SIBUR for Clients
ISSUE № 22

CHEMICALS AGAINST THE CORONAVIRUS

The epidemic is an additional incentive to set up advanced production facilities in Russia.

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Fine chemistry focuses on high value-added products like dyes, surfactants, pharmaceutical substances, etc. It involves multi-step processes which require skilled professionals and sophisticated equipment. The chemicals here mainly come from China and Germany. Russia's chemical industry will hardly ever be able to cover the domestic demand, but in fact, there is no such need. Nevertheless, the lack of Russian-made fine chemicals hinders the development of such sectors as pharmaceuticals, which are so in demand in this market.

The fight against the coronavirus has highlighted the necessity of promoting domestic chemical production to provide people with modern medicines, antiseptics and disinfectants. Their range is extremely wide today: surfactants (quaternary ammonium compounds (QACs), e.g. Miramistin), chlorine-containing compounds (Chloramine B), oxygen-containing compounds (hydrogen peroxide and peroxy acids), amines, alcohols (ethanol, propyl alcohol, isorpopyl alcohol), guanidines (Chlorhexidine), salts of heavy metals, and many others. Most of the antiseptics currently in the market are based on QACs imported from China.

At best, Russian manufacturers just make the finished pharmaceutical product or simply reconstitute the concentrate and then bottle it. Although a simple compound, it is not produced in Russia – something that needs to be changed given the growing demand. Pharmaceuticals face a similar challenge: while the development of new medicines has been traditionally considered the domain of healthcare professionals and pharmacists, one should bear in mind that it all starts with chemistry. Obtaining the active pharmaceutical

substance and developing its production process both require chemical technologies. The programme for the development of the pharmaceutical and medical industry in 2013–2020 maintained by the Ministry of Industry and Trade helped create a lot of promising preparations for treatment and diagnosis, and 50% of medicines in the Russian market are now manufactured domestically.

Drug manufacturing at the Advanced Pharmaceuticals Indian-Russian JV.

RUSSIA’S MARKET IS DOMINATED BY INDIAN AND CHINESE SUPPLIERS, WITH ONLY 5% COVERED BY ACTIVE AGENTS MADE DOMESTICALLY. CHINA IS THE LEADER IN THE TRADITIONAL LARGE-TONNE PRODUCTION,WHILE INDIA IS THE TOP MANUFACTURER OF ADVANCED HIGH-TECH PRODUCTS

Producing a medication is a two-step process involving making a pharmaceutical substance (an active agent) and the finished pharmaceutical product to be used by patients. Russia does quite well with the finished products, while pharmaceutical substances leave a great deal to be desired. Its market is dominated by Indian and Chinese suppliers, with only 5% covered by active agents made domestically. China is the leader in the traditional large-tonnage production, while India is the top manufacturer of advanced high-tech products. The Chinese pharmaceutical industry had never led the world in innovation, focusing on generic medicines instead. Recently, however, it has been investing a lot of effort in innovative development.

Pharmaceutical substances require a more complex production process than antiseptics – one that involves state-of-the-art technologies and highly-skilled personnel. However, even if both of these components are available, setting up own production of substances is a challenging and often unachievable task. The Dmitry Mendeleev University of Chemical Technology of Russia successfully works with major Russian suppliers to establish pharmaceutical facilities, but these projects are clearly insufficient to cover the market demand.

Again, the main problem is the lack of domestic chemical feedstock for synthesis. Bearing in mind the goals and objectives of Russian producers, their foreign peers hinder the sale of semi-finished products and intermediates, because they understand that Russia is going to stop importing their raw materials quite soon. Having domestic production of the substances is a must. After all, it is a matter of national security and public health.

A doctor by an extracorporeal membrane oxygenation machine.

THE CHEMICAL INDUSTRY IS A DRIVER OF ECONOMIC GROWTH. IT IS VITAL FOR THE DEVELOPMENT OF OTHER INDUSTRIES, INCLUDING PHARMA

There is one more example of using chemical products to tackle COVID-19 – polymer membranes for extracorporeal membrane oxygenation (ECMO), a device for people with lung failure. Hospital No. 52 in Moscow has seven such devices to treat the patients most severely affected by the coronavirus.

ECMO works in the same manner as human lungs, with the polymer membrane functioning as the lung tissue to oxygenate the blood and remove CO_2 from it. The membrane must have a high gas permeability and be both biologically and chemically compatible with human blood. It is made from polytetrafluoroethylene, polypropylene, copolymers (polycarbonate/polysiloxane), etc. Special polymers are fine chemicals manufactured for ECMO only in Japan, the US, Germany, and Italy.

The chemical industry is a driver of economic growth. It is vital for the development of other industries, including pharma. Making these much needed products will be impossible without the government's support and cooperation between the business and scientific communities. To this end, the Law On Innovative Research and Development Centres was adopted, and the government passed a resolution on subsidising joint efforts of universities and businesses aimed at creating advanced high-tech facilities. However, as the pandemic gives rise to new challenges for the chemical and business communities, the government needs to act as a customer that can redirect its support to products and technologies crucial to the national security.

Source: Vedomosti (https://www.vedomosti.ru/opinion/articles/2020/05/20/830689-himiya-koronavirusom)