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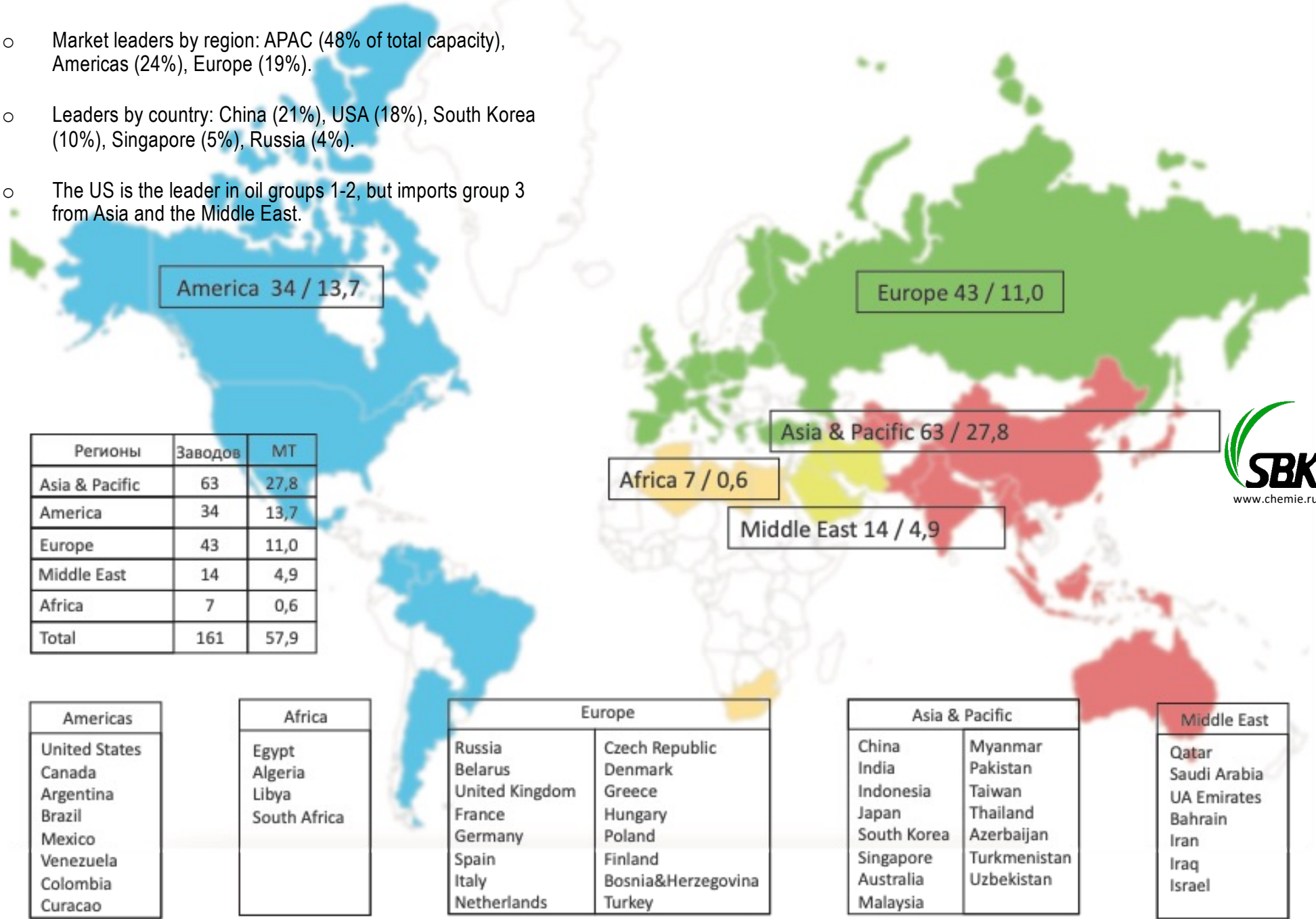
Some trends in the development of the lubricants market



Moscow - St. Petersburg
2024r.

Location of plants producing oils of groups 1-3 with their capacities by regions, megatons

- Market leaders by region: APAC (48% of total capacity), Americas (24%), Europe (19%).
- Leaders by country: China (21%), USA (18%), South Korea (10%), Singapore (5%), Russia (4%).
- The US is the leader in oil groups 1-2, but imports group 3 from Asia and the Middle East.



America 34 / 13,7

Europe 43 / 11,0

Asia & Pacific 63 / 27,8

Africa 7 / 0,6

Middle East 14 / 4,9



Регионы	Заводов	MT
Asia & Pacific	63	27,8
America	34	13,7
Europe	43	11,0
Middle East	14	4,9
Africa	7	0,6
Total	161	57,9

Americas
United States
Canada
Argentina
Brazil
Mexico
Venezuela
Colombia
Curacao

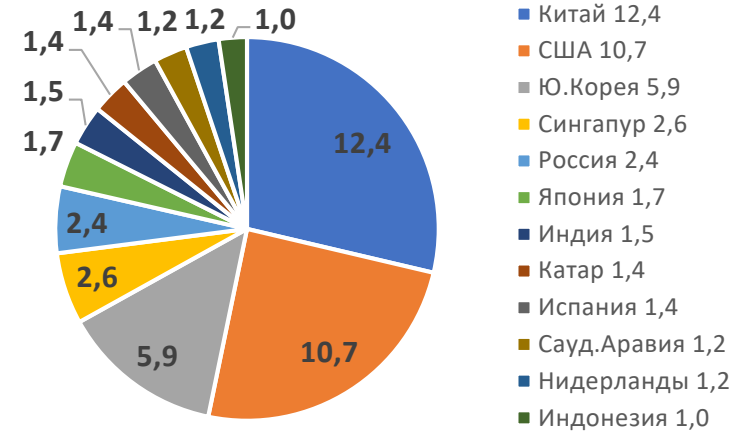
Africa
Egypt
Algeria
Libya
South Africa

Europe	
Russia	Czech Republic
Belarus	Denmark
United Kingdom	Greece
France	Hungary
Germany	Poland
Spain	Finland
Italy	Bosnia&Herzegovina
Netherlands	Turkey

Asia & Pacific	
China	Myanmar
India	Pakistan
Indonesia	Taiwan
Japan	Thailand
South Korea	Azerbaijan
Singapore	Turkmenistan
Australia	Uzbekistan
Malaysia	

Middle East
Qatar
Saudi Arabia
UA Emirates
Bahrain
Iran
Iraq
Israel

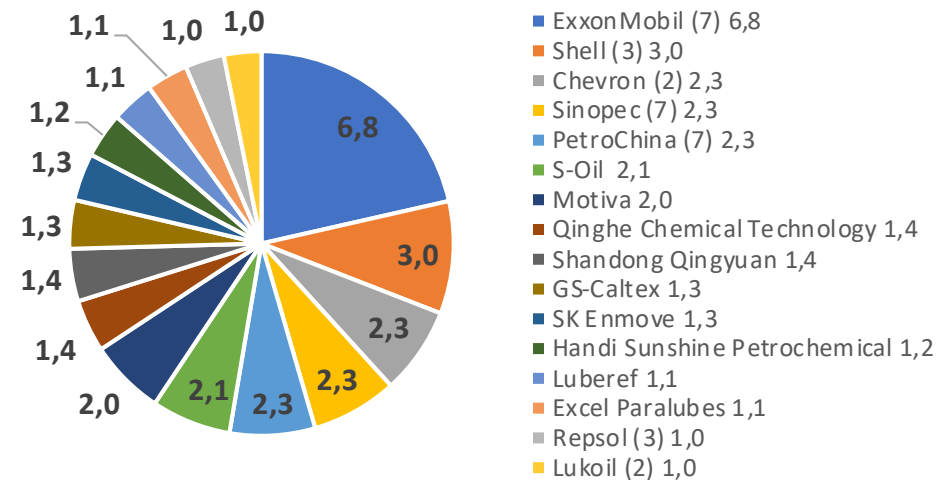
Countries with production capacity of base oils of groups 1-3 in 2023 of more than 1 million tons/year



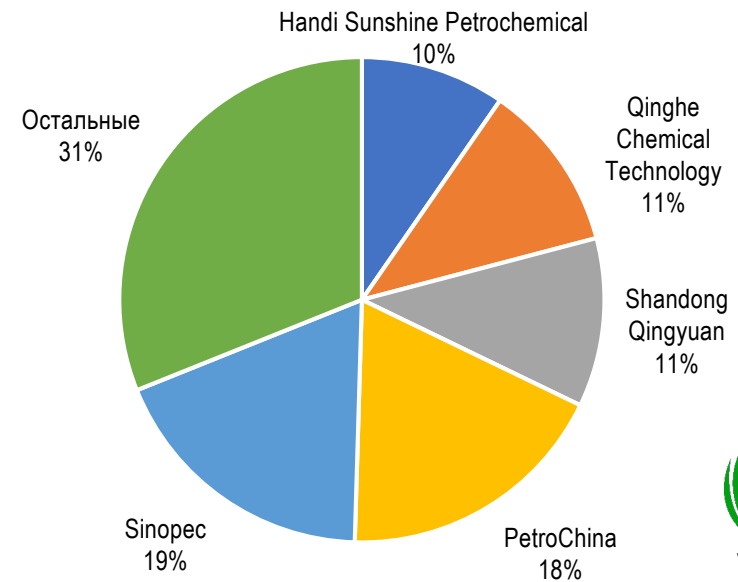
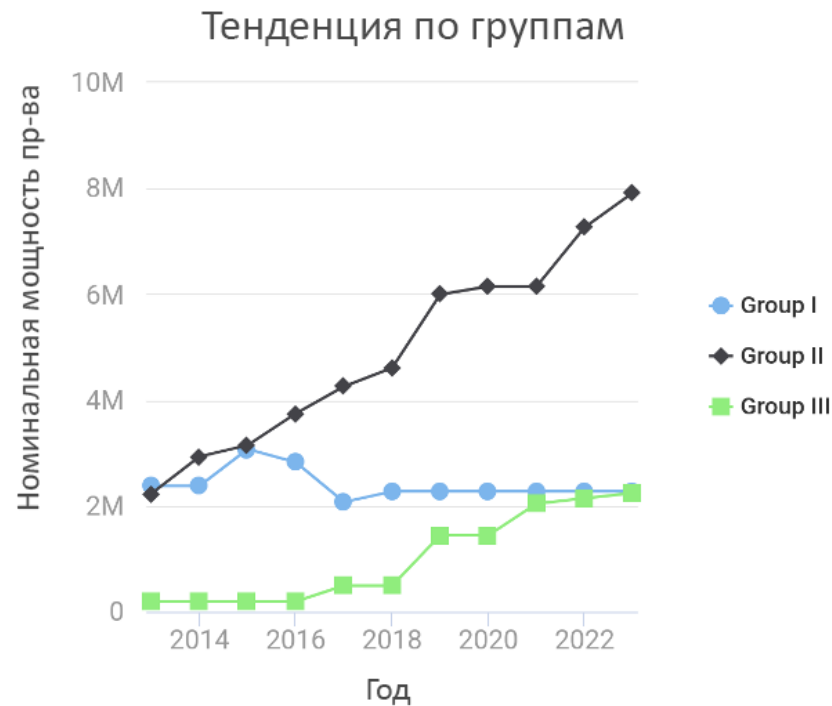
- Despite the APAC region's leadership in terms of capacity, the most influential among the companies are Western Exxon Mobil (7 plants), Shell (3 plants) and Chevron (2 plants). Shell takes the second place due to its capacities in Qatar and South Korea.
- Only after them come Chinese producers: Sinopec (7 plants) and PetroChina (7 plants), South Korean company S-Oil with one plant with a capacity of about 2 million tons per year.



Companies with production capacity of base oils of groups 1-3 in 2023 of more than 1 million tons/year



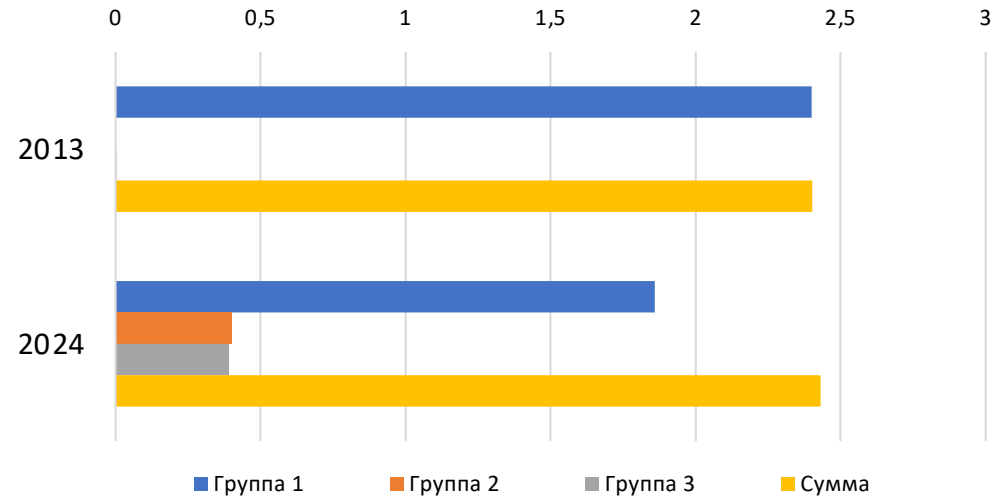
Production structure of base oils of groups I-III in China



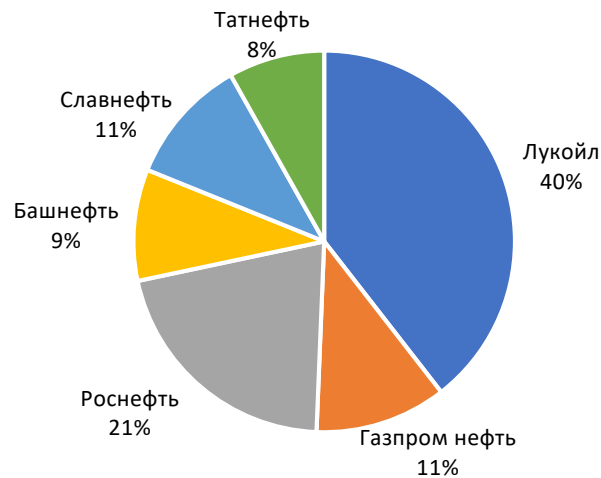
- Despite China's first place in base oil production capacity - about 60% is idle (production for 2023 - 7.54 million tons).
- Exports from China in 2022 increased to 140 thousand tons mainly due to Sinopec, while in 2018 it was about 25 thousand tons.
- China produces mostly Group 2 base oils (64% of all oils in Groups 1-3), but has a need for Group 3 base oils, which are imported. For 2022, imports amounted to about 1.8 million tons.
- China came out on top in terms of base oils production capacity in 2022 - 12.5 million tons for groups I-III only, 14 million tons including naphthenic oils.
- China's production of base oils has increased 3 times in the last 10 years.
- In 2023, the production of Group II+/III oils was expanded by 600,000 tons/year in Taizhou by Taizhou Co.

Production capacity of base oils of groups I-III in Russia

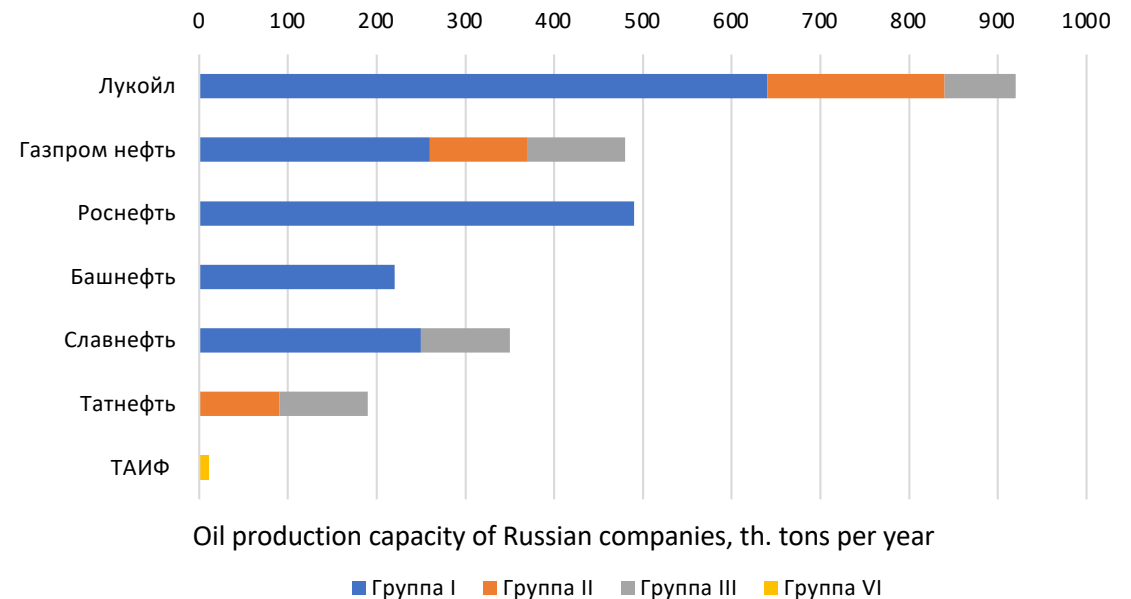
- About 280 thousand tons of Group II and III oils have been put into production in Russia over 10 years, with Group I production capacities decreasing both in relative and absolute terms, but still prevailing in total production.
- The leader by company is Lukoil, both in terms of capacity and diversity. Rosneft and Bashneft are producers of Group I oils only. Gazprom Neft, with the launch of a new unit at the end of 2023, has the capacity to produce all three groups of oils.



Structure by company (2023)

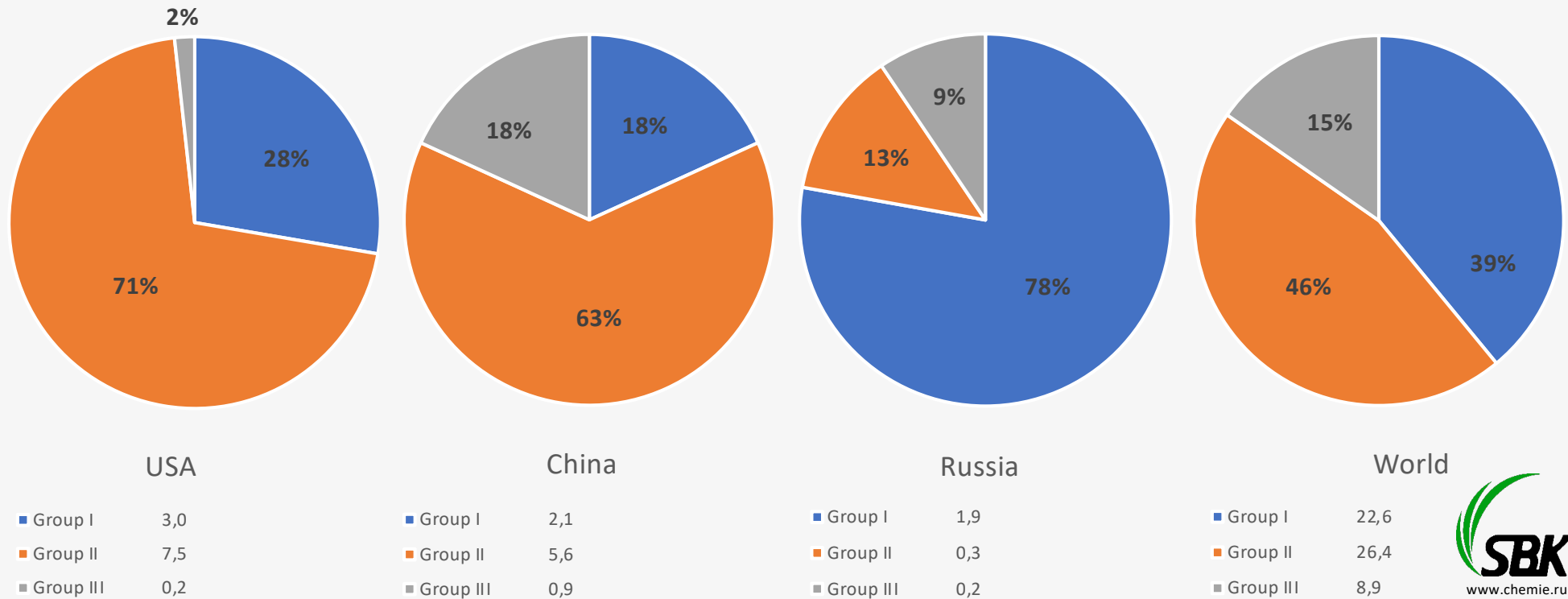


Base oils production structure by groups and by companies



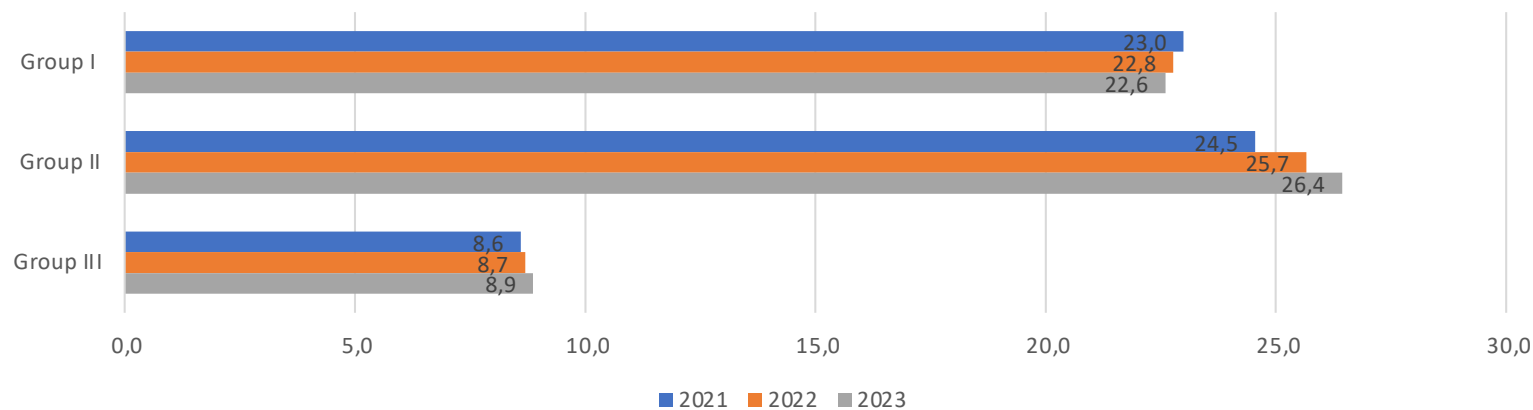
Oil production capacity of Russian companies, th. tons per year

Ratio of production capacity of base oils of groups 1, 2 and 3 in 2023, mln tons



- In 2023, the capacity of plants producing base oils of groups I-III amounted to 57.9 million tons, of which 39% was group 1, 46% was group 2, and 15% was group 3.
- Total production of base oils of groups I-III in the world is growing at 1-2% per year, with production of group 1 oils decreasing and groups 2 and 3 increasing.
- Group I oil production capacity will decrease: Luberef (Saudi Arabia) will close its refinery in 2026 and Eneos (Japan) has already closed at the end of 2023 but will continue to supply until March 2024.
- More than 15 projects until 2027 include expansion of existing capacities or construction of new plants with a total capacity of more than 6 million tons.
- We can also note the repurposing of some production facilities. For example, an oil refinery in Japan is planned to be replaced by a low-carbon fuels plant. At the same time, there are also reverse cases, for example, Shell plans to change the profile of the plant from fuel to oil (Group III) in Germany.
- Thus, production of Group 2 and Group 3 oils will continue to grow. Key countries where new projects are planned: USA, India, China, Saudi Arabia.
- The largest increase in capacity will be for Group III oils.

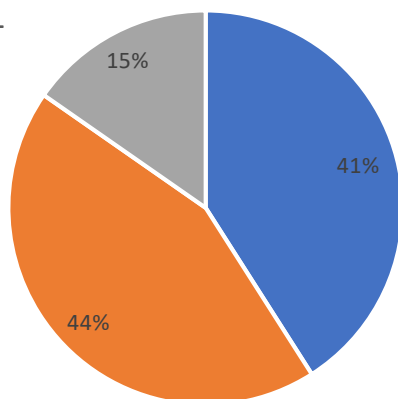
Growth rate of oils of groups 1-3 from 2021 to 2023, mln tons



	I Group	II Group	III Group	Total
2021	23,0	24,5	8,6	56,1
2022	22,8	25,7	8,7	57,1
2023	22,6	26,4	8,9	57,9

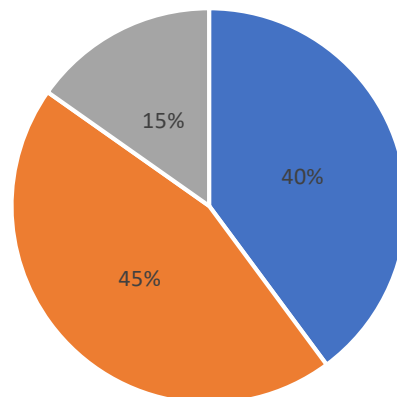


2021



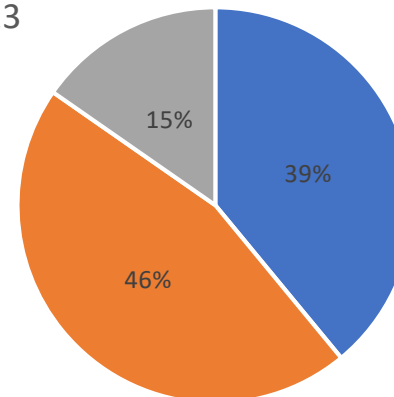
■ Group I ■ Group II ■ Group III

2022



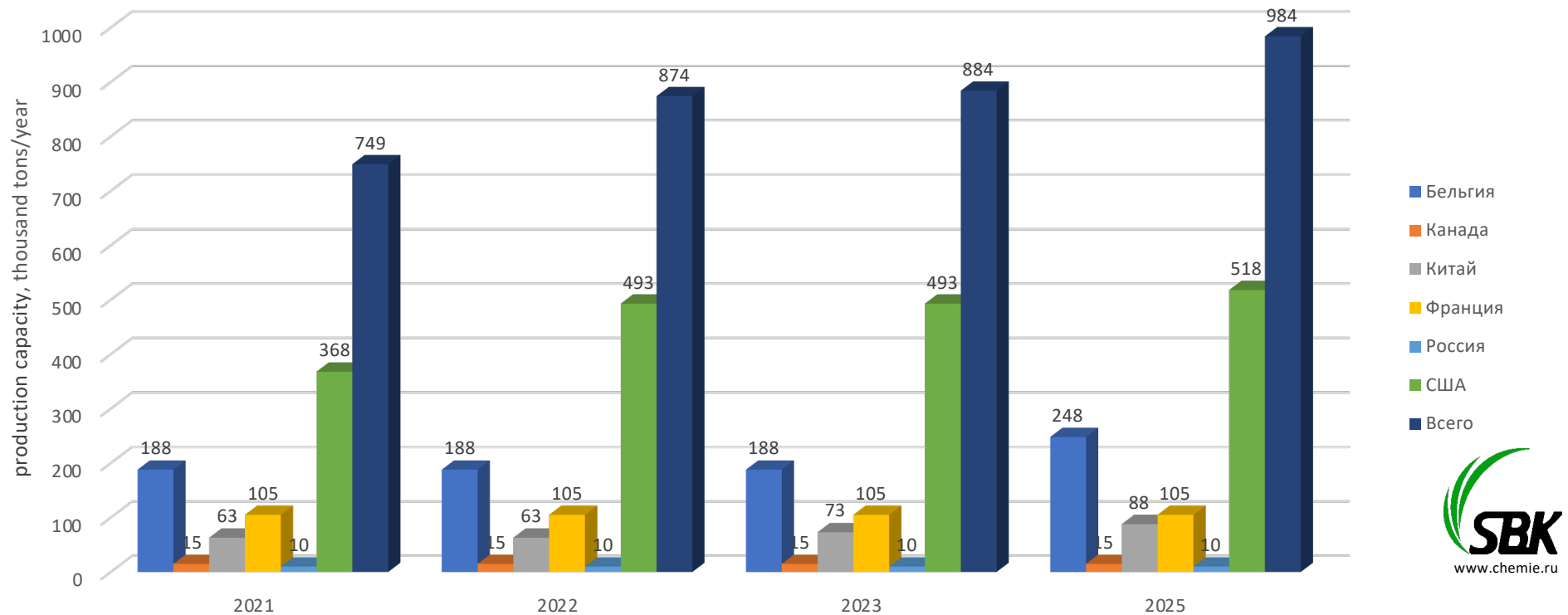
■ Group I ■ Group II ■ Group III

2023



■ Group I ■ Group II ■ Group III

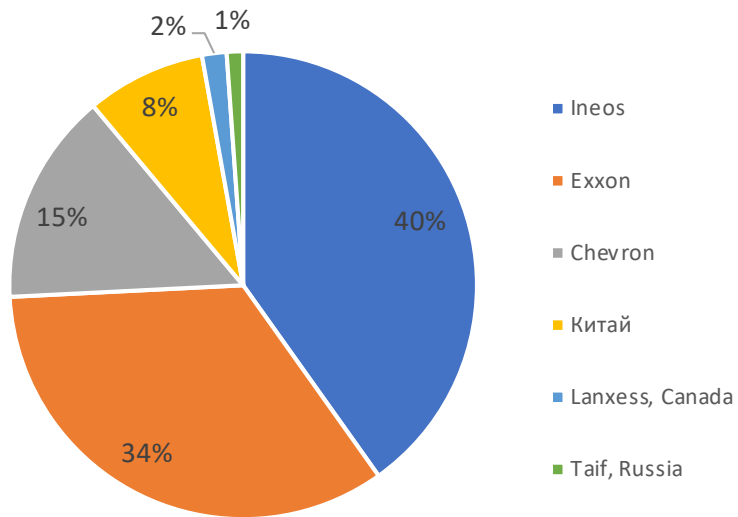
World production capacity of base oils thousand tons



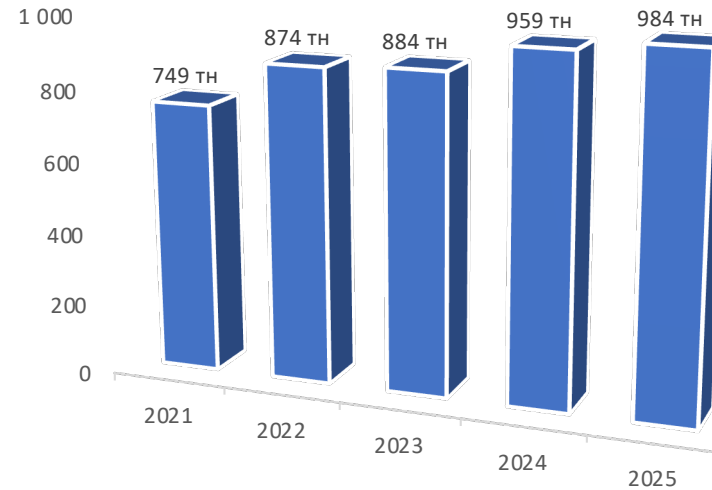
- The majority of PAO production capacity is located in the USA (5 plants with a total capacity of 493 thousand tons).
- By 2025, production capacity is expected to increase by about 100 thousand tons due to new projects in the USA, China and Belgium. There are also projects for which production volumes have not yet been announced (Ineos project in Saudi Arabia).
- In Russia there is only one PAO production facility in operation at the Nizhnekamsk complex and there are no plans to expand it.
- Ineos Oligomers, ExxonMobil Chemical and Chevron Phillips Chemical are the world market leaders in production of PAOs. At the same time, there are 9 companies with 16 plants worldwide.
- Compared to Groups II-III, the growth of new capacities is rather low.

Production of base oils of groups 4-5 in 2023

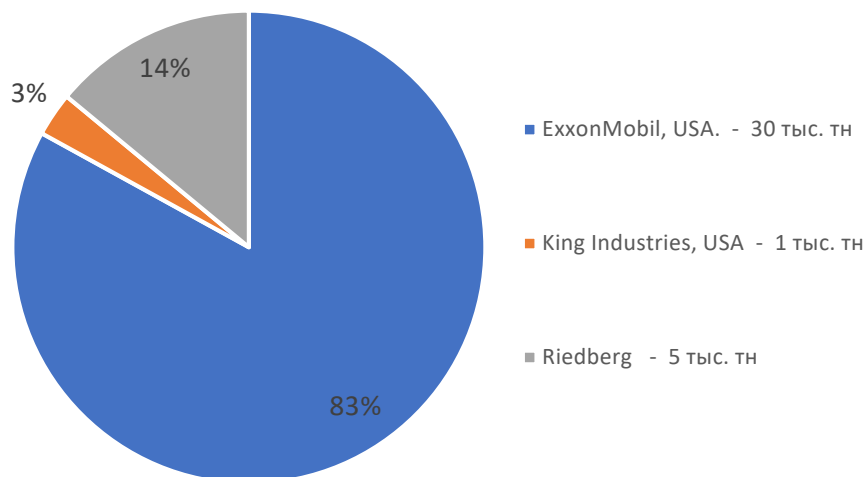
Production capacities of PAO



Production growth rate of PAO thousand tons



Production capacities of AN thousand tons



PAO offers from China

2 / 3 / 4 / 6 / 8 / 10 / 12

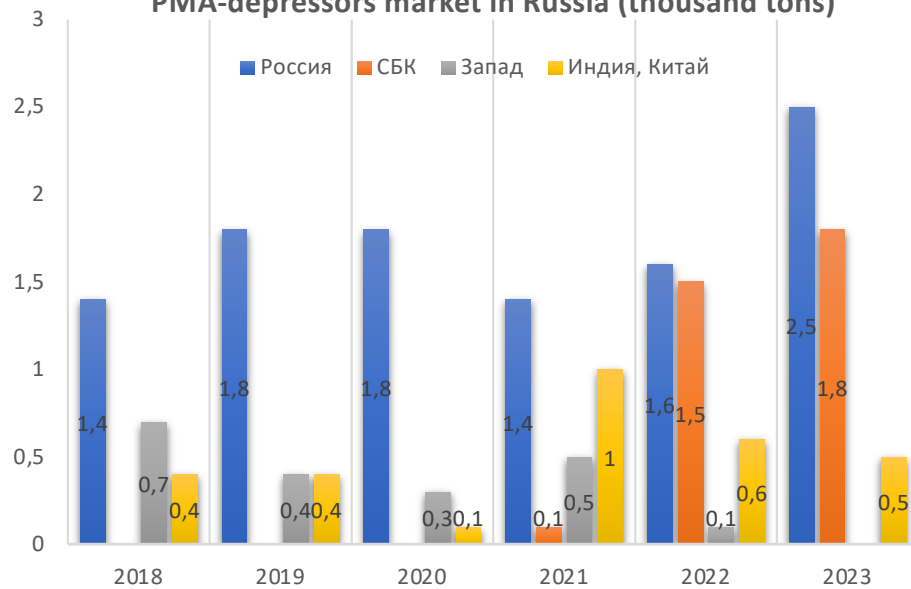
- 20 / 40 / 100
- 65 / 150
- 600 / 1000

Some planned plants of PAO

- Satellite Chemical - 15
- Chevron Phillips Chemical - 60
- Ineos Oligomers (2025) - 25
- JV China National Offshore Oil Co & Shell

Russian PMA additives market

PMA-depressors market in Russia (thousand tons)

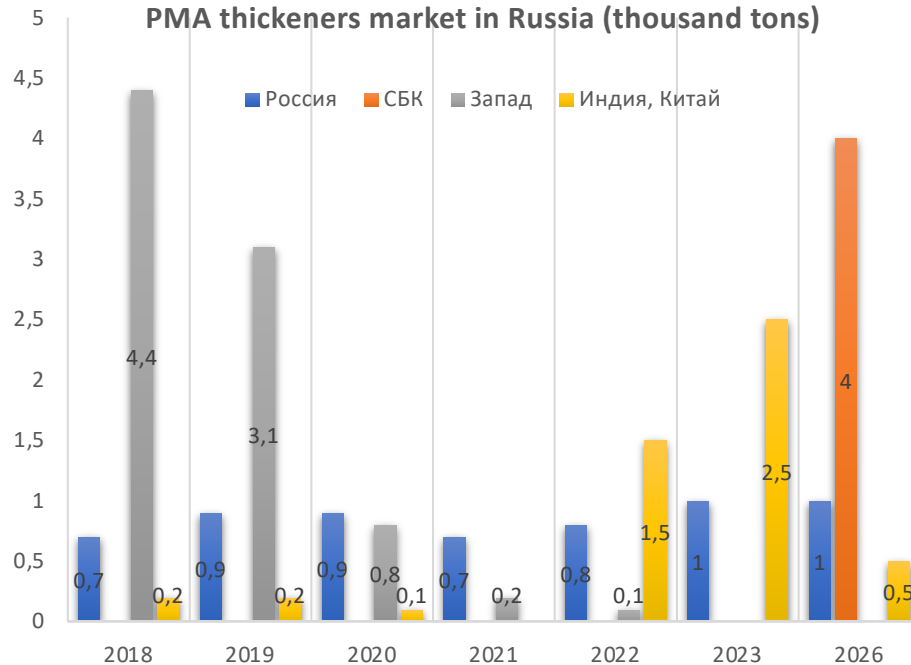


- From 2022, growth in Russian production due to the launch of the newest production facility in Kazan with a capacity of 3.6 thousand tons/year
- Total market growth forecast is due to increase in domestic production of finished oils

Import substitution of PMA



PMA thickeners market in Russia (thousand tons)



- In 2024, we expect new PMA-based thickeners produced in Kazan to be launched on the market
- By 2025, the share of Russian products in the PMA additives market will reach 95%.
- By 2026, the PMA additives market will reach the pre-pandemic level

Product PMA - 7/60

PMA 7/60 is a highly effective and resistant to degradation depressor used in engine, gear, hydraulic and industrial oils by breaking down crystallizing paraffins.

The recommended % input is 0.1% to 1%

Name of Indicator	Test method	Standart
External appearance	ГОСТ 25336	A light brown colored liquid
Kinematic viscosity at 100°C, mm ² /sec	ГОСТ 8420 или ASTM D 445	40-500
Density (at 200C), g/dm ³	ГОСТ 18995.1 или ASTM D4052	850 - 950
Температура вспышки, °C	ГОСТ 6356 или ASTM D92	Не менее 90

Base oil	% of input PMA 7/60	Result
I group (-15 °C)	0,4	-40
II group (-18 °C)	0,4	-46
III group (-28C)	0,4	-50



- PMA-7/60 is a solution of polyalkyl methacrylates in the base oil of group II, which is obtained by means of modern hydrocatalytic processes, the content of paraffin-naphthenic hydrocarbons is much higher than in the base oils of group I obtained by means of solvent processes. Therefore, the use of polymer as a solvent in group II base oils allows to destroy crystallizing paraffins most effectively.
- Within 3 years we managed to increase the output of the depressor from 300 to 1800 tons per year
- The product is included in the formulations of more than 80% of all Russian oil producers.
- In 2024, we expect to double the output growth due to a new line of polymethacrylate thickeners.

Pr H 2157 product

- liquefied nitrogen-containing heterocyclic derivative of aliphatic amine with long carbon chain benzotriazole, belongs to a series of organic friction modifiers of lubricating oils and shows its efficiency due to chelation and adsorption on metal rubbing surfaces.
- theoretical nitrogen content is about 15.0%
- a slightly alkaline product with a total alkaline value of approximately 13.2 mgKOH/g, which is important for extending the life of the lubricating oil and neutralizing acidic substances in the system
- the structure of long-chain aliphatic amine gives it typical friction improvement properties; the nitrogen-containing heterocyclic compound gives it excellent non-ferrous metal corrosion inhibition properties, which can obviously inhibit copper corrosion by active sulfur and can partially or completely replace expensive copper
- Has obvious anti-seize and anti-wear properties with sulfur, which can effectively improve the quality of lubricating oil. Has anti-corrosion properties and can be used as amine anti-corrosion agents for anti-corrosion components. It has antioxidant properties and can be used with phenols

Etovel KE 36 product

Etovel KE 36 is an ethoxylated castor oil with 36 mole of Ethylene Oxide. We also produce castor oil ethoxylates from 20 to 54 mol EO. Etovel KE 36 are used as an ingredient in soluble oil-based process fluids (PMFs), semi-synthetic coolants, and pure oils. Their main role is to dissipate the heat generated by the friction of the processed materials and to reduce friction.

Applications of Etovel KE 36:

- Coolants for machining
- component in the formulation of coolants used in machining processes
- hydraulic fluids



Product Benefits:

- very good emulsifying, solubilizing, dispersing and lubricating properties
- resistance to acidic environment
- biodegradability
- the product is not classified as a hazardous substance according to the CLP/GHS Regulation.
- good solubility in water
- the product is soluble in most organic solvents