RUSSIAN CHEMICAL REVIEWS
Uspekhi Khimii

November 1967

FIFTY YEARS OF SOVIET CHEMISTRY

The splendid anniversary—fifty years of Soviet power—celebrated by our people has seen a mighty growth in all branches of science, industry, and agriculture. Great achievements have also been made in chemical science and chemical industry.

In fact, chemical industry began from scratch after the October Revolution, since before the revolution Russia only had a few semi-artisan concerns. At present our country has a successfully developing inorganic and organic chemical industry, a petrochemical industry, a polymer industry, etc. In the sphere of chemical industry, the Party was guided by Lenin's precepts, that socialist science and culture could only be created on the basis of assimilation and critical reconsideration of the spiritual heritage of the past. It must be noted that remarkable discoveries, such as Mendeleev's Periodic System and Butlerov's theory of structure, among others, were made in pre-revolutionary Russia. Nevertheless, science only became a general concern of the State with the early years of Soviet rule, a subject of constant care by the Party and the people. Under the most difficult conditions of civil war and foreign intervention the Soviet State did not begrudge funds for the organisation of an extensive network of scientific research establishments, the development of theoretical and applied science, and the training of scientists, since the small number of scientific establishments inherited from Tsarist Russia was inadequate to cope with the problems posed by the national economy.

The Party and the Soviet Government have always paid great attention to the development of Soviet chemical science and industry. The resolutions of the May Plenary Session of the Central Committee of the Communist Party of the Soviet Union (1956) and the resolutions of the XXIIIth Congress of the Party outlined a grandiose programme of chemical development in our country.

Many scientific-research chemical Institutes have been created during the years of Soviet rule. For example, within the system of the Academy of Sciences of the USSR there are Institutes of Inorganic Chemistry, Chemical Physics, Physical Chemistry, Organic Chemistry, Petrochemical Synthesis, Organoelemental Compounds, etc. Chemical Institutes have been created in the National Republics: the Ukraine, Belorussia, Georgia, Armenia, Azerbaidzhan, Latvia, and others. A series of chemical institutes has been created within the system of the Siberian and a number of other branches of the Academy of Sciences of the USSR. A large number of research institutes are based on the chemical, petrochemical, and other industries, and resolve successfully the problems which arise in developing the chemical side of industry and making use of chemistry in various types of industry and the national economy. At present Soviet chemical science is in the forefront of all the most important aspects of world science.

The new requirements determined by the growth of modern technology and those new theoretical changes which have taken place in its various fields posed a number of serious problems to chemical science. Theoretical questions have acquired particular significance. Decisive achievements in this area allow the purposeful realisation of new materials and substances with properties fulfilling prerequisite demands.

The achievements of Soviet chemical science are based on large-scale accomplishments of its various branches, such as chemical physics, physical chemistry, inorganic chemistry, analytical chemistry, organic chemistry, organoelemental chemistry, chemistry of complexes, and chemistry of high-molecular-weight compounds.

Soviet chemists' outstanding achievements have made a tremendous contribution to the development of science and technology in our country.

The Communist Party and the Soviet Government justly appreciate this contribution, which is recognised by the award of Soviet Orders and titles of Laureates of the Lenin and the State Prizes to Soviet scientists, and the award of the Orders of Lenin and of the Red Banner of Labour to the leading institutes of the Soviet Union.

All this puts great responsibility on chemists, who are armed with modern methods of investigation and the resolve to make a worthwhile contribution to the common task of building a communist society.

Extensive development of theoretical research in all areas of chemistry and a strengthening of the links with industry—these are the most important aims put before Soviet scientists by the XXIIIth Congress of the Communist Party of the Soviet Union, goals which will doubtless be achieved. The remarkable achievements of Soviet chemistry during the fifty years of Soviet rule are a guarantee of this.

U.D.C. 546

FIFTY YEARS OF DEVELOPMENT OF INORGANIC CHEMISTRY IN THE SOVIET UNION

V.I.Spitsyn

The Great October Socialist Revolution opened up unprecedented possibilities for the development of science in the Soviet Union. In fifty years, an extensive network of research centres has been created, and large numbers of teams of highly qualified specialists have been educated and trained for these centres. Considerable success has been achieved in the planned development of science and in the coordination of its various branches.

The intensive growth of theoretical and applied studies, together with the general sharp increase in the industrial potential of the country, has created favourable conditions for the development of strong Soviet research schools, many of which have now obtained world recognition.

It was the creation of a strong science-backed industrial basis for the new technology in the Soviet Union that enabled the country to withstand the severe trials of the Great Patriotic War against German fascism. The same factors in the post-war years made it possible in a short time to resolve such complex problems as the creation of an atomic industry and nuclear energy, the construction of powerful rockets and the development of propellants for them, the organisation of the production of semiconductor and laser materials, etc. Here an important part has been played by the chemical sciences, and by inorganic chemistry in particular.

Inorganic chemistry originated in Russia two hundred years ago when M. V. Lomonosov carried out studies of the oxidation of metals, of outstanding scientific importance, and for the first time on the basis of experimental data formulated the law of conservation of matter. In 1869, D. I. Mendeleev made an outstanding contribution to the development of world science by his discovery of the Periodic Law governing the chemical elements; this law represents the greatest generalisation of our knowledge in the field of inorganic chemistry. The Periodic Law formed the basis for the development of subsequent work involving the study of atomic structure, the phenomena of radioactivity, and the synthesis of new chemical elements.

Scientists in Russia developed the theory of solutions and carried out studies of the platinum metals, one result of which was the discovery of the element ruthenium. Silicates, peroxides, salt ammines, crystal hydrates, and the radioactive elements were studied. The foundations were laid for the development of the method of physicochemical analysis, which has given particularly valuable results in the study of alloys and intermetallic compounds.

Despite the high scientific level of this work, however, the total volume of research on inorganic chemistry in Russia before the revolution was clearly inadequate and the studies were carried out in only a few places: the chemical laboratory of the Academy of Sciences and the inorganic chemistry departments of the universities and certain higher educational establishments of other types. The grants made by the Tsarist government to the maintenance of these laboratories were negligible. There were no specialised research institutes. The number of inorganic chemists carrying out scientific research work throughout the whole of Russia did not exceed several dozen.

Decisive changes in the development of inorganic chemistry and the whole of science took place after the Great October Socialist Revolution. In Soviet Russia, among other measures designed to strengthen science, a start was made in the organisation of chemical scientific research institutes. In 1918 the Institute of Physicochemical Analysis and Institute for the Study of Platinum and Other Noble Metals were founded in the Academy of Sciences. The Central Laboratory founded by the Higher National Economic Council subsequently became the Karpov Physicochemical Institute. The Scientific Institute for Fertilisers, State Applied Chemistry Institute, the Institute for Pure Reagents, the Radium Institute, and a whole series of other research establishments were organised. Scientific research work was extended in the inorganic chemistry departments of Moscow and Leningrad universities and many other higher educational establishments. An important centre for the development of Soviet inorganic chemistry was provided by the Institute of General and Inorganic Chemistry of the Academy of Sciences of the USSR, formed in 1934.

On the instructions of the government, the scientific research institutes and the departments of the higher educational establishments carried out extensive studies of native raw materials and methods for processing them, and helped industry to organise various new production systems, ensuring the economic independence of the young Soviet republic. The rare chemical elements were studied, and on the basis of the scientific research work which was carried out, industry organised the production of many rare metals and their compounds. Scientific research establishments were provided with pure chemical reagents, prepared in Soviet factories.

Since the time of the first five-year plans for the development of the national economy of the USSR (the years 1929–1932 and 1933–1937), the work of Soviet research chemists has been directed chiefly towards the provision of direct assistance in the task of socialist construction. In this period, inorganic chemists have developed the scientific basis for many technological processes in the chemical industry, metallurgy, and the production of binding agents.

Under the direction of N. S. Kurnakov, the salt reserves of the Soviet Union were explored, salt deposits and salt lakes were studied, and methods of natural salt technology were developed. Of particular importance was the study of the Kara-Bogaz-Gol bay in the Caspian Sea, leading to the