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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

REPORT

STAT

COUNTRY USSR

DATE DISTR. 12 May 1948

SUBJECT Chemical Industry

NO. OF PAGES 4

PLACE ACQUIRED USSR

NO. OF ENCLS. (LISTED BELOW) 3161.1A

DATE OF INFORMATION November 1947

SUPPLEMENT TO REPORT NO.

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THIS IS UNEVALUATED INFORMATION FOR THE RESEARCH USE OF TRAINED INTELLIGENCE ANALYSTS

SOURCE Russian periodical. Khimicheskaya Promyshlennost, No 11, 1947. (Information specifically requested.)

THIRTY YEARS OF THE SOVIET CHEMICAL INDUSTRY

Russia's chemical production in 1913 was only 2 per cent of that produced in 1940.

In prospecting for phosphorite raw materials, a detailed study was made in 1929-33 of the rich deposits of apatite-nepheline ore in the Khibins on Kukisvumchorr Mountain. A large-scale mining-chemical enterprise, the Apatite Combine imeni S. M. Kirov, was planned, built, and operates at the present time on the base of these deposits. Inasmuch as the apatite ore contains only 24 per cent phosphoric anhydride, Soviet chemists developed an original method of preliminary concentration of the ore by flotation in order to be able to use it in the phosphate fertilizer industry. The flotation method made it possible to obtain a concentration of 40 per cent phosphoric anhydride.

A great achievement of Soviet mining chemistry was the opening of the stratified phosphorite deposits in the Kara-Tau mountains. The construction of a first-class mine in Kara-Tau was completed in 1946. This has created the basis for the construction of large-scale superphosphate plants in Central Asia, which are necessary for the development of agriculture in Uzbekistan and Kazakhstan.

Another achievement is the opening of the rich potassium salt deposits and construction of the Solikamsk Potassium Combine on their base. These deposits of high-quality potassium salts cover an area of more than 2,000 square kilometers. The Combine supplies the country with potassium chloride and magnesium chloride and frees Russia from importation of the necessary potassium salts. Prior to World War II, construction was begun on a second Solikamsk potassium combine, the first part of which is operating at the present time.

During the first years of the existence of the Soviet Republic a raw material base was created for the production of sulphuric acid. The creation of this raw material base was parallel with the development of non-

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ferrous metallurgy.

The problem of boric ores was solved with the opening of the Indersk borate deposits in 1934.

The development of one of the most important branches of the chemical industry, nitrogen, was begun in 1927 with the opening of the Chernorechensk chemical plant. It was the first synthetic ammonia plant in the Soviet Union.

At this time construction was begun on the Dorogomilovsk and Rubezhansk aniline dye plants and a number of superphosphate and sulphuric acid plants.

The nitrogen industry, including the production of synthetic ammonia and the processing of it into nitric acid, received the greatest development in the Stalin Five-Year Plans. Such giants of the chemical industry as Stalinogorsk, Berezniki-vsk, Chirchinsk, Kemerovo, and other nitrogen fertilizer plants were developed under this program.

The following methods were developed to solve the raw material problem of the nitrogen industry: gasification of coke and low-grade fuels, as a result of which a rational plan for gasification and construction of gas generators was developed; obtaining hydrogen from coke gas by cooling the gas from natural gas containing methane by catalytic conversion of the gas; obtaining hydrogen from water by electrolysis in large original electrolyzer installations; gasification of coke of low-grade coal using an oxygen blast.

The sulphuric acid industry and production of mineral fertilizers was widely developed during the Stalin Five-Year Plans. During this period such large-scale enterprises as Voskresenskiy Chemical Combine, Nevskiy superphosphate plant, Konstantinova chemical plant, and many other plants producing superphosphates and sulphuric acid were built. The production of sulphuric acid in 1940 was 9.6 times greater than in 1913, and the extraction of phosphorites increased 57 times in comparison with prerevolutionary production.

Considerable work was carried on in the sulphuric acid industry on the intensification of production. Whereas the original planned capacity of the tower system was 18-20 kilograms of sulphuric acid per one cubic meter of tower, at the present the capacity of most sulphuric acid plants is 100 kilograms per cubic meter, while in some plants it reaches 200 kilograms per cubic meter.

The production of calcined soda in 1940 was 3.3 times that of 1913, while the production of caustic soda had increased 2.6 times.

In the first years of World War II the chemical industry lost a considerable amount of its productive capacity in a number of branches. These losses in comparison with the prewar capacity were: 50 percent in the nitrogen industry, 77 percent in the sulphuric acid industry, 83 percent in the calcined soda industry, and 88 percent in the dye industry. However, long before the end of the war, work on the destroyed plants was begun, and by the end of the war they had not only been restored, but chemical production had been expanded.

The new Five-Year Plan stipulates that by 1950 the chemical industry, though the introduction of new advanced techniques, and intensification of the productive processes, must surpass prewar production by one and a half times. Capital investment for the chemical industry projected in the present Five-Year Plan is equal to the total investment of the three earlier Five-Year Plans combined.

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THE NITROGEN INDUSTRY -- ONE OF THE MOST IMPORTANT BRANCHES OF THE NATIONAL ECONOMY

A. Ya. Ryalenko, Chief of the Main Administration of the Nitrogen Industry, MKhP, USSR

The basis for a strong nitrogen industry was established in the first Stalin Five-Year Plan. Several nitrogen plants were built and put in operation from 1929-1933.

The production of ammonia in several plants is based on the gasification of coke. Coke gas, from which hydrogen is extracted by the deep cooling method, is the source of hydrogen for the synthesis of ammonia.

By 1938, the nitrogen industry occupied first place in the chemical industry of the Soviet Union.

One of the more recent important problems of the nitrogen industry was the reorganization of production of fertilizers on a mass scale for agriculture. This problem was solved in 1945. In 1946 the output of nitrogen fertilizers almost reached the prewar level, and in the first half of 1947 this level was passed.

The synthesis of methanol is based on the nitrogen industry. Therefore, in the current Five-Year Plan, there is a provision for the development of the synthesis of methanol and the synthesis of higher alcohols.

The second characteristic of postwar development of the nitrogen industry is the special attention given to the purification of raw materials and by-products.

THIRTY YEARS OF MINERAL FERTILIZER PRODUCTION IN THE USSR

Academician S.I. Vol'fkovich and A.M. Dubovitskiy, Candidate of Technical Sciences

Members of the Scientific Institute of Fertilizers have participated in the construction of such large and advanced enterprises as the Khibin Apatite Combine, Solikamsk Potassium Combine, Voskresenskiy, Chernorechensk, Aktyubinsk fertilizer enterprises, and many other mines and plants.

The current Five-Year Plan projects an increase in phosphate fertilizer production of double the prewar production, while nitrogen fertilizer is to be increased 1.8 times and potassium fertilizer 1.3 times the prewar level.

The USSR has the greatest supply of phosphates in the world. A major part of the phosphorites are found in the central and northern regions of European Russia, occurring in the form of nodules in sandy and clay rocks. Most of them contain up to 24 per cent P_2O_5 and must be subjected to preliminary concentration prior to use. The supplies of phosphate ores in the USSR increased sharply with the opening of the new deposits of apatite in the Khibinos and the stratified phosphates in Kara-Tau. At the present time, the supplies of industrially classified ores, including apatites and phosphates of Kara-Tau, are measured in billions of tons. The Kara-Tau deposits contain approximately 12 percent of all supplies of the USSR.

The opening of the world's largest potassium deposits in the Solikamsk region of the northern Urals was a great achievement of Soviet chemistry. Other potassium areas are the Carpathian, Ural, Central Asiatic, and other regions.

In view of the fact that many of the phosphates are of low quality with low phosphorous content and a high content of deleterious admixtures -- especially of iron and aluminum oxides -- research has been directed mainly in work connected with in-

creasing the maximum concentration of P_2O_5 in the raw material and in fertilizers.

THE SULPHURIC ACID INDUSTRY FOR 30 YEARS OF SOVIET POWER

K. M. Malin, Candidate of Technical Sciences

In 1928, after the period of restoration and expansion following World War I, sulphuric acid production in the Soviet Union reached 200,000 tons.

Prior to 1936 the intensification of the tower system had been with reference to the tower volume; however, intensification in other equipment had been achieved in certain plants. Thus, by 1932 the Krasnyy Khimik plant had reached a capacity of 130 kilograms per day of 45 per cent pyrite per square meter of mechanical furnace bottom. In 1947 the capacity had reached 250-300 kilograms.

/ABSTRACTS/

DEVELOPMENT OF THE AGRICULTURAL INSECTICIDE INDUSTRY FOR 30 YEARS

V. I. Orlov, Candidate of Technical Sciences; K. A. Gar, Candidate of Agricultural Sciences; and M. G. Gabriyelova, Candidate of Technical Sciences

The production of insecticides, one of the youngest branches of the Soviet chemical industry, is a product of the Stalin Five-Year Plans. No data is given in the article on plants, processes, or productive capacity. The article is concerned mainly with the chemistry of insecticides.

THE PLASTICS INDUSTRY

Professor B.N. Rutovskiy and A.N. Levin, Chief Engineer of GlavKhimPlast

The plastics industry is another recent newcomer in the Soviet chemical industry, having developed from the celluloid toy factories of earlier days. Mention of three plants is made: Karbolit, Karacharovskiy, and the plant imeni Komsomol'skiy Pravda. No production statistics nor processes are discussed.

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