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Uspekhi Khimii

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CHEMISTRY AND THE BUILDING OF COMMUNISM

The 22nd Congress of the Communist Party of the USSR has been an important stage in the progress of our country towards Communism. The Congress reviewed the colossal achievements of the Soviet people and the great, revolutionary changes achieved under the direction of the Communist Party and its Leninist Central Committee, since the 20th Congress.

The programme adopted by the 22nd Congress is a majestic document of world-wide importance, a scientifically formulated plan for building a Communist society in our country.

The leading role in the solution of the main economic aim of the Party and of the whole Soviet nation — the creation of a material and technological foundation for Communism — belongs to Soviet science.

In the report of the Central Committee to the 22nd Congress Comrade Khrushchev said: "To-day, when our country is taking such gigantic strides towards the building of communism, new and still more majestic aims face Soviet science. Scientific research should be more precisely focussed; young forces should find readier access to science. Our aim is to occupy leading positions in all the main branches of world science".

The third Party programme adopted by the 22nd Congress puts before Soviet scientists a complex and responsible aim: "It is a matter of honour for Soviet scientists to consolidate the leading positions won by Soviet science in the most important branches of knowledge and to attain a leading place in world science in all its main divisions". Soviet chemistry plays an honoured part in the achievement of this aim.

The development of the chemical industry, which requires a high level of theoretical research in various branches of chemistry and an initmate connection between pure science and industry, is one of the biggest economic aims of the Party. This was already evident when the Central Committee gave a powerful stimulus to the speeding up of the development of the industry in May 1958. This has become a truly national undertaking. The Party programme has now indicated most clearly the main directions to be followed in developing chemical science and the technical achievements of the chemical industry. Recent advances in chemistry will be more and more intensively applied to all branches of the national economy. The production of synthetic materials to meet the needs of the national economy and of the consumer market is to be vastly increased. A great petrochemical industry is to be created, and the chemical treatment of natural gas will be developed; the production of mineral fertilisers and chemical agents for the protection of crops is to be increased. Rare elements, various metallic alloys with new properties, and semiconductors, will be used extensively in industrial practice. These aims require the use of highly purified substances whose preparation is a new and most important field of chemistry. Synthetic substances with semiconductor properties are becoming increasingly interesting. Chemical and electrochemical methods will supplement and even replace the mechanical treatment of materials. New chemical sources of electrical energy will find practical application. Advances in the chemistry of natural and biologically important compounds will result in new pharmaceuticals to be used against diseases such as cancer, viral infections, cardio-vascular disorders, and other dangerous illnesses.

The extensive application of chemistry to agriculture and animal husbandry in the form of numerous and varied physiological substances will be most effective economically.

The Communist Party has always encouraged and will continue to encourage science to take a leading role in the building of Communism. Those investigations which open up new possibilities in the development of the nation's productive power will receive the closest attention. Soviet scientists will have even more scope for scientific research leading to promising discoveries.

The Party will be especially concerned with the application of scientific achievements to the national economy. A new unified plan is coming into being, ensuring optimal conditions for the rapid development and adoption of important advances — from laboratory experiments through the pilot plant stages, technical and economic evaluation, design and construction work, to the actual establishment of new industries.

Science is increasingly becoming a direct productive force. Research coordination is becoming enormously important because of the mighty growth of research in all the leading branches of natural science. The State Committee for Scientific Research Coordination, newly created by the Council of Ministers of the USSR, is vastly important in this respect. Familiarity with the present state of research in our country enables this Committee to abolish unnecessary duplication of a number of projects, avoid harmful and wasteful dissipation of resources and monetary funds, and concentrate on the most important trends and aims.

Scientific and technical progress is determined primarily by the achievements in the leading branches of the natural sciences. It is therefore essential to ensure a high level of development in mathematics, physics, chemistry, and biology as an underlying factor in the further creative rise of technical, medical, agricultural and other sciences. The Party programme considers the development of theoretical investigations and the close interconnection of science and industry of the utmost importance. On the theoretical side the work envisaged includes investigation of the mechanisms and kinetics of important chemical processes and development of suitable instrumentation; this will make it possible to create highly effective new industries and perfect existing ones. Of great interest in the connection are studies of chemical processes occurring at very high temperatures, under extremely high pressures, or at very low temperatures but with participation of active particles.

Modern experimental methods (mass-spectroscopy, electron paramagnetic resonance, nuclear magnetic resonance, spectroscopy, electron microscopy, radioactive isotope labelling etc.) open up new possibilities of investigation of the mechanism of reactions. The use of electronic computers will extend the scope of theoretical investigations requiring complex mathematical calculations. Free radicals and the reactions in which they take part (including chain reactions), as well as organic ions and other unstable particles arising in chemical processes, are of great theoretical and practical interest.

Much importance is attached to the investigation of the structure and mechanism of the transformations of organo-metallic compounds.

Soviet chemistry has achieved success in the field of polymers with important features such as heat stability, mechanical strength, chemical stability, requisite electrical and magnetic properties. Wear-resistant rubbers with enhanced heat stability have been produced. Substantial practical perspectives arise with the extensive use of oligomers in the manufacture of glass, surface coatings, building materials and so forth. The technology of fibre-glass plastics is benefiting from the results of scientific research. New processes have been developed for the preparation of extremely strong synthetic fibres. Non-woven synthetic fabrics for clothing are being investigated.

Studies of the deterioration and the stabilisation of high polymers are undertaken on an increasingly large scale.

Extensive work is being devoted to new methods of preparation of monomers and other starting materials for the synthesis of high polymers. Among these are simple single-stage oxidations of hydrocarbons (especially the hydrocarbon gases) to long-chain, oxygen-containing compounds. Numerous catalytic transformations of hydrocarbons are being studied.

Work on organic syntheses is on a very large scale.

The Party programme envisages extensive development of theoretical investigations into the industrial uses of atomic energy. This means the development of radiation chemistry and its practical applications. The use of penetrating radiation is promising in many chain reactions (polymerisation, oxidation, halogenation). Polymers can be cross-linked, and polymer coatings on metallic equipment can be formed *in situ* by the action of radiation. New chemical syntheses can be effected by using radiation in the active zone of a nuclear reactor. Investigations of the action of penetrating radiations on the catalytic, electrochemical, adsorption, and semiconductor properties of solids will have a strictly scientific basis.

Radiochemical research is increasing in volume with the development of atomic industry. More work will be needed in the field of physicochemical mechanics and corrosion resistance in various materials.

Great scope for new and bold creative decisions is to be found in the utilisation of natural resources, in particular the isolation of various metals and minerals.

The imminent advances in the whole complex of the biological sciences related to the successful solution of medical and agricultural problems are of interest to chemists as well as to biologists, physicists, technologists, and mathematicians who will be taking an active part in this work. More investigations will be concerned with mineral fertilisers, insecticides, plant growth stimulants, and agents effective against plant diseases. Research into the properties and synthesis of proteins and nucleic acids and many other natural and biologically active compounds will also be developed.

Chemical research will contribute to the elucidation of the phenomenon of life, and ultimately provide means for controlling life processes such as metabolism and heredity. In the medical field chemists have a part to play in collaboration with biochemists, biologists, and doctors in developing a rational basis for the chemotherapy of various diseases.

Soviet chemists are enthusiastically embarking on the great Party programme. The Party and the Government have already done much to elevate Soviet chemical science and industry. The Party's concern for the further growth of chemistry is manifest in the building of new scientific institutes and laboratories, in the provision of modern equipment, and in the constant inflow of gifted young scientists.

A wonderful atmosphere of creative scientific endeavour has been achieved in our country. The Party and the Government give every assistance to the development of Soviet science. In response to this, Soviet chemists will exert their utmost efforts and apply their knowledge in order to attain the leading place in world science and all branches of the chemical industry.