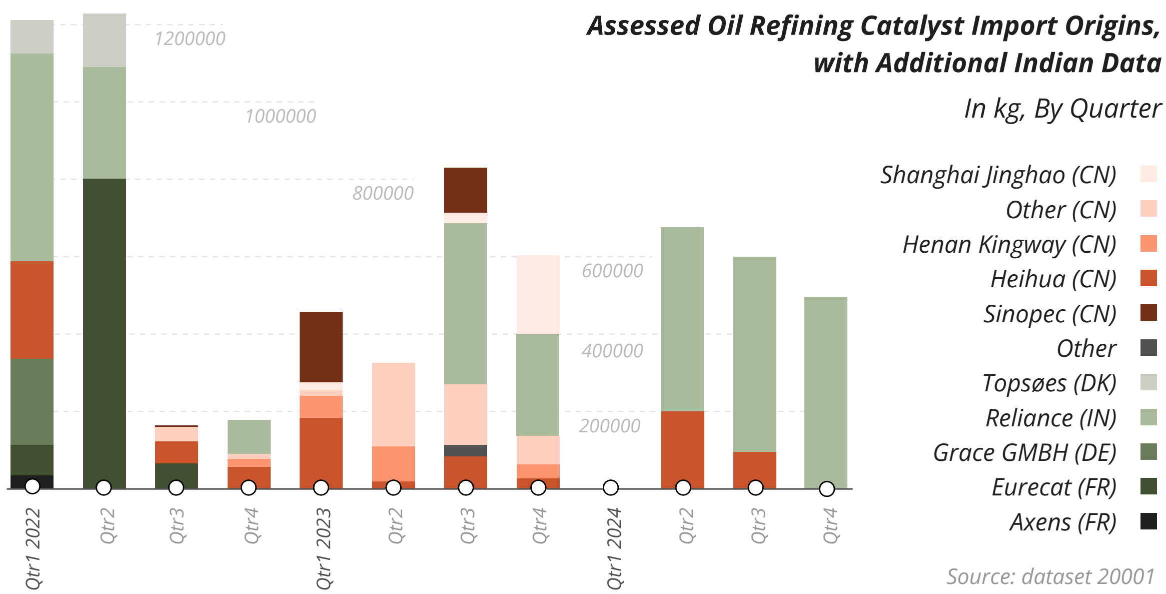
Russian import records under HS 3815199000 (catalysts) between 2021 and 2024 were inspected to identify likely catalysts for oil refining. This was done by looking at which entity was importing them (oil refineries), or product descriptions. This method is not flawless, and probably missed some importers, but it does provide some structure for assessing oil refining catalyst import/consumption patterns and major exporters/importers.

After using that method, this is the image that emerged of Russian oil refining catalyst imports:



Again, one can observe here how Russia cuts off its catalyst-related data starting around the end of 2023. Even so, one can observe the shift away from European suppliers by Q3 2022, towards more Chinese suppliers and an Indian supplier, above all the Chinese giant Sinopec and the Indian company Reliance.

After overlaying Indian export data with Russian import data, one can see the impact of the manipulation of Russian trade data, totally hiding the important role of the Indian company Reliance in 2024 to keeping Russia's oil refineries operating.



Missed opportunity: Russian refining might have been hit earlier, and the war shortened or made more difficult for Russia if Europe had declared and enforced a ban on the export of catalysts in early 2022.

Reliance made headlines in 2025 as the largest Indian importer of Russian crude to India, importing over 600k barrels a day (about a third of India's total oil imports from Russia).(69) In late 2025 Reliance claimed that it halted imports of oil in response to new European and American sanctions, or as the company put it "product-import restrictions".(70)

Case Study:
Haihua - A Chinese company supplying Russia with catalysts

According to Russian trade data, only companies associated with the Haihua Industry Group (Haihua) have continued to export oil refining catalyst chemicals to Russia since the end of 2023. Sinopec Catalysts and Reliance disappeared from the data earlier than Haihua, and the continued inclusion of data about Haihua in Russian import data was probably an oversight, or maybe some large companies getting more attention than a smaller player with a lesser-known global brand. Even so, Haihua probably plays an important role in the Russian oil industry, especially in the provision of catalysts and equipment, and is worthy of attention.(71)

The Haihua Industry Group is a privately-owned Chinese company that apparently specializes in doing business in Russia and Central Asia. It is involved in the oil production, refining, mining, and construction industries.(72) According to its website, Haihua has been involved in supplying refining catalysts to Russian customers for over 10 years.(73) It also claims to supply equipment, technology, and to provide refinery design services specifically for the standards and requirements of the formerly-Soviet space.(74)

Haihua owns two Russian companies: Petro-Haihua and Haihua-Rus.

Petro-Haihua has received some limited attention from Ukraine because of its activities in occupied Ukraine. Ukraine sanctioned Petro-Haihua in 2021 because of its illegal activities in Russian-occupied Crimea, including constructing new terminals and reconstructing a runway at Simferopol airport.(75) Petro-Haihua builds airports and airport facilities in Russia, as well as provides equipment to the oil and chemical industry.(76)(77) Based on its recent job postings (Nov 2025), it is heavily involved in reconstructing Rosneft's Komsomolsk Refinery in the Russian Far East.(78)(79)

Haihua-Rus is the company actually importing oil refining catalysts into Russia.(80) An archived copy of its website from July 2024 states that Haihua-Rus "develops long-term and fruitful cooperation with American companies such as Schlumberger, Weatherford, HALLIBURTON, and the Russian companies Rosneft Oil Company, Surgutneftegaz, Gazpromneft, Salvneft, the Eurasia Drilling Company, Gazprom Drilling, SSC [Sinopec Service Corporation], and others..."(81)

On its page in a Russian job-posting website, Haihua-Rus claims it employs specialists from "Russia, the USA, Canada, Ukraine, China, and other countries."(82)

In sum, in addition to being the only known supplier of imported oil refining catalysts to Russia after 2023, Haihua-Rus is, according to its own marketing materials, a crucial link between American, Chinese, and Russian companies, including sanctioned companies such as Gazpromneft and Rosneft.(83)

This research has not been able to establish that Haihua-Rus has ever evaded sanctions, though given that it was working with Western and Russian oil firms after 2014, this is worth more attention.

Oil refining catalysts are a potentially strategic sub-sector that could harm Russia's ability to prosecute the war.

Recommendation: *Analysts should be extra vigilant for secret shipments of oil refining catalysts to Russia. Haihua and its subsidiaries may be a candidate for sanctions or other trade-control measures. Oil refining catalysts, including hydrotreating and hydrocracking catalysts, should be added to the list of Items determined pursuant to E.O. 14024, Sec. 11 (a)(ii), authorizing the sanctioning of any foreign financial institution that facilitates the trade in these items to Russia. Ukrainian allies should communicate with Reliance (India) and other manufacturers of oil refining catalysts, and warn them of possible sanctions if they continue exports to Russia.*

Lubricant Additives

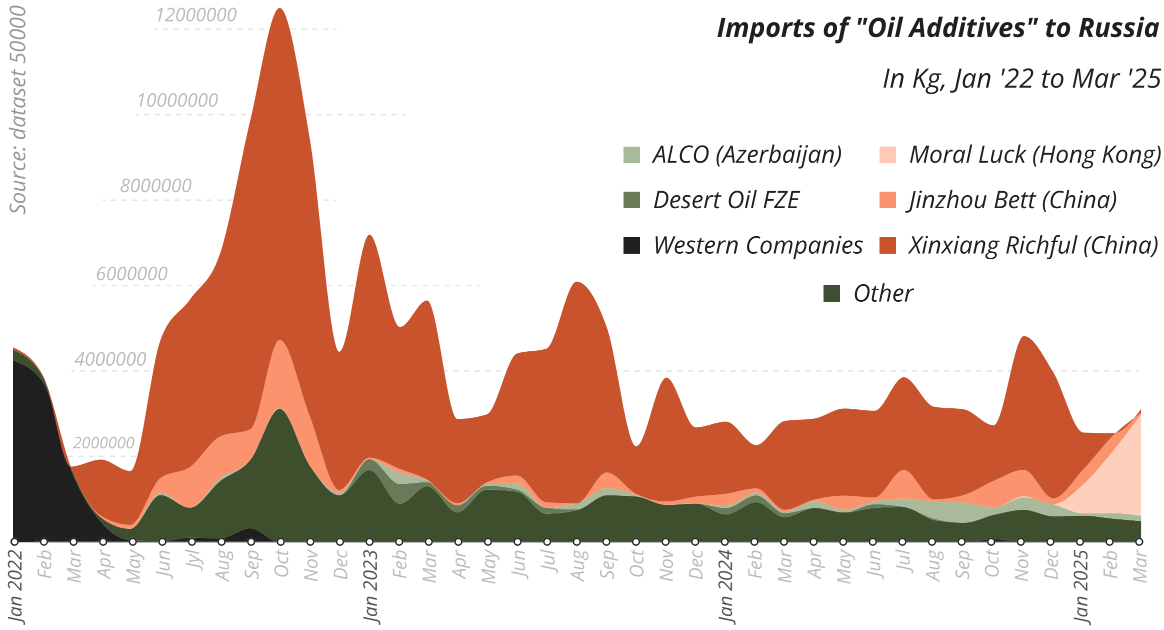
While Russia has an enormous supply of oil, it needs to import large amounts of essential precursors for making mechanical lubricants: lubricant additives.

Lubricant additives are mixtures of special chemicals, minerals, and sometimes polymers that are mixed with base oil to give special properties to a mechanical lubricant, such as to thicken it, prevent it from foaming, or make it behave differently at different temperatures or pressures. Lubricant additives usually make up between 1 and 30 percent of any mechanical lubricant, and the different types of mechanical lubricants, greases, gear oil, high performance engine oil, turbine oil etc. are usually distinguished by the different kinds of lubricant additives that they use.(84)(85)

The global lubricant additive industry is highly consolidated, with just four companies (the “Big Four”) dominating the industry and providing around 80% of all the lubricant additives in the world. Crucially, the “Big Four” are all Western: Lubrizol (US), Chevron Oronite (US), Afton Chemical (US), and Infineum (UK).(86)

In 2022 these companies and other European lubricant additive providers pulled out of Russia suddenly. This produced a lubricant shortage within Russia.(87)(88) According to one Russian article, before 2022 60% of Russia’s lubricant additive needs came from imports.(89) A summer-2023 letter of complaint to Russian Prime Minister Mikhail Mishustin from the Russian National Automobile Union complained that the lubricant shortage was particularly bad for heavy-duty trucks. This letter stated that while for general lubricant additives Russia imported 60% of its supply before 2022, when it comes to specialized lubricant additives Russia’s dependency was closer to 90%.(90)

The ingredients to lubricant additives can be so varied (everything from lithium to specialized polymers) that they are sometimes difficult to discern in trade data. Fortunately most lubricant additives are exported as “additive packages”, pre-mixed by a lubricant additive producer. Looking at the trade data for “oil additives” one can clearly see the departure of Western manufacturers, and their replacement by a few Asian manufacturers, and primarily a single Chinese lubricant additive producer, the Xinxiang Richful Lubricant additive Company of Henan, China (“Richful”):



Richful appears to be the single manufacturer capable of producing additives in the quantities that Russia needs, given that Western firms have pulled out. Richful has a single facility located in Henan, China.(91) This single facility is likely responsible for the lion's share of Russia's continuing lubricant additives imports. The important role of Richful lubricant additives to the Russian economy and war effort has been discussed in a previous DKP report.(92)

If the output of Richful's single facility were diverted, or if the company elected to stop exporting to Russia because of sanctions threats (or a loss of access to Western markets) it could have catastrophic effects on Russian lubricant production.

While this study does not have access to the appropriate data to investigate Richful's inputs, one should note that all four of the "big four" Western companies that dominate global lubricant additive production have production facilities in China. Richful may be purchasing inputs from them.(93)

The most important change that is observable in more recent Russian import data is that in November 2024 a new exporter appeared on the scene, a front company named “Moral Luck”, based in the Tsuen Wan area of Hong Kong’s New Territories. Moral Luck is a company with hardly any public history or profile and no previous involvement in the lubricant additive industry, and it became the primary exporter of lubricant additives to Russia in the space of a few months, totally “displacing” Richful. This is very obviously a lazy attempt by Richful to reduce its signature, probably in response to the increasing attention that Richful has received as an enabler of the Russian war machine. Limited publicly available data on Moral Luck’s source shows that as of March 2025 it imports unspecified material from: Xinxiang Richful Lubricant additives.(94)

Missed Opportunity: *Richful could have been pressured much earlier in the war, potentially greatly damaging Russian lubricant production.*

Recommendation: *Threaten sanctions on Richful, to include loss of access to Western export markets, if it does not immediately cease export of lubricant additive packages to Russia. Increase surveillance of Richful and of the Chinese lubricant additive trade.*

Eurotekhat – A Russian Specialist in the Chemical Trade

Many of the major importers of the lubricant additives discussed in the previous section are well-known Russian makers of lubricants, such as Gazpromneft Lubricants or Obninskorgsintez. One company that became a huge importer of lubricant additives after 2022 is Eurotekhat, a firm that previously was involved in the catalyst trade, as an exporter. Eurotekhat was the authorized representative of the Eurecat Group of France, which is owned by the catalyst-maker Axens, and it exported significant quantities of BRIM branded diesel hydrotreating catalysts, a brand of the Danish Topsoe company of Denmark.(95)(96)(97) This catalyst was probably produced under licence in Russia, and Eurotekhat was a dealer. It is not known if any relationship between Eurecat and Eurotekhat has continued, but trade data indicating a relationship between the two halted after 2022.

Brim catalysts, from the Topsoe website

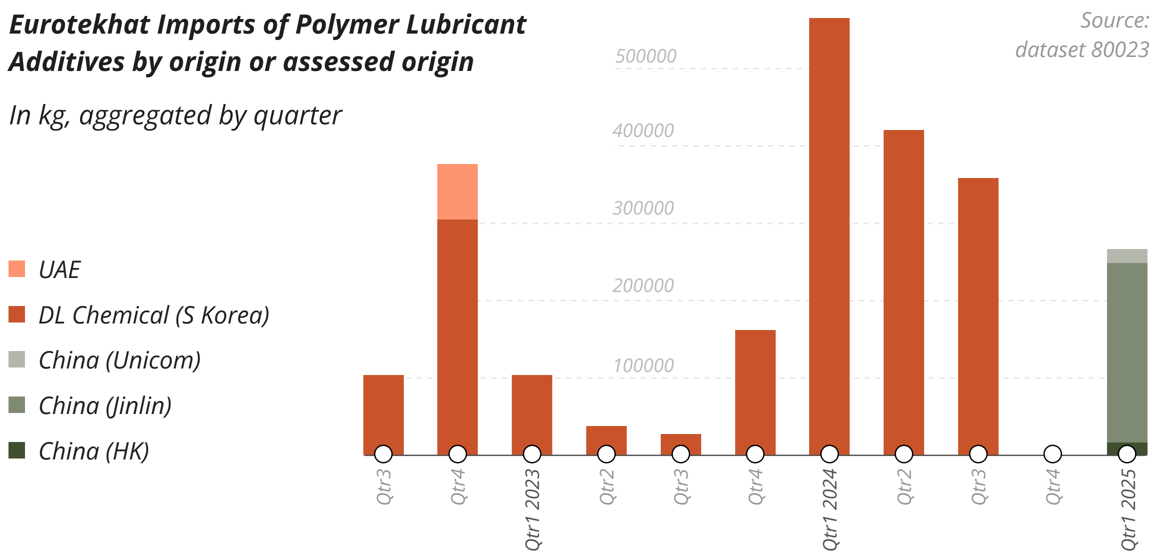
Other than its connection to Axens, Eurotekhat has another important corporate relationship evident in its export data – it is the only Russian exporter to The Sinopec Research Institute of Petroleum Processing Co. (Sinopec RIPP).(98) Sinopec RIPP is the primary research and development center for the Chinese giant Sinopec. Russian records show Eurotekhat exported small quantities of summer diesel fuel, maritime fuel oil, and activated carbon to Sinopec RIPP between September 2023 and September 2024. This might have been preparation for larger exports of these materials to Russia, or the samples may have been provided as part of Chinese-Russian R&D efforts to find ways to replace non-Chinese inputs (such as catalysts) in critical production. In November 2023 Eurotekhat also made one shipment of a “Sinopec” brand precious metal catalyst to Sinopec RIPP, perhaps a defective one returned to the producer.

Eurotekhat does not appear to produce anything on its own. Its records with the Russian tax authorities say it has 26 employees, and its parent company “Spirkas” (which changed its name from Eurotekhat in 2023) has only 12.(99)(100) It is likely, as it describes itself on its website, a dealer, not a producer.(101) (Among various catalysts and chemicals for refining it offers on its website, it also offers cassava and tapioca, hardly things that are produced in Russia.)(102) If Eurotekhat were sanctioned or came under some other kind of legal pressure it would likely have a limited effect on the Russian war economy, as the skilled chemists or well-connected dealers who currently work there would likely just shift to a new corporate home and continue their activities.

However, export and import records suggest that while Eurotekhat is just a dealer, it is a very important dealer, connected to Sinopec RIPP, Lukoil, and other key firms, and is at the forefront of major shifts in the Russian chemical industry. This section will look at two chemical industry related imports of Eurotekhat, not to argue for sanctions or trade controls on Eurotekhat, but to identify potential areas of approach and other Russian vulnerabilities.

Eurotekhat and Polymer Lubricant Additives – From Korea to the UAE, and/or China?

For example, take polymer lubricant additives. These generally fall under a different HS code than other lubricant additives. Starting in 2022 Eurotekhat (along with Russian lubricant makers) began importing large quantities of D Synol 1100, a variant of a special polymer lubricant additive produced by the DL Chemical company of South Korea.(103)



These exports from South Korea abruptly halted in August 2024. However, After a few months Eurotekhat began importing similar substances, mostly from China.

The origin of the D Synol replacement is not entirely clear. One of the shipments from China is listed as "On behalf of Isenik Solution FZCO." Isenik Solutions FZCO is a company based in the UAE, with the "FZCO" indicating it is a free zone company. It was registered in 2023, and a year later became a major shipper of specialized polymers to Russia.(104) This is another example of a possible Russian chemical industry input node operating out of the UAE. It may even be the case that they are re-exporting material made in South Korea or even the United States or polymers produced by a Western company in the Persian Gulf.

There is insufficient data available to determine if the shipments from China and/or the UAE are just pass-throughs for continued imports of D Synol, or if the Russians have found an alternative supplier of a similar-enough polymer for their lubricant production needs.

12-Hydroxystearic acid (12-HSA)

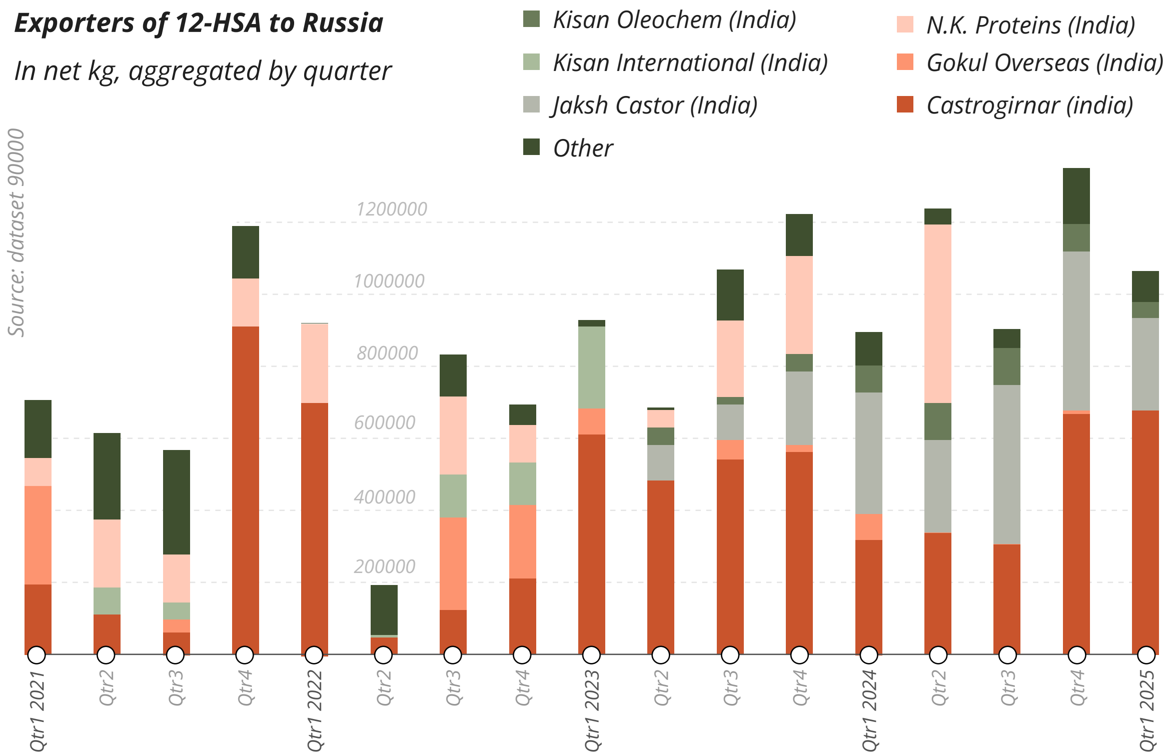
Another interesting input that Eurotekhat began to import since 2022 is 12-hydroxystearic acid (12-HSA). Eurotekhat became a big importer of 12-HSA starting in late 2022, having never imported it in the past.

12-HSA is an important precursor used in the production of various kinds of soaps, cosmetics, coatings, paints, polishers, and lubricants. It is also used in the production of rubber items.(105)(106)(107) The bills of lading for Eurotekhat's import make the end-use of this 12-HSA clear: "12-hydroxystearic acid, used in the production of lithium greases."(108)

Consistent with its other known support for the Russian lubricant industry, Eurotekhat was importing this precursor for the Russian lubricant industry. Much like with natural rubber, 12-HSA may represent a potential agriculture-based chemical input vulnerability that Russia could not replace.

Eurotekhat is the 4th largest importer of 12-HSA to Russia since 2022, with about 6% of total shipments by weight, and that is starting from 0 before 2022. The largest importer of 12-HSA to Russia since 2022 (≈ 24%) is the company Khimintekhno LLC, a chemical supplier that was placed under EU sanctions in July 2025.(109)(110)

What is more interesting than who is importing the 12-HSA to Russia is who is exporting it. 12-HSA is derived from castor oil. 90% of castor oil exports are from India, and most castor seeds from India are produced in the state of Gujarat (≈86%).(111) Eurotekhat's imports almost all come from a single producer: Castorgirnar Industries, of Gujarat.(112) A broader look at all 12-HSA imports to Russia shows that the exporters are highly consolidated, almost entirely from India.



India has a global near-monopoly on castor seeds and castor oil, and while there are some producers of 12-HSA located in China, the U.S., and Europe, they are mostly dependent on exports of castor beans from India, and any Indian producer located near the source of the beans has a natural advantage.(113)

This potential weakness in Russia's, as well as in China's chemical inputs does not lend itself to an easy sanction or trade-control angle of attack. Any ham-fisted attempt to coerce Indian producers to halt exports to Russia might instead result in retaliation against western chemical companies also dependent on 12-HSA. Nevertheless, a strategy of gentle pressure or even persuasion, such as offering tax-free status in certain jurisdictions in exchange for halting exports to another, might serve as a route to disrupting or even halting the shipment of 12-HSA to Russia, or at least reduce it and force Russia to deal in the Chinese secondary market only.

Conclusion

This study found potential Russian chemical sector vulnerabilities in the rubber/tire, PVC, oil refining catalysts, and lubricant additive sectors. These case studies and recommendations should be considered low-hanging fruit. Especially after Russia has begun to hide trade data. Rather than going straight to Russian data as this study began with, analysts will have to attempt to re-construct critical Russian import data from other countries' exports. This will be a particular issue with Chinese exports, and analysts dealing with publicly available data may have to rely on marketing materials, trade shows, and other indirect signs of trade rather than data ultimately provided by Russian authorities.

These case studies point the way to several actions Ukrainian allies could take which could harm the Russian chemical industry and the wider Russian war effort. In addition to these recommendations, the study has made the following cross-cutting findings:

The Dominance of China in the Chemicals Sector:

Russia has been able to source much of its chemical input needs from China. This is inconvenient, but brings its own opportunities. Many of these Chinese chemical companies probably want to trade outside of Russia and China, and could be denied inputs or access to Western markets in retaliation for assistance to Russia. While China is a major chemical powerhouse, several of the case studies presented in this research show opportunities to harm the Russian chemical industry that have no nexus with China.

Russian awareness and deception: both the launch of the "New Materials and Chemistry" project and the progressive Russian shut-off of bill of lading information about catalysts show that the Russian state is aware of exploitable weaknesses in their chemical industry and is afraid.

South Korea as a source: In synthetic rubbers, catalysts, and specialist lubricant additives South Korean firms emerge as surprisingly important contributors of important Russian inputs. While China will remain a primary source of Russian inputs that previously came from Europe, South Korea also deserves more attention as a major industrial power that has continued to deal with Russia. One suspects that, in addition to the chemical industry, there are other South Korean contributors to the Russian war economy in other industrial sectors, such as in machine tools and software.

India as a source: In refining catalysts and in 12-HSA, Indian firms were important, even dominant, in imported Russian inputs. There has been a great deal of attention to Indian imports of Russian oil. Perhaps analysts and policymakers should pay closer attention to Indian chemical firms and exports to Russia.

The UAE as a pass-through: In both lubricant additives and in polyvinyl alcohol, UAE companies located in free zones appear to play key roles as pass-throughs for chemicals. These companies are very easy to set up and can probably be abandoned if there is any friction or attention from investigators.

Areas for further study

01/ Researchers can find other items that "disappear" in Russian data: The progressive disappearance of different catalysts in Russian import data is very interesting, and it suggests a method to discover other critical imports for the Russian war economy by noting their disappearance. A future study could take all Russian trade data and use AI to determine when certain keywords, HS codes, or suppliers/importers disappear, in order to drive research targets for potential critical imports.

02/ Natural Rubber: As with 12-HSA, natural rubber is something that Russia cannot grow on its own. There is Chinese production of natural rubber, but it is not sufficient for Chinese needs.(114) Russia could piggy-back off of Chinese natural rubber inputs, but under the proper regime this could bring its own risks to certain Chinese firms' access to the global market and continued access to natural rubber. A future study on the global rubber industry and Russian suppliers could help policymakers craft a strategy to deny or disrupt Russian supplies of this input.

03/ Investigate chemical and other inputs to Russia originating from India, South Korea, and the UAE: Identify databases that are available, recruit analysts with the appropriate language skills and knowledge, and possibly even involve in-person checks of businesses

04/ Other input-centric research: While on the one hand, it is obvious that Russian authorities are aware that their trade data has revealed insights about its military production activities and have taken steps to hide them, other insights might be generated by observing the import behavior of Russian firms, especially in the metalworking, spare parts, or mineral sectors.

Appendix: Priority Chemical List – 2025

In the spring of 2025, Russia launched the national project "New Materials and Chemistry" to revitalize the Russian chemical industry by developing low- and medium-scale chemistry production. Russian chemical concerns, such as the Russian chemical behemoth Sibur, can produce substantial quantities of certain chemical products utilizing Russia's abundant feedstocks of natural gas, oil, and other raw materials. However, Russia lacks indigenous supplies of many smaller-scale but still essential chemical products, such as the catalysts and precursors needed for large-scale chemical production. Soviet small- and medium-scale chemical producers disappeared with the collapse of communism; they could not compete on the global market, and today the Russian chemical industry is heavily dependent on imports from abroad. This national project seeks to reduce this dependence with the support of 2 trillion roubles of funding (about USD $25 billion). Eventually, the project envisions creating 150 new Russian production facilities and 700 new chemical products.(115)

The counter-sanctions aspect of this project is obvious. While the import of some selected chemicals has been sanctioned or interdicted since the start of Russia's massive invasion of Ukraine in 2022, there has not been a concentrated Western effort against the Russian chemical industry. However, many specialty chemical companies have ceased operating in Russia or voluntarily halted exports. This Russian national project is likely partly envisioned to reduce the likelihood that a broad campaign against the Russian chemical industry would have a significant impact on the Russian economy, as well as to protect key industrial sectors, including military-industrial sectors, from disruption.

Starting in the summer of 2025, the Russian Agency for Technological Development (ATD) began a program of grants for the "New Materials and Chemistry" project, offering up to 150 million rubles for enterprises attempting to create specific chemicals within Russia, with projects covering up to 80% of costs and lasting up to 24 months.(116) The ATD released a list of 84 priority chemical products for potential grant awardees sometime around May 2025.(117) This list was later expanded to 99 chemicals. Russian news reports indicate that the "New Materials and Chemistry" project plans to implement "138 projects to create priority chemical products by 2030", suggesting that this list of 99 may eventually expand to 138.(118) The list as of December 2025 is reproduced below, with translation and commentary.

There is no information about the methods the Russians used to choose these priority chemicals. Still, an initial review shows that they span a wide range of industries, including those that use chemicals in the food, cosmetic, and personal hygiene sectors. However, the list provides several important clues to weaknesses in Russia's chemical industry that could have profound implications for its ability to wage war, if these weaknesses are exploited, especially those related to rubber/tire production, as well as gasoline refining.

RUBBER/TIRES:

23 of the priority chemicals on this list are related to the production of rubber and/or tires. Tires, the rubber, and the chemicals used in their production are major military-related commodities, and it appears that Russian industry has difficulty producing them. The Dekleptocracy Project has previously been involved in investigations to halt the Russian import of tires from Japan, which Russia was using on armored personnel carriers. We suspect that this push to acquire specialized chemicals related to rubber and tire production is an attempt to boost Russian tire output, including of tires for military vehicles, and mitigate the impact of sanctions or export controls on Russian combat power.

CATALYSTS, PARTICULARLY GASOLINE-REFINING CATALYSTS

Catalysts, chemicals that increase the rate of a chemical reaction, can be essential for specific industrial processes. Nine of the priority chemicals are specifically listed as catalysts. Three of the chemicals on this list are catalysts used for refining gasoline, produced by the French company Axens. Given Ukraine's highly successful campaign against Russian refining, a disruption of gasoline-related catalysts into Russia could have a strategic effect on Russia's ability to wage war.

LIST OF PRIORITY CHEMICAL PRODUCTS

№	Russian Name / *English Translation*	Commentary
01	Бета-пропиолактон *Beta-propiolactone (BPL)*	A sterilizing agent used in the medical/pharmaceutical industry. (119)
02	Синтетические оксиды металлов пигменты *Synthetic metal oxide pigments*	
03	Композиция холодного покрытия Cold Coating composition	
04	Гликолевая кислота 99% *Glycolic acid 99%*	
05	Ускоритель вулканизации. Дибензотиазил - дисульфид *Vulcanization Accelerator Dibenzothiazyl disulfide*	
06	Ускоритель вулканизации ТББС *Vulcanization Accelerator TBBS*	This refers to N-tert-butyl-2-benzothiazole sulfenamide (TBBS), a delayed-action vulcanization accelerator used in a variety of production processes, including for tires.(120)
07	Ускоритель вулканизации ДЦБС *Vulcanization Accelerator DCBS*	N, N-Dicyclohexyl-2-benzothiazolesulfenamide is a delayed action vulcanization accelerator produced from benzothiazole and cyclohexylamine, used in producing several rubber products, including tires.(121)
08	Ускорулканизации - Цитель ЦБС *Vulcanization Accelerator CBS*	N-cyclohexyl-2-benzothiazolesulfenamide (CBS) is a vulcanization accelerator widely used in the production of items made of rubber, including tires. (122) It is often used alongside zinc oxide and stearic acid.(123)
09	Замедлитель вулканизации – СТР н циклогексилтио фталимид *Vulcanization Retarder — CTP N Cyclohexylthiophthalimide*	CTP N Cyclohexylthiophthalimide is a scorch retarder for sulfur cured rubber, which delays the onset of vulcanization.(124)

№	Russian Name / *English Translation*	Commentary
10	Гидрофобный компаунд для изделий наружной установки, 4-х компонентный *Hydrophobic compound for outdoor use products, 4 component*	
11	Компаунд для заливки силовых распределительных трансформаторов 5-ти компонентный *Compound for filling power distribution transformers, 5-component*	
12	Противостарители СДПФД *Antioxidant DTPD*	Antioxidant DTPD is a p Phenylenediamine type antioxidant for rubber, providing long term heat/ozone crack protection in tires and other items.(125)
13	Противостарители *Antioxidants*	"Antioxidants" likely refers to chemicals that protect rubber from oxidation and ozone, extending service life and reducing surface cracking.(126)(127)(128)
14	Алкилфенолформальдегидная смола *Alkylphenol–formaldehyde resin*	This likely refers to a type of chemical used to increase the hardness, chip resistance, and abrasion resistance of rubber products, including tires.(129)
15	Смола третбутилфеноло-альдегидная (95 % продукта сополимеризации п-трет бутил-фенола и ацетилена и 5 % нафтената цинка) *Tert-butylphenol-aldehyde resin (95% copolymerization product of p-tert-butylphenol and acetylene, and 5% zinc naphthenate)*	Possibly refers to an adhesive commonly used to bond leather, rubber to rubber, or rubber to metal surfaces.(130)
16	Смола фенольная повышенной клейкости (Продукт поликонденсации п алкилфенола и формальдегида) *Phenolic resin with increased adhesiveness (Polycondensation product of p alkylphenol and formaldehyde)*	It appears to be another type of adhesive.

№	Russian Name / *English Translation*	Commentary
17	Модификатор (80 % резорцина, 20 % полимерного связующего и диспергирующие агенты) *Modifier (80% resorcinol, 20% polymer binder and dispersing agents)*	Likely refers to a component of bonding system resorcinol-formaldehyde silica used for bonding rubber to reinforcing material, for example, Rhenogran Resorcin-80 produced by LANXESS.(131)
18	Модификатор (модификатор адгезии) *Modifier (adhesion promoter)*	May refer to general adhesion promoters, which improve bonding between rubber matrices and textile/ metal reinforcements during vulcanization.(132)
19	Модификатор 65 (смесь 65% гексаметоксиметилмеламина и 35% осажденного кремнезема) *Modifier 65 (65% hexamethoxymethylmelamine + 35% precipitated silica)*	May refer to rubber adhesive RA-65 produced by Vennok or an analogous product.(133)
20	Циклогексилтиофталамид *Cyclohexylthio Phthalimide*	Cyclohexylthio Phthalimide, possibly N-cyclohexylthio-phthalimide, is a pre vulcanization inhibitor to prevent scorching in sulfur cured rubber(134)
21	Двухкомпонентный полиуретан Two component polyurethane	
22	Глицерофосфат кальция (C3H7CaO6P) *Calcium glycerophosphate (C3H7CaO6P)*	Calcium glycerophosphate is an ingredient found in oral care products such as toothpaste, as well as in cosmetic products.(135)
23	Ксилитол (ксилит, пентанпентанол, C5H7(OH)5) *Xylitol (xylitol, pentane pentanol, C5H7(OH)5)*	A sugar substitute.(136)
24	Глицерофосфат натрия гидрат (C3H7NA2O6P*H2O) *Sodium glycerophosphate hydrate (C3H7NA2O6P*H2O)*	Sodium glycerophosphate is a compound used in medicine.(137)
25	Натрия лаурилсульфат (додецилсульфат натрия, CH3(CH2)11OSO3Na) *Sodium lauryl sulfate (sodium dodecyl sulfate, CH3(CH2)11OSO3Na)*	A chemical used in the production of synthetic rubber and plastics.(138) It is also widely used in shampoos, cleansers, and industrial formulations.(139)

№	Russian Name / *English Translation*	Commentary
26	Метилпарабен (C8H8O3, метил-4-гидроксибензоат, нипагин) *Methylparaben (C8H8O3, methyl 4-hydroxybenzoate, nipagin)*	Antimicrobial preservative used in cosmetics, foods, and pharmaceuticals.(140)
27	Дикальцийфосфат дигидрат (CaHPO42H2O, брашит) *Dicalcium phosphate dihydrate (CaHPO42H2O, brushite)*	Food additive agent, also used in some toothpastes.(141)
28	Натрия кокоамфоацетат (кокоамфопропионат натрия) *Sodium Cocoamphoacetate*	Used in shampoos and facial cleansers.(142)
29	Гидроксиэтилцеллюлоза (натросол) *Hydroxyethyl cellulose (Natrosol)*	Used as a thickener in a variety of applications, including cosmetics, cleaning fluids, and explosives.(143)(144)
30	Поливинилпирролидон ((C6H9NO)n, повидон) *Polyvinylpyrrolidone (PVP)*	Polymer used in pharmaceuticals and cosmetics.(145) It has been used as a blood plasma substitute.(146)
31	Полисорбат 20 (Монолаурат полиоксиэтилена (20) сорбитана, Твин-20, Лауропан Т20) *Polysorbate 20 (polyoxyethylene (20) sorbitan monolaurate)*	Emulsifier used in fragrances and oils.(147)
32	Пропилпарабен (C10H12O3) Propylparaben	Preservative used in cosmetics and pharmaceuticals.(148)
33	Диоксид кремния в модификациях:- абразивный- загущающий *Silicon dioxide in modifications: - abrasive - thickening*	Appears to reference silica for use in polishing
34	Акриловая смола модифицированная *Modified acrylic resin*	
35	Разделительный состав для резиновых смесей *Release agent for rubber compounds*	Refers to chemicals used to create a film between rubber and a mold, allowing newly-molded rubber items to be removed quickly from molds.(149)

№	**Russian Name / *English Translation***	**Commentary**
36	Стирол-акриловая композиция смолы и пигмента *Styrene-acrylic resin composition and pigment*	
37	Трет бутилхлорид *Tert butylchloride*	Precursor for other organic compounds.(150)
38	Полиуретан *Polyurethane*	
39	УФ-отверждаемые чернила повышенной светостойкости для цифровой пьезоструйной печати *UV curable inks (high lightfastness) for digital inkjet printing*	
40	Полистирольно-полиолефиновый сополимер смесь *Polystyrene–polyolefin copolymer blend*	
41	Катализатор Граббса 2 поколения (CAS номер 246047-72-3) *Grubbs Catalyst, 2nd Generation (CAS Number 246047-72-3)*	Grubbs Catalyst 2nd Generation is used in olefin metathesis reactions for research, industrial production, and pharmaceuticals.(151)
42	Аминометилпропанол *Aminomethylpropanol*	Used in cosmetics to adjust pH.(152)
43	C12-15 Алкил Бензоат *C12-15 Alkyl Benzoate*	Used in the cosmetics industry.(153)
44	Катализаторы низко-температурной конверсии 217 *Low Temperature Reduction Catalysts 217*	This likely refers to the Shiftmax 217 catalyst, produced by the Swiss company Clariant. This is a version of Clariant's Shiftmax 207 catalyst, which is used in the production of syngas, a fuel and feedstock for further production of other chemicals, such as ammonia and methanol.(154)(155)
45	Катализатор селективного гидрирования бензина 846 *Catalyst for selective hydrogenation of gasoline 846*	This most likely refers to the catalyst HR 846, produced by the French company Axens. This is used to remove sulfur from gasoline.(156)

№	Russian Name / *English Translation*	Commentary
46	Катализатор селективного гидрирования бензина 845 *Catalyst for selective hydrogenation of gasoline 845*	This most likely refers to the catalyst HR 845, produced by the French company Axens. This is used to remove sulfur from gasoline.(157)
47	Катализатор селективного гидрирования бензина 841 *Catalyst for selective hydrogenation of gasoline 841*	This most likely refers to the catalyst HR 841, produced by the French company Axens. This is used to remove sulfur from gasoline.(158)
48	Катализатор предриформинга производства водорода *Pre-reforming catalyst for hydrogen production*	
49	Катализатор предварительно полимеризованный Z501 *Pre-polymerized catalyst Z501*	Based on some contextual information from commercial data, this refers to the Avant Z501, currently produced by the Dutch-American company LyondellBasell. Avant Z501 is used in the production of High-Density Polyethylene (HDPE).(159)
50	Триганокс С (Третбутилпербензоат) *Trigonox C (tert-butyl peroxybenzoate)*	Trigonox C (tert-butyl peroxybenzoate) is a polymer additive, an aromatic perester, which is used for the curing of unsaturated polyester resins at elevated temperatures, and which is produced by the Dutch company Nouryon Specialty Chemicals.(160) It has a variety of industrial applications.(161)
51	Добавка ФФГБ *Supplement FFGB*	This may refer to a type of chemical used to assist injection molding. There are a few candidate products.
52	Бензотриазол/ 1,2,3-Бензотриазол *Benzotriazole/ 1,2,3-Benzotriazole*	1,2,3-Benzotriazole is a chemical compound with a variety of industrial uses, including as a corrosion inhibitor in fuel additives and antifreezes, and as a metal cleaner.(162)
53	Акриловый сополимер Octylacrylamide/Acrylates/ Butylaminoethyl Methacrylate Copolymer(163) *Acrylic copolymer Octylacrylamide/ Acrylates/Butylaminoethyl Methacrylate Copolymer*	Octylacrylamide/Acrylates/Butylaminoethyl Methacrylate Copolymer is used in the cosmetic industry for its film-forming and binding properties.(164)

№	Russian Name / *English Translation*	Commentary
54	Акриловый сополимер/Acrylates Copolymer (химическое описание: Terpolymer of tert-butyl-acrylate, ethyl acrylate and methacrylic acid)(165) *Acrylic copolymer/Acrylates Copolymer (chemical description: Terpolymer of tert-butyl-acrylate, ethyl acrylate and methacrylic acid)*	Appears to be a chemical used in the cosmetics industry.(166)
55	Полировальная суспензия Ультрасол 200А *Polishing suspension Ultrasol 200A*	Pureon Ultra-sol 200A is an aluminum-oxide polishing suspension made by the Swiss Pureon company.(167)
56	Суспензия полировальная Компол 80 *Polishing suspension COMPOL 80*	Refers to a silicon polishing slurry made by the Fujimi corporation of Japan. It is used to polish metals, ceramics, and electronic substrates such as lithium tantalate ($LiTaO_3$), lithium niobate ($LiNbO_3$), and sapphire.(168)
57	Жидкий однокомпонентный полиуретановый быстроотверждаемый клей *One component fast curing polyurethane adhesive*	
58	Катализатор среднетемпературной паровой конверсии оксида углерода *Water gas shift catalyst (medium temperature)*	Catalyst used in hydrogen production.(169)
59	Гидроксид цинка *Zinc hydroxide*	Zinc hydroxide has several industrial uses, such as in galvanizing metal, battery manufacture, and as a vulcanizing agent in rubber manufacture.(170)(171)
60	Олеиновая кислота *Oleic acid*	A naturally occurring substance used as an emulsifier in chemistry and a lubricant in metalworking.(172)
61	Промышленная стеариновая кислота *Stearic acid (industrial grade)*	An acid used in rubber compounding, soaps, and other products.(173)(174)
62	Диоксид кремния пирогенный *Fumed silica*	Used as a thickener in coatings, sealants, and resins.(175)

№	**Russian Name / *English Translation***	**Commentary**
63	Волластонит синтетический *Synthetic Wollastonite*	Synthetic wollastonite has a variety of uses in construction, metal coatings, paints, and other applications.(176)
64	Керамический композиционный порошок оксида никеля NiO *Ceramic composite powder of nickel oxide NiO*	Nickel oxide is widely used in the ceramics and glass industries and as a catalyst.(177)
65	Керамический композиционный порошок оксида циркония YSZ *Yttria stabilized zirconia (YSZ) ceramic powder*	High temperature ceramic used for thermal barriers and solid oxide fuel cells.(178)
66	Фидсток для литья (инжекционного) порошковых материалов под давлением *Feedstock for injection molding of powder materials under pressure*	
67	Материал на основе кордиерита для производства термостойких электроизоляционных элементов для дугогасительных камер Электроконтакторов *Cordierite-based material for the production of heat-resistant electrical insulating elements for arc-extinguishing chambers of electrical contactors*	Possibly refers to Cordierite ceramic.(179)
68	Клей MA3940 LH ITW IT501/N *Glue MA3940 LH ITW IT501/N*	This refers to Plexus MA3940LH, an all-purpose fast-setting thermoplastics adhesive made by the US company Illinois Tool Works (ITW).(180)
69	Грунт адгезионный IMP. 2K COND. IH2T020 мод. A-0520503-MF *Adhesive primer IMP. 2K COND. IH2T020 mod. A-0520503-MF*	Appears to be a substance manufactured by PPG Iberia, used in the automotive industry.(181)
70	Лак Эвер Глосс 905 прозрачный JF71-0313-0900 50229630 *Ever Gloss 905 transparent varnish JF71-0313-0900 50229630*	Appears to be EverGloss 905, a product made by BASF.(182)

№	Russian Name / *English Translation*	Commentary
71	Кремнеземный наполнитель ZEOSIL 1085 GR *Silica filler ZEOSIL 1085 GR*	ZEOSIL 1085 GR is a silica filler for the tire industry produced by the Belgian company Solvay.(183)
72	Кремнеземный наполнитель Hi-Si 225 CG D *Silica filler Hi-Si 225 CG D*	This is probably a misprint, and refers to Hi-Sil 255 CG D, a silica filler made by the Polish company Qemetica S.A. (which recently acquired the PPG subsidiary that produces it).(184)(185)
73	Кремнеземный наполнитель ZEOSIL 1165 MP *Silica filler ZEOSIL 1165 MP*	ZEOSIL 1165 MP is a silica filler for the tire industry produced by the Belgian company Solvay.(186)
74	Транексамовая кислота *Tranexamic acid*	A medication.
75	Сульфат цинка высокочистый *High-purity zinc sulfate*	Zinc sulfate has a variety of industrial uses, including in agriculture, medicine, and electroplating.(187)
76	Композиционный материал на основе полиэфирэфиркетона *Composite material based on polyetheretherketone*	Polyetheretherketone (PEEK) is a high-performance thermoplastic.(188)
77	Синтетический рассасывающийся материал полигликолид-со-лактид (ПГЛА) *Synthetic absorbable material polyglycolide-co-lactide (PLGA)*	A biodegradable material used in medicine.(189)
78	Биоразлагаемый материал на основе полилактида (ПЛА) *Biodegradable material based on polylactide (PLA)*	Biodegradable plastic used in medicine.(190)
79	Полиэтилентерефталат-гликоль *Polyethylene terephthalate glycol*	A plastic that is easy to form at low temperatures.(191)
80	Медицинский полифениленсульфон *Medical polyphenylene sulfone*	

№	Russian Name / *English Translation*	Commentary
81	Резорцин *Resorcinol*	Resorcinol has a number of industrial uses, including in pharmaceuticals and as a bonding agent in the tire industry.(192)
82	Фенольная смола новолачного типа *Novolac-type phenolic resin*	Novolac has a variety of industrial uses, including in the automotive sector, in the production of tires, and in photolithography.(193)(194)
83	Поверхностно-активное вещество ЕМ (полиэфирполиол) *EM Surfactant (polyether polyol)*	Probably refers to an emulsifying surfactant used as a foaming agent.(195)(196)
84	Поверхностно-активное вещество ТХ (смесь сульфированных углеводородов) *TX Surfactant (a mixture of sulfonated hydrocarbons)*	May refer to Dow Triton X-100 surfactant. It has industrial applications in cleaners, paints, oilfields, metalworking, etc.(197)
85	Эпоксифенольный лак *Epoxy phenolic lacquer*	Coating applied to the interior of containers that protects them from corrosion and contamination. Used in storage for food, chemicals, and other goods.(198)
86	Высокомолекулярный полиакрилат натрия *High molecular weight sodium polyacrylate*	Superabsorbent polymer used for water retention and thickening.(199)
87	Термолак *Thermolak*	
88	Двухкомпонентная полиуретановая эмаль на органической основе *Two component polyurethane enamel (solvent borne)*	2K PU enamels for chemical resistant topcoats for industrial equipment.(200)
89	Термоклеевой материал на основе сополимера этилена и винилацетата *Hot melt adhesive material based on ethylene vinyl acetate copolymer*	Material-based ethylene vinyl acetate, used for packaging.(201)

№	**Russian Name / *English Translation***	**Commentary**
90	Замасливатель 354N *Lubricant 354N*	Likely FILCO 354N, an unsaturated polyester resin used to reinforce composites of glass, carbon, basalt, etc.(202)(203) FILCO products are marketed and produced by the Italian company COIM.(204)
91	Замасливатель 661 MF *Lubricant 661 MF*	Likely Filco 661 MF, a binder for use with composites.(205) FILCO products are marketed and produced by the Italian company COIM.(206)
92	Замасливатель 868 *Lubricant 868*	The meaning is unclear; a few possible candidates exist.
93	Замасливатель 9851 AF *Lubricant 9851 AF*	Possibly "Neoxil 9851AF", a variant of the composite-strengthening resin brand Neoxil of the Tennessee company AOC.(207)
94	Замасливатель 8838 *Lubricant 8838*	Possibly a kind of polyvinyl acetate, a binder used to produce fiberglass emulsion mats.(208)
95	Комплект полиграфических красок электронного отверждения *Electronic curing printing ink set*	Superabsorbent polymer used for water retention and thickening.(209)
96	Прозрачная краска-медиум Transparent paint-medium	
97	Гексаметоксиметилмеламин *Hexamethoxymethylmelamine (HMMM)*	Used in the production of coatings and plastics for cans, coils, and automobiles.(210)
98	2,2,4-триметил-1,2-дигидрохинолин *2,2,4-trimethyl-1,2-dihydroquinoline (Antioxidant TMQ)*	Antioxidant used in the rubber industry to inhibit oxidation, in tires, for example.(211)
99	Жидкость полиметилсилоксановая *Liquid Polydimethylsiloxane (PDMS)*	Liquid PDMS is used in a variety of applications to dampen motion, torque, and vibration in a number of sectors, including in military and aerospace applications.(212) Liquid PDMS is used in braking systems and hydraulics, for example.(213)

Sources

(1) https://ofac.treasury.gov/media/932446/download?inline

(2) https://tass.com/economy/1986441

(3) https://xn--80aapampemcchfmo7a3c9ehj.xn--p1ai/new-projects/novye-materialy-i-khimiya/

(4) http://en.kremlin.ru/events/president/news/76304

(5) https://forumspb.com/programme/business-programme/145561/

(6) https://www.kommersant.ru/doc/7179883

(7) https://www.yaoduochem.com/news/2019-04-05/10.htm

(8) https://links.sgx.com/FileOpen/20250424%20-%20Responses%20to%20questions%20from%20shareholders%20for%20AGM.ashx?App=Announcement&FileID=842484

(9) https://company.nokiantyres.com/news-and-media/news-article/inside-information-the-russian-governmental-commission-has-approved-pjsc-tatneft-s-purchase-of-nokian-tyres-plc-s-operations-in-russia/

(10) https://ofac.treasury.gov/media/932446/download?inline

(11) https://fardad-ibs.com/en/rubber-and-tire-industry-in-russia-en/

(12) https://www.michelin.com/en/publications/group/michelin-is-selling-its-activities-in-russia-to-power-international-tires-llc?utm_source=chatgpt.com

(13) https://www.bridgestone.com/corporate/news/2023122001.html?utm_source=chatgpt.com

(14) https://press.pirelli.com/pirelli-russian-technologies-and-sibur-holding-sign-agreement-to-develop-joint-activities-in-the-tyre-sector-in-russia/

(15) https://focus.kontur.ru/entity?query=1117746594371

(16) https://www.sibur.ru/en/press-center/news-and-press/pirelli_and_russian_technologies_finalize_transfer_of_voronezh_tyre_plant_from_sibur_/

(17) https://www.sibur.ru/en/press-center/news-and-press/sibur_has_transferred_the_assets_of_its_kirov_tyre_plant_jsc_to_the_pirelli_and_russian_technologies/

(18) https://archive.is/ZqzYZ

(19) https://books.google.com/books?id=5VGoDwAAQBAJ&pg=RA1-PT383&dq=%22kirov%22+russia+tire+military&hl=en&newbks=1&newbks_redir=0&sa=X&ved=2ahUKEwjBxPbSwPmPAxUdN2IAHeg3HmEQ6AF6BAgOEAM#v=onepage&q=%22kirov%22%20russia%20tire%20military&f=false

(20) https://www.list-org.com/company/6605322

(21) https://bmpd.livejournal.com/2084661.html

(22) https://bmpd.livejournal.com/2084661.html

(23) https://www.otr-tyre.com/1150x400-457-KI-126-Military-Cross-Country-Tire-126-pd508454268.html

(24) https://www.extremetyre.ru/product.htm?id=td0093

(25) https://zakupki.gov.ru/epz/contract/contractCard/common-info.html?reestrNumber=1770425226116001155&contractInfoId=29583862

(26) https://dossier.center/opk/

Sources

(27) https://www.jsc-niir.ru/produkciya-2/shini/

(28) https://trudvsem.ru/company/1067757820349

(29) https://checko.ru/company/pk-kirov-tayr-1174350007413#rating

(30) https://baza.drom.ru/nizhneudinsk/wheel/tire/rezina-btr-novaja-73596231.html

(31) Source 100001 - Import Genius Data

(32) Source 10004 - Import Genius Data

(33) Source 10004 - Import Genius Data

(34) https://www.linkedin.com/company/flexsys/

(35) https://flexsys.com/flexsys_products/crystex-ot33as/#:~:text=can%20be%20critical.-,Crystex%E2%84%A2%20OT%2033%20AS%20is%20a%20special%20grade%20with,%2Dstaining%20and%20non%2Ddiscoloring.

(36) Source 10002 - Import Genius Data

(37) https://www.vennok.com/product/insoluble-sulfur-ot33/?utm_source=chatgpt.com

(38) https://s3-ap-south-1.amazonaws.com/occl-web/wp-content/uploads/2020/01/DS-OT-33.pdf?utm_source=chatgpt.com

(39) https://www.tradekorea.com/product/detail/P597102/Insoluble-sulfur-OT33.html?utm_source=chatgpt.com

(40) https://rct.kglmeridian.com/view/journals/rcat/35/1/article-p147.xml

(41) https://www.lindepolymer.com/why-do-rubber-products-bloom-and-turn-white-and-preventive-measures/#:~:text=Sulfur%20is%20a%20traditional%20vulcanizing,product%20is%20cooled%2C%20forming%20bloom.

(42) https://img.antpedia.com/standard/files/pdfs_ora/20230517/D/D%204528%20-%2088%20%282017%29.pdf?utm_source=chatgpt.com

(43) https://yghuatai.com/sys-pd/5.html

(44) https://www.goldsupplier.com/provide/p171521477.html

(45) https://jingsharubber.en.made-in-china.com/product/IfCpjTBPAlks/China-High-Grade-Insoluble-Sulfur-HS-Ot33.html

(46) https://www.eastman.com/en/who-we-are/locations/dalian-china

(47) https://www.eastman.com/en/who-we-are/locations/nanjing-china

(48) https://balakovo24.ru/roman-busargin-predpriyatie-balakovorezinotexnika-odin-iz-krupnejshix-proizvoditelej-komponentov-dlya-rossijskogo-avtoproma

(49) https://dossier.center/opk/

(50) Source 10000 - Import Genius Data

(51) https://www.rosneft.com/press/news/item/222250/

(52) Source 10000 - Import Genius Data

(53) https://www.linkedin.com/company/unid-global-corporation/

(54) https://www.eni.com/en-IT/media/press-release/2017/11/lotte-versalis-elastomers-a-new-industrial-complex-in-south-korea.html?utm_source=chatgpt.com

Sources

(55) https://dossier.center/opk/

(56) http://en.kremlin.ru/events/president/news/76304

(57) https://home.treasury.gov/news/press-releases/jy1731

(58) Source 22100 - Import Genius Data

(59) Source 22100 - Import Genius Data

(60) https://tadviser.com/index.php/Company:Haval_Motor

(61) https://ofac.treasury.gov/media/932446/download?inline

(62) https://www.mdpi.com/2073-4344/14/12/841

(63) https://web.archive.org/web/20230927055356/https://www.energyintel.com/0000017f-2cae-dca3-a77f-eebf43a30000

(64) https://web.archive.org/web/20230927055356/https://www.energyintel.com/0000017f-2cae-dca3-a77f-eebf43a30000

(65) https://rupec.ru/news/49882/

(66) https://rupec.ru/society/blogs/54991/

(67) https://www.axens.net/solutions/catalysts-adsorbents-grading-supply/fcc-gasoline-selective-desulfurization-catalysts

(68) Source 20001 - Import Genius Data

(69) https://www.cnbc.com/2025/10/24/what-a-cut-in-reliances-russian-crude-purchases-would-mean-for-india.html

(70) https://www.outlookbusiness.com/corporate/reliance-denies-claims-of-receiving-22-mn-barells-of-russian-oil-amid-us-pressure

(71) Source 20002 - Import Genius Data

(72) https://ru.haihuagroup.com/solution/

(73) https://ru.haihuagroup.com/solution/petrochemical/

(74) https://ru.haihuagroup.com/solution/petrochemical/

(75) https://arcrimea.org/en/news/2022/12/31/small-and-big-problems-of-chinese-illegal-business-in-crimea/

(76) https://www.e-xecutive.ru/companies/1997777-petro-hehua

(77) https://www.tadviser.ru/index.php/%D0%9A%D0%BE%D0%BC%D0%BF%D0%B0%D0%BD%D0%B8%D1%8F:%D0%9F%D0%B5%D1%82%D1%80%D0%BE-%D0%A5%D1%8D%D1%85%D1%83%D0%B0_%28Haihua_Industry_Group%29

(78) https://www.rosneft.com/business/Downstream/Neftepererabotka/OilRefineries/KomsomolskRefinery/

(79) https://komsomolsk-na-amure.hh.ru/employer/1234432?hhtmFrom=vacancy, See also source 20003 - Petro-Hehua jobs offered in Komsomolsk-on-Amur — 19 vacancies as of November 2025

(80) Source 20001 - Import Genius Data

(81) https://web.archive.org/web/20240711044900/http://www.haihuarus-ru.1gb.ru/

Sources

(82) https://hh.ru/employer/4043619

(83) https://home.treasury.gov/news/press-releases/jl2629

(84) https://www.machinerylubrication.com/Read/31107/oil-lubricant-additives

(85) https://www.sciencedirect.com/topics/engineering/lubricant-additive

(86) https://web.archive.org/web/20230926095046/https://www.lubesngreases.com/magazine/29_6/change-abounds-for-additives/

(87) https://auto.mail.ru/article/88044-kartina-masla-avtomobilistyi-pozhalovalis-na-defit/

(88) https://newizv.ru/news/2022-06-10/avtoekspert-o-sanktsiyah-defitsit-prisadok-iz-ssha-privodit-k-polomkam-dvigateley-355267

(89) https://news.ati.su/article/2022/12/02/tseny-rastut-proizvodstvo-padaet-chto-proishodit-s-rynkom-avtomobilnyh-masel-v-rossii-530383/

(90) https://iz.ru/1536516/2023-06-29/avtomobilisty-pozhalovalis-mishustinu-na-defitcit-motornykh-masel

(91) https://www.lubesngreases.com/lubereport-asia/8_53/richful-plans-more-additive-capacity/

(92) https://dekleptocracy.substack.com/p/trumps-untapped-trump-card-a-sanction

(93) https://www.lubesngreases.com/factbook/fb-article/world-production-locations/

(94) https://archive.is/ANnwV

(95) https://web.archive.org/web/20190705191335/http://eurotechcat.com/category/kompaniya/

(96) https://www.axens.net/resources-events/news/ketjen-axens-reach-new-eurecat-relationship-and-collaboration-agreements

(97) Source 80020 – Import Genius Data

(98) Source 80020 – Import Genius Data

(99) https://www.audit-it.ru/contragent/1177746564280_ooo-evrotekhkat

(100) https://www.audit-it.ru/contragent/1207700235445_ao-spiraks

(101) https://eurotechcat.ru/

(102) https://eurotechcat.ru/products/other_products/

(103) https://chem.hanwa.co.jp/list/?id=1626839602-103891#:~:text=%E6%B7%BB%E5%8A%A0%E5%89%A4-,D.,%E6%B8%9B%E3%82%89%E3%81%99%E3%81%93%E3%81%A8%E3%81%8C%E5%8F%AF%E8%83%BD%E3%81%A7%E3%81%99%E3%80%82&text=%E9%AB%98%E7%B2%98%E5%BA%A6%E6%8C%87%E6%95%B0%E3%80%81%E9%AB%98%E3%81%84%E4%BD%8E%E6%B8%A9,%E6%80%A7%E3%82%92%E5%90%91%E4%B8%8A%E3%81%95%E3%81%9B%E3%81%BE%E3%81%99%E3%80%82&text=REACH%E3%81%8A%E3%82%88%E3%81%B3NSF%E8%AA%8D%E8%A8%BC%EF%BC%88H,%E5%8F%AF%E8%83%BD%E3%81%AA%E6%B7%BB%E5%8A%A0%E5%89%A4%E3%81%A7%E3%81%99%E3%80%82

(104) https://app.invest.dubai.ae/dul/dul-CM8557?bk=1

(105) https://www.chemicalbook.com/ChemicalProductProperty_EN_CB9162185.htm

(106) https://www.nimbasia.com/blogs/calcium-12-hydroxystearic-acid-benefits-uses-and-side-effects.html

Sources

(107) https://www.acme-hardesty.com/product/12-hydroxy-stearic-acid/

(108) Source 9000 or Source 80000 - Import Genius Data

(109) https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202501494#:~:text=KHIMINTEKHNO%20LLC.%20Local%20name:%20OOO%20%D0%A5%D0%98%D0%9C%D0%98%D0%9D%D0%A2%D0%95%D0%A5%D0%9D%D0%9E.%20Address(es):,Moscow%2C%20Shcherbinka%2C%20Simferopolskoye%20highway%2C%2016%2C%20Russian%20Federation.

(110) Source 90000 - Import Genius Data

(111) https://pmc.ncbi.nlm.nih.gov/articles/PMC5015816/

(112) Source 9000 or Source 80000 - Import Genius Data

(113) https://www.businessresearchinsights.com/market-reports/12-hydroxystearic-acid-market-122819

(114) https://interestingengineering.com/military/china-gobi-desert-military-grade-rubber

(115) https://archive.is/Cj0gU

(116) https://archive.is/OPfjw

(117) https://web.archive.org/web/20250503151416/https://itdf.ru.com/Documents/208/%D0%9F%D0%B5%D1%80%D0%B5%D1%87%D0%B5%D0%BD%D1%8C_%D0%BF%D1%80%D0%B8%D0%BE%D1%80%D0%B8%D1%82%D0%B5%D1%82%D0%BD%D1%8B%D1%85_%D0%BA%D0%BE%D0%BC%D0%BF%D0%BB%D0%B5%D0%BA%D1%82%D1%83%D1%8E%D1%89%D0%B8%D1%85_%D0%A5%D0%B8%D0%BC%D0%B8%D1%8F.pdf

(118) https://www.rbc.ru/opinions/business/26/05/2025/683073a39a794751461db7a6

(119) https://www.epa.gov/sites/default/files/2016-09/documents/beta-propiolactone.pdf

(120) https://www.specialchem.com/polymer-additives/product/henan-connect-rubber-chemical-limited-accelerator-tbbs-ns-powder

(121) https://www.chembroad.com/dcbs-rubber-accelerator-properties-uses-and-benefits/

(122) https://www.chembroad.com/cbs-rubber-accelerator-what-it-is-and-how-it-works/

(123) https://crosslandchemicals.com/rubber-accelerators.php

(124) https://www.akrochem.com/pdf/technical_data_sheet/rubber_chemicals/retarder_ctp.pdf

(125) https://www.vennok.com/wp-content/uploads/2023/10/Rubber-Antioxidant-DTPD.pdf

(126) https://www.akrochem.com/pdf/technical_papers/antiox_antioz_part1.pdf

(127) https://pubchem.ncbi.nlm.nih.gov/compound/Calcium-Glycerophosphate

(128) https://www.akrochem.com/pdf/technical_papers/reinforcing_phenolic_resins01.pdf

(129) https://www.polyolsandpolymers.net/blog/detail/application-of-alkyl-phenolic-resins-novolaks-difference-between-resol

(130) https://www.contactdermatitisinstitute.com/4-tert-butylphenol-formaldehyde-resin.php#:~:text=Where%20is%204%2Dtert%2DButylphenol,%2Dtert%2DButylphenol%20Formaldehyde%20Resin?

(131) https://www.specialchem.com/adhesives/product/lanxess-rhenogran-resorcin-80

Sources

(132) https://ris.utwente.nl/ws/portalfiles/portal/6085993/thesis_Wennekes.pdf

(133) https://www.vennok.com/product/rubber-adhesive-ra-65/

(134) https://wrchem.com/product/westco-ctp/#:~:text=Zinc%20Oxide-,Crosslinking%20&%20Vulcanization,from%20the%20date%20of%20manufacturer.

(135) https://www.specialchem.com/cosmetics/product/isaltis-mineralis-gy-ca

(136) https://www.health.harvard.edu/nutrition/xylitol-what-to-know-about-this-popular-sugar-substitute

(137) https://pubchem.ncbi.nlm.nih.gov/compound/sodium%20glycerophosphate

(138) https://www.zzcleanchem.com/Sodium-Lauryl-Sulfate-SLS-K12-SDS.html

(139) https://go.drugbank.com/drugs/DB00815

(140) https://health.ec.europa.eu/system/files/2023-12/sccs_o_276_final.pdf

(141) https://en.wikipedia.org/wiki/Dicalcium_phosphate

(142) https://en.wikipedia.org/wiki/Sodium_cocoamphoacetate

(143) https://en.wikipedia.org/wiki/Hydroxyethyl_cellulose

(144) https://patents.google.com/patent/EP2526077A1/en

(145) https://en.wikipedia.org/wiki/Polyvinylpyrrolidone

(146) https://pubmed.ncbi.nlm.nih.gov/23212975/

(147) https://en.wikipedia.org/wiki/Polysorbate_20

(148) https://en.wikipedia.org/wiki/Paraben

(149) https://www.henkel-adhesives.com/ke/en/products/industrial-coatings/mold-release-agents.html

(150) https://en.wikipedia.org/wiki/Tert-Butyl_chloride

(151) https://www.chemimpex.com/products/31487?srsltid=AfmBOorM652fTX2bUHZmAdRO0Bf9UHnIPi4wcOtnajO7p-mfiuBOzR4W

(152) https://drugs.ncats.io/drug/LU49E6626Q

(153) https://www.acme-hardesty.com/product/alkyl-benzoate/

(154) https://www.clariant.com/en/Solutions/Products/2019/02/15/09/47/ShiftMax-217#:~:text=ShiftMax%E2%84%A2%20217%20is%20a,numerous%20commercial%20LTS%20reactors%20worldwide

(155) https://www.welker.com/syngas-more

(156) https://www.axens.net/solutions/catalysts-adsorbents-grading-supply/fcc-gasoline-selective-desulfurization-catalysts

(157) https://www.axens.net/solutions/catalysts-adsorbents-grading-supply/fcc-gasoline-selective-desulfurization-catalysts

(158) https://www.axens.net/solutions/catalysts-adsorbents-grading-supply/fcc-gasoline-selective-desulfurization-catalysts

(159) https://www.lyondellbasell.com/en/who-we-are/updates-events/products--technology-news/lyondellbasell-selected-by-indian-oil-corporation-ltd.-for-advanced-hdpe-technology

Sources

(160) https://www.nouryon.com/product/trigonox-c-tert-butyl-peroxybenzoate-cas-614-45-9

(161) https://www.nouryon.com/globalassets/inriver/resources/pds-trigonox-c-polymer-production-glo-en.pdf

(162) https://www.tolyltriazole-benzotriazole.com/products/123-benzotriazole/

(163) The English elements in the name are in the original Russian document

(164) https://www.specialchem.com/cosmetics/inci-ingredients/octylacrylamide-acrylates-butylaminoethyl-methacrylate-copolymer

(165) The English elements in the name are in the original Russian document

(166) https://www.specialchem.com/cosmetics/product/basf-luvimer-100-p

(167) https://pureon.com/products/lapping-and-polishing-slurries/acidic-colloidal-alumina-slurries/

(168) https://www.fujimi.com/catalog/compol/

(169) https://en.wikipedia.org/wiki/Water%E2%80%93gas_shift_reaction

(170) testbook.com/chemistry/zinc-hydroxide

(171) https://hmroyal.com/blog/french-process-zinc-oxide-a-key-ingredient-in-rubber-production/

(172) https://mateossl.es/oleic-acid/

(173) https://en.wikipedia.org/wiki/Stearic_acid

(174) https://www.goldenagri.com.sg/stearic-acid-101-the-quiet-game-changer-in-oleochemicals/

(175) https://en.wikipedia.org/wiki/Fumed_silica

(176) https://www.essentialminerals.org/mineral/wollastonite/

(177) https://www.edge-techind.com/Products/Refractory-Metals/Other-metals/Nickel-Ni/Nickel-Oxide-Powder-799-1.html

(178) https://en.wikipedia.org/wiki/Yttria-stabilized_zirconia

(179) https://www.preciseceramic.com/blog/an-introduction-to-cordierite-ceramic.html

(180) https://itwperformancepolymers.com/products/plexus/low-modulus/plexus-ma3940lh

(181) https://nevacert.ru/reestry/gos-reestr/ru-33-vl-04-008-e-000651-07-12

(182) https://patents.google.com/patent/WO2019141823A1/en

(183) https://www.solvay.com/en/brands/zeosil/zeosil-1085gr

(184) https://www.harwick.com/files/tds/HI_SIL_255C-D_255CG-D.PDF

(185) https://investor.ppg.com/news/news-details/2024/PPG-completes-sale-of-silicas-products-business-to-QEMETICA/default.aspx

(186) https://www.solvay.com/en/product/zeosil-1165mp

(187) https://www.valudor.com/buying-and-industry-uses-of-zinc-sulfat

(188) https://www.mcam.com/en/products/peek

(189) https://www.mdpi.com/1424-8247/16/3/454

(190) https://www.sciencedirect.com/science/article/pii/S2666542524000262

(191) https://www.acmeplastics.com/what-is-petg

(192) https://capitalresin.com/the-properties-and-uses-of-resorcinol/

Sources

(193) https://www.sumibe.co.jp/english/topics/2025/hpp/0319_01/index.html

(194) https://bakelite.com/bakelite-phenolics-in-everyday-electronics/

(195) https://www.gantrade.com/blog/what-is-a-surfactant

(196) https://pmc.ncbi.nlm.nih.gov/articles/PMC9798868/#:~:text=22%E2%88%9230,than%20those%20governing%20bubble%20growth.

(197) https://www.dow.com/documents/119/119-01882-01-triton-x100-surfactant-tds.pdf?iframe=true

(198) https://unicheminc.com/technologies/feature/epoxy-phenolic-lining/#:~:text=Epoxy%20phenolic%20linings%20are%20specialized,contents%20from%20contamination%20and%20corrosion.

(199) https://en.wikipedia.org/wiki/Sodium_polyacrylate

(200) https://en.wikipedia.org/wiki/Polyurethane#Adhesives_and_coatings

(201) https://en.wikipedia.org/wiki/Hot-melt_adhesive

(202) https://www.patproducts.store/products/filco-354n

(203) https://www.coimgroup.com/filco-en.htm

(204) https://www.coimgroup.com/filco-en.htm

(205) https://www.patproducts.store/products/filco-661-mf

(206) https://www.coimgroup.com/filco-en.htm

(207) https://issuu.com/aocresins/docs/aoc_neoxil_brochure_-_web_version_feb_2024_

(208) https://ru.made-in-china.com/co_unioncomposites/product_Polyvinyl-Acetate-Emulsion-Binder-8838-PVAC-for-Fiberglass-Chopped-Strand-Mat-Tissue_yssrssserg.html

(209) https://www.sigmaaldrich.com/US/en/tech-docs/paper/1290876?srsltid=AfmBOooMUJWWhQxLj9HewwTZ2uNPZhS8aEtRj_pUKQrtgpbFgnbH6Ui4

(210) https://www.zxchem.com/products/poly12-dihydro-224-trimethylquinoline/

(211) https://www.clearcoproducts.com/silicone-damping-fluids/

(212) https://www.clearcoproducts.com/defense/

(213) https://gwunitedsilicones.com/pure-polydimethylsiloxane-fluid/