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DEVELOPMENT OF THE CHEMICAL SCIENCES AND INDUSTRY IN UZBEKISTAN

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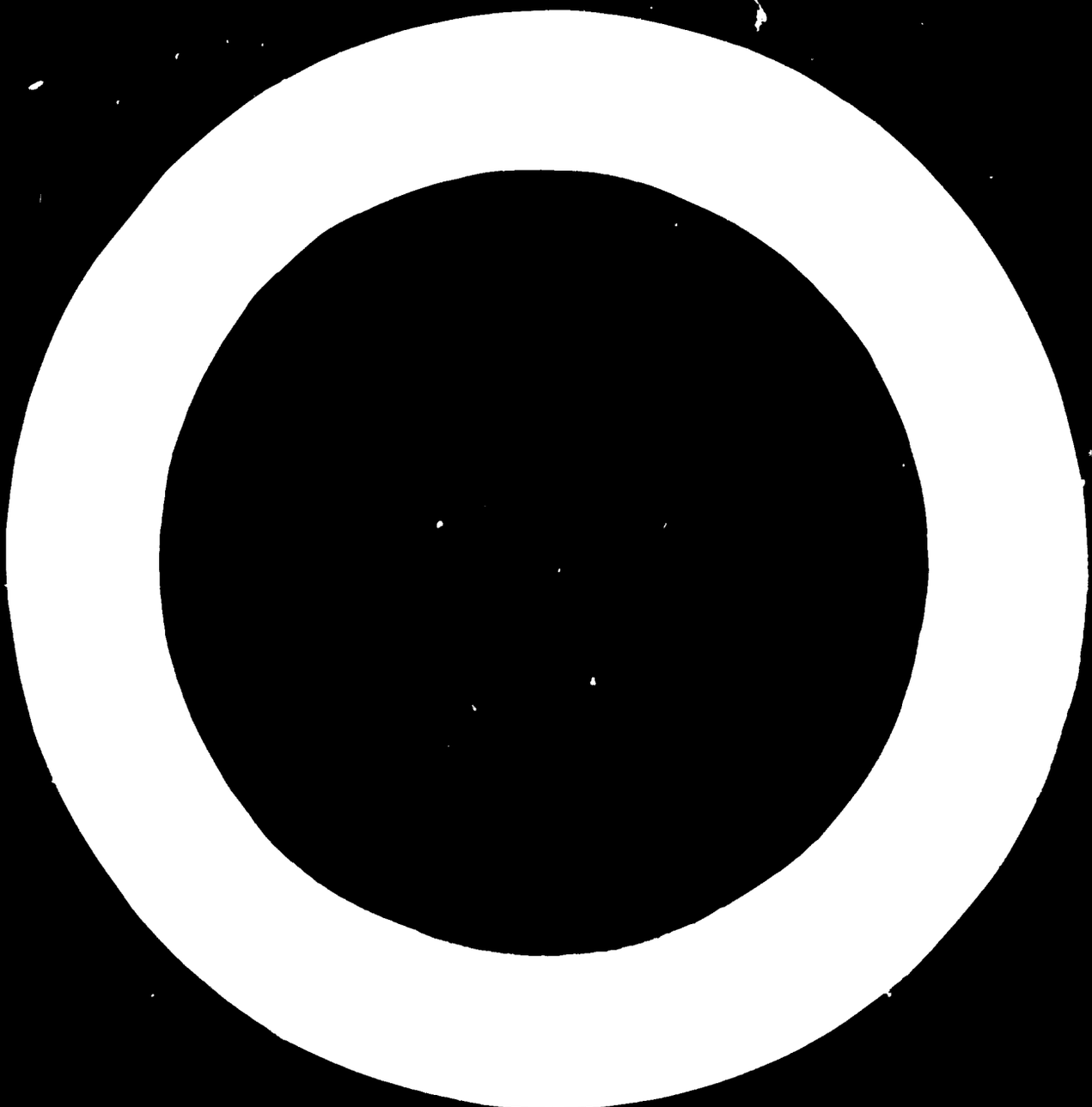

DEVELOPMENT OF THE CHEMICAL SCIENCE AND INDUSTRY IN UZBEKISTAN

Before saying about chemistry in Uzbekistan it is necessary to deal with the history of science and industry in the republic in general.

The Uzbek Soviet Socialist Republic is one of the rich regions of our vast country. Its geographical location, the climate and ample water resources for irrigation made it one of the centres for the production of cotton, rice, vegetables and other agricultural crops as well as live stock breeding and sericulture.

Among the ancient occupations of the Uzbek people have been cotton growing, silk worm breeding, grape growing, karakul pelt production, oil extraction, pottery, production of mercury and various salts, copper smelting, mosaic arts, etc. Samarkand, Bukhara, Khiva, Kokand and Tashkent were also centres of science. Abu Ali-ibn Sina (also known in the west as Avicena) was the great physician of the tenth century. The fifteenth and sixteenth centuries gave the world such prominent Central Asian scholars and thinkers as Ulughbek, Navoii, Al Biruni, Al Khorezmi and scores of other outstanding poets, astronomers, mathematicians, artists, etc.

The scientific and cultural achievements of the Uzbek people in the Middle Ages are known to the world but it was only after the establishment of the Soviet power that Central Asia began to make a planned and steady progress in its science and culture. The Great October Socialist Revolution of 1917 brought genuine liberation to the people and enabled them

to develop their talent and abilities. The Russian people helped the peoples of Central Asia in accomplishing the Revolution and developing the revolutionary spirit.

The 1917 Revolution heralded the beginning of a new history for the Uzbek people. Attention was focused on the elimination of illiteracy and a big network of elementary and secondary schools was set up in the region where there were just a few before the establishment of the Soviet power.

The chemical science in Uzbekistan has changed radically during the last half a century. After the 1917 Revolution the development of science and industry in Uzbekistan called for a big number of highly qualified specialists. The first higher educational establishment to train them was the Chemical Faculty at the Central Asian State University opened in 1920 under a decree signed by Vladimir Lenin . Tashkent State University (as it is now known) not only trained specialists but itself gave rise to many ther education l establishments andresearch centres.

Prior to the opening of the University in Tashkent, the Central Council for the National Economy of the Turkestan Republic organized the Central Chemical Laboratory by merging the Hydrometeorological Laboratory and the Building Materials Testing Laboratory. The functions of the new establishment included chemical-analytical control, assessment of products and other forms of servicing industrial enterprises. In 1925 this Laboratory was taken over by the University and became a chair of engineering chemistry, which on the one hand trained chemists and technologists, while on the other co-ordinated the activities of various chemical specialists working in applied chemistry. Later the chair was re-organized into

the Uzbek Research Institute of the Building Materials Industry which in 1940 became the Chemistry Research Institute of the Uzbek Branch of the USSR Academy of Sciences. It must also be noted that the Tashkent Polytechnic, the Tashkent Textile and Light Industry Institute, the Tashkent Pharmaceutical Institute, Samarkand State University and other higher educational establishments opened in Uzbekistan in the thirties also played an important part in training researchers, engineers and technicians for chemical science and industry.

In 1943 a national Academy of Sciences was set up in Uzbekistan to co-ordinate research work throughout the Republic. During the years of World War Two a number of leading research establishments were moved to Uzbekistan from territories occupied by the enemy and among them the Karpov Institute of Physical Chemistry, the Central Nitrogen Industry Institute, the Kendel yev Institute of Chemical Technology, the Kharkov Institute of Chemical Technology, some of the laboratories of the Fertilizer, Pesticide and Fungicide Research Institute.

The close co-operation between Uzbek scientists and their colleagues from Moscow and other big scientific centres made it possible to solve a number of important problems related to organization of chemical research and to train highly-qualified researchers.

The creation of new research centres in Uzbekistan further facilitated the development of chemical science in the republic. The fact that during the post war period Uzbekistan developed its national cadres and has many prominent [illegible] chemists speaks of the high level of chemical research in the republic.

Chemical research is carried out in several research establishments : the Institute of Chemistry of the Uzbek Academy of Sciences (director — Professor S.Akhmedov, member of the Uzbek Academy of Sciences), the Institute of Chemistry of Vegetable Substances (director — Professor S.Yunusov, associate member of the USSR Academy of Sciences), Institute of Chemistry and Technology of Cotton Cellulose (director — Professor K.Usmanov, member of the Uzbek Academy of Sciences), Central Asian Oil Refinery Research Institute (director Professor A.Sulatov). Many of the higher educational establishments in Uzbekistan (Tashkent State University, the Tashkent Polytechnic, the Tashkent Textile Institute) have special laboratories on chemistry, chemistry of vegetable substances and chemistry of polymers with up-to-date equipment.

All the research institutes and laboratories have highly-qualified staff and are able to cope with the most complicated scientific and engineering problems. The chemical research in Uzbekistan covers a wide range of problems -- utilization of vegetable raw materials including the utilization of cotton waste, the working of mineral resources (oil, natural gas, etc.).

Research conducted by academicians S.Yunusov and A.Sadykov and their teams concerns the wild plants of Uzbekistan which are regarded as potential sources of raw materials. They have studied the alkaloid content in 4,000 plant species and several hundred of these have been subjected to comprehensive chemical analysis. Some fifty alkaloids have been isolated and described in detail. Several dozen physiologically active substances isolated from vegetable substances have been tested and recommended for quantity production as medical preparations.

Thanks to research by S.Yunusov, A.Sadikov and their colleagues the Uzbek Republic is now one of the leading world centres for alkaloid studies. Academician K.Usmanov and his pupils have made Uzbekistan an important centre of research in cotton lint cellulose (an important raw material), its processing into various synthetic fibres and films (hydrocecate and acetate fibre), in the modification of cellulose fibre and fabrics properties (drip-dry, unshrinkable, resistance to light, heat and micro-organisms, good dyeing properties, etc.). They conduct large-scale and comprehensive studies of the physico-chemical, thermodynamic and structural properties properties of cellulose and its derivatives.

During the last few years the Institute of Chemistry and Technology of Cotton Cellulose has been making wide use of modern physical methods of research in the field of physics and chemistry of cellulose — Co^{60} gamma rays, electrical fields, etc. This has produced excellent results (new methods for strengthening cellulose film and fibre, etc) and some of them have been introduced at the chemical works of Uzbekistan.

Academician M.Nabiev and his colleagues at the laboratories of mineral fertilizers of the Institute of Chemistry at the Uzbek Academy of Sciences deserve great credit for their part in developing chemical science in the Republic. Considerable progress has also been achieved in the field of organic and colloidal chemistry thanks to work by Academician K.Akhmedov and corresponding member of the Uzbek Academy of Sciences A.Sultanov (synthesis of highly-molecular compounds, development of new catalysts, new types of plastics, lacquers and coatings).

The close contacts between chemical science and industry have helped to develop the latter. In this paper we shall examine the

history of industry (including chemical industry) in the Uzbek Republic after the 1917 Revolution.

To begin with we may note that before the Revolution Uzbekistan did not have any industry worth mentioning and agriculture was based on primitive farming. The region had rich natural resources but did not produce goods. Pre-revolutionary Turkestan (as Central Asia was then known) did not have a single textile or shoe factory. Here are a few historical facts to illustrate the existing situation at that time. In 1908, for instance, Turkestan supplied almost all the raw cotton required by the Russian empire while its share in textile output amounted to barely 0.01 %. As a result of the lop-sided distribution of productive forces Turkestan was compelled to export all its raw materials into the central regions of Russia and import ready-made goods. The same was the situation in sericulture. Despite the fact that Turkestan was the leading producer of silk worm cocoons for tsarist Russia, the region did not have any silk spinning industry. Most of the silk worm cocoons were exported to Russia, Italy (Milano) and France (Marseille) from where it returned as silk.

The first silk spinning enterprise in Turkestan was built in Marghillan in 1919 and 1920 saw the construction of large silk weaving factories in Fergnana, Marghillan, Bukhara and other towns in Uzbekistan.

The development of cotton growing in Uzbekistan after the Revolution was accompanied by an equally rapid development in the cotton processing industry. In 1926-1927 cotton ginneries and other cotton processing enterprises accounted

for 64 % of industry and food enterprises for 23% of industry in Uzbekistan. Other branches of industry (oil extraction, tanning, printing) accounted for 9.7 % of the gross industrial output.

The processing of cotton has always been the leading branch of industry. In 1924 the cotton ginneries of Uzbekistan put out 6,000 tons of fibre. In 1932 the first section of a textile factory went into operation in Kokhand and that same year construction began of a textile mills in Tashkent, one of the largest textile enterprises in the Soviet Union which was commissioned in 1940. Other projects included the Katta-Kurgan Oil extracting Plant, the largest of its kind in the Soviet Union. The building materials industry in Uzbekistan was radically reconstructed. In 1931 a big cement works went into operation in Kuvasai and the existing Bekabad cement works was reconstructed. Extensive reconstruction was also undertaken of the only sugar refinery in the republic at Kaunchi. However the sugar industry did not develop in Uzbekistan as it was found more profitable to grow sugar beet in the Ukraine, the Kirghiz Republic and in other parts of the country leaving Uzbekistan to concentrate on cotton growing.

Uzbekistan's oil industry was also reconstructed and operations started at the Shor-Su oil fields and the Mum-Kum-Mai ozokerite deposits. A big mining and metallurgical plant went into construction at Almalik where enormous reserves of polymetallic ore had been discovered.

An important feature of that period was the fact that many of the industrial enterprises built on the territory

of Uzbekistan contribute not only to the economy of the republic but to the country as a whole.

Uzbekistan's chemical industry began to develop on a large scale during the thirties. With the available raw materials for chemistry and cotton production as the main branch of the national economy, the development of the chemical industry pursued the task of raising efficiency of cotton growing and boosting yields. This called for the broad development of mineral fertilizer production and output of insecticide. Along with this it became necessary to build enterprises for the processing of cotton products and cotton waste including hydrolisic plants, cellulose complexes, synthetic fibre plants, etc.

Two nitrogenous fertilizer plants were built in Kokand and Kagan to provide fertilizer for the cotton plantations of Uzbekistan. The republic also started production of paints and other chemical goods for everyday use.

The construction of the Chirchik hydropower station in Uzbekistan played an important role in the national economy of the republic during the first five-year plans. Its cheap electric power was used for production of nitrogenous fertilizer. In 1937 the chemical industry of Uzbekistan put out almost 500,000 roubles' worth of goods which is 12 times more than in 1913.

World War Two gave great impetus to the chemical industry of Uzbekistan . Prior to 1941 the republic had a sulphur works at Shor-Su, two nitrogenous fertilizer plants and an acetylene plant in Tashkent. The first section of the Chirchik Chemical Works went into operation at the end

of 1940 . This enterprise began production of ammonium nitrate.

The post-war period saw the further development of the chemical industry in Uzbekistan.Today the republic has several large chemical works including the Navoii and Chirchik Plants,the Ferghana Nitrogenous Fertilizer Plant,the Almalik Ammonium Phosphates plant,the Kokand and Samarkand Superphosphates Plants,the Tashkent Lacquers and Paints Plant,the Andijan Hydrolysis Plant,the Fergana and Yangi-Yul Chemical Works and the Pap Rubber articles Plant. The chemical enterprises of the republic produce nitrogenous and phosphate fertilizer,sulphuric and nitrogenous acids,furfurol, yeast,alconol,defoliants,sulphur,lacquers and paints,rubber footwear,plastics,artificial leather,etc.

The Fergana and Yangi-Yul refineries produce high quality lubricants and gasoline. Today Uzbekistan is the fourth largest producer of mineral fertilizer in the Soviet Union but nevertheless has to import about 1 million tons of fertilizer (exporting about the same amount) per annum.The republic is faced with the task of making itself self-sufficient in fertilizer and producing it for export to the other Soviet republics and abroad.

With the completion of the Almalik Ammonium Phosphate Plant the republic will considerably reduce its deficit in phosphate fertilizer . Sulphuric acid is now produced in several parts of Uzbekistan and with the commissioning of additional units at the Almalik Plant the republic will be producing all the sulphuric acid it needs.

Defoliants (chemical substances for shedding leaves of the cotton plants) are an important prerequisite for cotton harvesting by machinery. The Ferghana Nitrogenous Fertilizer Plant produces magnium chloride, a defoliant, and in the near future it will fully meet the requirements of the republic in this preparation.

The Uzbek Republic has truly inexhaustible reserves of natural gas in the heart of the Kizil-Kum desert. The estimated reserves of this valuable fuel and raw material for the chemical industry have been placed at 640 thousand million cubic metres while long-range estimates stand at 5.5 trillion cubic metres. The natural gas piped from Bukhara region has the lowest production cost in the country — less than half of that of the natural gas in the North Caucasus and the Ukraine and a third of the cost of gas in the Volga region.

The integrated utilization of Uzbekistan's gas resources is currently in the focus of attention. The Navoi Chemical Works operates on this very principle. Besides producing mineral fertilizer from natural gas the plant will be producing acetylene, acetic acid, acetyl-cellulose, nitryl-lactic acid, its polymers and nitron fibre. The plant is to become one of the leading chemical enterprises in the Soviet Union.

Until recently it was believed that Uzbekistan did not have enough mineral raw material for the chemical industry and utilization of local deposits of rock salt, gypsum and other minerals was conducted experimentally. Latest finds by geologists have shown how unfounded was this point of view.

Rich deposits of oil and various minerals — potassium and magnium salts,sulphur,sulphide ores,non-ferrous metals, gold,limestone,etc. have been discovered in various parts of the Uzbek Republic.All these natural resources combined with vast power resources and favourable conditions for economic upbuilding are a reliable guarantee that within the next few years Uzbekistan will develop its chemical industry to a higher plane.This will be achieved through the integrated utilization of natural gas, oil refinery gas and other chemical raw materials. The newly discovered raw material deposits allow for a new approach to the power and raw material resources of Uzbekistan and provide for a more rational distribution of productive forces and the creation of a large-scale chemical industry producing various organic and inorganic products.

The next five years will see the construction of chemical plants and the reconstruction of existing enterprises for the production of concentrated phosphorus,nitrogenous and potassium fertilizer. The production of chemical compounds for insect pest control and defoliation of cotton plants will also be sharply increased.

Synthetic fibres are playing an increasing role in the total balance of raw material for the textile industry.This year the Ferghana Synthetic Fibres Plant is to increase its capacity and production of nitron fibre is to begin at the Navoii Chemical Works. Plans have been drawn for the production of capron fibre which will be used in cord fabric production for the Angren Rubber Tyre Plant to be built in the republic in the future. The raw material for this fibre-

kaprolactan is to be produced at a big chemical works [illegible] be built in Navoii. All this means that by 1975 Uzbek[illegible] is to become a leading producer of synthetic fibres.

The production of plastics and synthetic resins [illegible] be further developed and there is to be a considerable [illegible] crease in the output of polyformaldehyde and vinyl[illegible] The gas condensate and light oil from the Ghazli and [illegible] deposits will serve as excellent raw material for the pro[illegible] ion of such important products as polyethylene and po[illegible] pylene.

The plastics industry is gain considerable [illegible] existing enterprises in Tashkent for the manufac[illegible] household articles from plastics are to be enlarged a[illegible] special plant for the manufacture of plastic [illegible] fittings is under construction in Djizak.

The high rate of development in the chemical [illegible] Uzbekistan at all its stages depended to a conside[illegible]e on the state of chemical science in the republic. An [illegible] ing feature of our chemical industry is the [illegible] duction of new machinery and new methods based [illegible] achievements of science. Chemistry, as it were, brings [illegible] such problems as increasing labour productivity, boosting country's economy and raising the living standards of the people.

Back in 1920 Vladimir Lenin dreamed of boosting [illegible] industry output 2.5 times against the level of 1913. In the country's chemical industry had grown 94 times as compared with the pre-revolutionary level. Here in Uzbekistan gross chemical output last year was several dozen times

the 1940 level.

This year chemical output in Uzbekistan is expected to be three times of what it was in 1965 thus making the republic a leading chemical producer in the USSR.The output of mineral fertilizer is to grow 2.1 times,synthetic resin and plastics — 4.5 times,pesticide -- 76 times and synthetic fibre -- 107 times as against 1965. Indeed,Lenin's dreams have come true.

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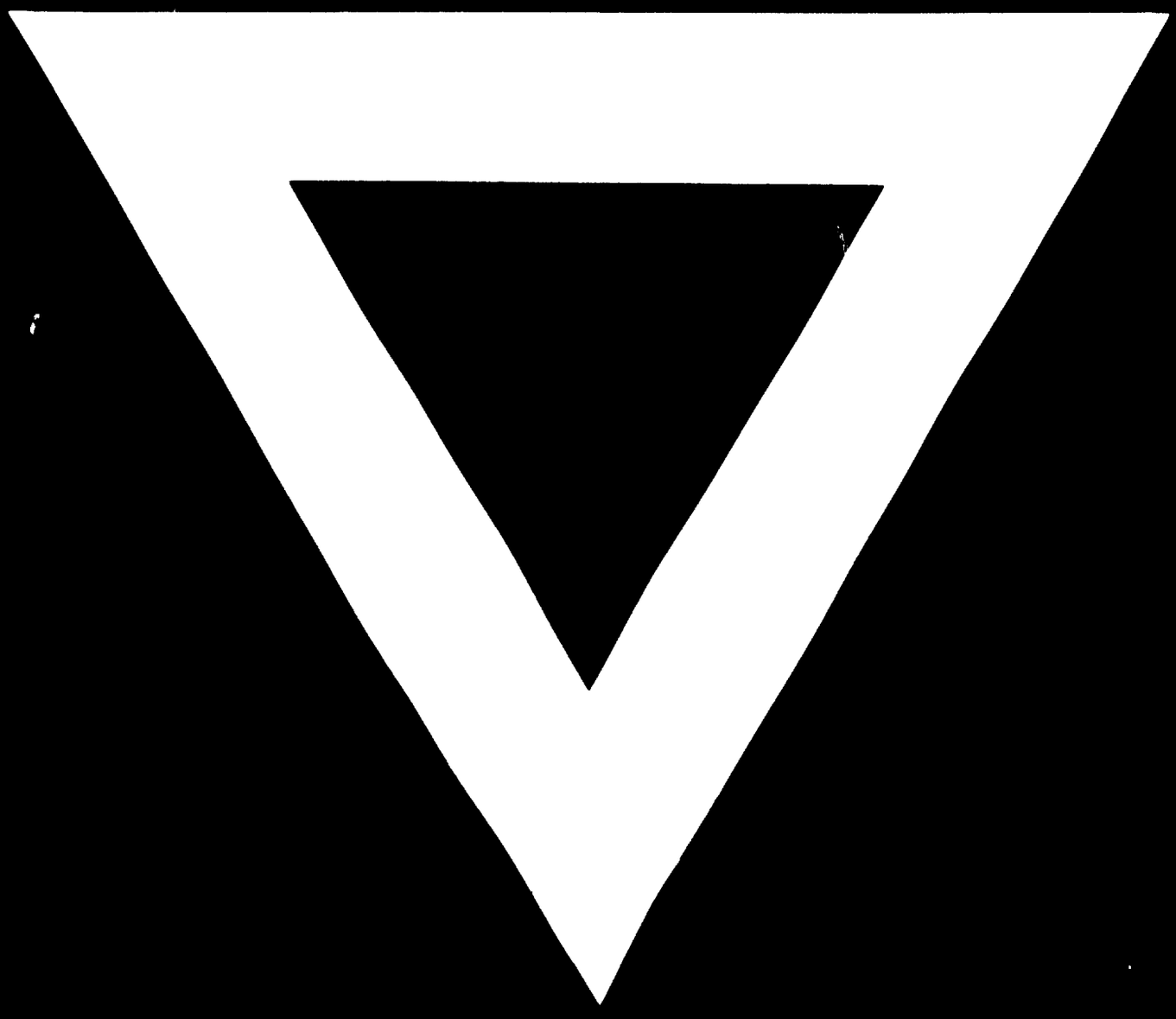

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