ANNIVERSARIES

Academician A.B. Nalbandyan
(1908 – 1987)

Aram B. Nalbandyan was a prominent scientist in the field of physicochemistry, one of the brilliant representatives of the famous school of the kinetics created by an academician Nobel Prize winner N.N.Semenov. A.B.Nalbandyan's 100th anniversary was celebrated on the first of January this year.

The scientific activities of A.B. Nalbandyan started in the period of rise and formation of the concept of chain reaction, wich gave birth to the development of new trends in different fields of natural sciences. He devoted his whole life to the study of the chain processes having contributed greatly to strengthening and developing these concepts.

Having graduated from the Physico-mathematical Department, Pedagogical Faculty of the Yerevan State University in 1930, in 1931 he entered the post-graduate course of the Institute of Chemical Physics (ICP) of the USSR Academy of Sciences (*AS*) and actively engaged in investigation of chain reactions.

The phenomenon of ignition limits was studied in detail by the example of hydrogen oxidation, which became the model of similar reactions. A.B. Nalbandyan's brilliant experiments allowed in-depth to understand the phenomena related to the chain terminations on the reactor walls at low pressures, close to the first (lower) self-ignition limit, thus to confirm the basic principles of the lower limit theory, and get deeply into the nature of the induction period and the kinetics of the process in the ignition region. In 1946 A.B. Nalbandyan succeeded in the control of chain ignition of the hydrogen-oxygen mixture by inserting the rods with different surface treatment into the reactor.

The extensive experimental and theoretical results obtained by A.B. Nalbandyan formed the basis of his Candidate's (1935) and Doctor's (1942) degree theses. In 1949 these data were integrated in the monograph "Mechanism of Hydrogen Oxidation and Combustion" written jointly with Academician V.V. Voyevodski. The monograph was honored with D.I. Mendeleev's Prize in 1950.

From 1956 to 1966 A.B. Nalbandyan headed the Laboratory of Hydrocarbon Oxidation at ICP, AS USSR and for many years he headed the Chair of Physics at the Moscow Institute of Communication.

A.B.Nalbandyan's researches jointly with his disciples and colleagues on degenerate branching in oxidation of organic compounds contributed greatly to the chain reaction theory. A series of researches on the mechanism of methane oxidation resulted in a proposal of the industrial production of formaldehyde by direct methane oxidation. The authors of this work, headed by A.B. Nalbandyan were awarded a Big Gold Medal of the Exhibition of USSR Economy Achievements in 1965. In 1959 a popular scientific book entitled "Formaldehyde is a material for plastics" written jointly with academician N.S. Enikolopyan was published.

A.B. Nalbandyan was always in close contact with the Armenian scientific community. He always headed the researches of the post-graduate students, trainees and graduates of Yerevan higher schools.

In 1959, at the suggestion of the Presidium of the Armenian Academy of Sciences, A.B.Nalbandyan established the Laboratory of Chemical Physics of Armenian AS – a new scientific center in Armenia. In 1975 the Laboratory was reorganized as the Institute of Chemical Physics (ICP) of Armenian AS. Till the very end of his life (January 24, 1987) A.B. Nalbandyan was the permanent Director and the scientific leader of this center.

In 1960 A.B. Nalbandyan was elected Corresponding member, and in 1963 full member of the Armenian AS. He was also academician-secretary of the Chemical Science Division of the Armenian AS.

A long term and systematic activity on staff training, equipping the Armenian scientific center with up-to-date equipment, searching and developing new experimental methods turned to be fruitful. The Institute of Chemical Physics of the Armenian AS achieved prominent progress in the field of studying kinetics and mechanism of complex chemical reactions that became famous in our country and abroud. For the first time direct experimental data on free radicals in complex, degenerate branched chain reactions were obtained which allowed to study chemical reactions at higher level and approach the ways of their controlling in practical purposes. It became possible thanks to the kinetic method of radical freezing in combination with ESR-spectrometer for detecting polyatomic radicals in gas phase processes, developed by A.B. Nalbandyan and his disciples.

A.B.Nalbandyan in his last years paid great attention to the processes taking place on the surface of the chemical reactor. Based on the results of studies in this field he concluded that depending on the process conditions, the chain branching could occur on the reactor walls. As a result of decomposition of unstable intermediate compounds such as peroxides with the ejection of radicals into the reactor volume will be followed by chain propagation in the gas phase.

The results of investigations on the kinetics and mechanism of complex reactions were summarized in Nalbandyan's monographs written jointly with his disciples: A.A.Mantashyan, I.A.Vardanyan, Y.M.Gershenson: “Elementary Processes in Slow Gas Phase Reactions” published in 1975 (awarded with the State Prize of the Armenian SSR in 1977), “Modern State of the Problem of Gas Phase Oxidation of Organic Compounds” (1986) and “Magnetic Resonance in Gases” (1987).

The world scientific community showed great interest in the studies carried out at the ICP of Armenian AS. Many scientists from UK, Germany, Belgium, France, Russia, Hungary and other countries visited the Institute to carry out joint studies.

Academician A.B. Nalbandyan greatly contributed to the development of new scientific areas: the reactions of free radicals in liquid phase, chemical catalysis, solid phase combustion, etc. In early seventies on the initiative of A.B. Nalbandyan at the ICP of the Armenian AS the activities were started on Self-Propagating High Temperature Synthesis (SHS) of valuable inorganic materials. These studies were headed by Prof. A.G. Merzhanov (currently academician of RAS and NAS of Armenia) the founder of this scientific direction at the ICP of AS USSR.

A.B. Nalbandyan was greatly interested in establishing and developing international relationships, permanently participating in many international conferences and symposia devoted to the problems of chemical kinetics, oxidation and combustion of organic compounds. A.B. Nalbandyan also repeatedly gave lectures in foreign countries. In 1973 the Goettingen University invited him to give lectures as a Gauss-Professor. As a rule, this right is privileged to prominent scientists of the world once in 15 years.

A.B.Nalbandyan was actively involved in the scientific and social activities: he was Chief Editor of “Armenian Chemical Journal”, member of Editorial Boards of “Khimicheskaya Fizika” journal and International Journal “Oxidation Communication”, member of Editorial Committee of Armenian Encyclopedia, member of the Terminology Committee under the Council of Ministers of Armenian SSR. As the academician-secretary of the Division of Chemistry, and in the last year of his life – of the Division of Chemistry and Geology of the Armenian AS A.B.Nalbandyan participated actively in the processes of science

organization. His scientific activity merited acknowledgment and was highly appreciated. He was awarded an Order of Lenin, two Orders of the Labour Red Banner, an Order of the Badge of Honour and medals. Twice he was awarded the State Prize of Armenia and was conferred the rank of Honoured Scientist of the Armenian SSR.

Currently there are a lot of candidates and doctors of sciences, academicians of NAS of RA among his disciples whose works take praiseworthy place in the scientific world.

A.B. Nalbandyan lived modestly, but his heritage is rich: scientific ideas, disciples and followers, his light image of a scientist and citizen.