

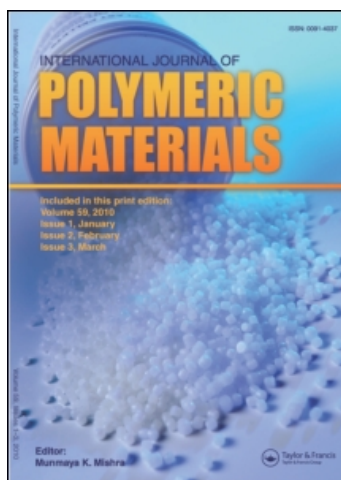
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Publisher *Taylor & Francis*

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International Journal of Polymeric Materials

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713647664>

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To cite this Article Zaikov, G. E.(1996) '80th Anniversary of Professor N. M. Emanuel (1915-1984)', International Journal of Polymeric Materials, 32: 1, i – iii

To link to this Article: DOI: 10.1080/00914039608029380

URL: <http://dx.doi.org/10.1080/00914039608029380>

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80th Anniversary of Professor N. M. Emanuel (1915–1984)

October 1st 1995 marks the 80th birthday of N. M. Emanuel, eminent Soviet scientist in the field of chemical kinetics and chemical physics (polymer chemical physics included), member of the Presidium of the USSR Academy of Science, Secretary of the General and Applied Chemistry Section of the Academy, President of the National Committee of Soviet Chemists, several State premiums laureate.

N. M. Emanuel was born in Tim, Kursk district. His father, Mark Yakovlevich Emanuel, was an agriculturist, and his mother, Olga Vitalievna, came from a family of Russian intellectuals.

In 1931, having finished a school with a chemical bias N. M. Emanuel, started working as a laboratory assistant in the Laboratory of Ion and Electron Converters of the Leningrad Physico-Technical (Electrophysical) Institute that was created on initiative of A. F. Joffe, member of the Academy of Sciences. In this way, N. M. Emanuel was exposed to the creative atmosphere of Leningrad research institutes closely bound with the Leningrad Polytechnical.

In 1933, he entered the Physico-Mechanical Faculty of the Polytechnical and graduated, in 1938, with honors. Within this period, he worked as chemist at the State Institute of High Pressures in Leningrad.

At the end of 1937, N. N. Semenov, member of the USSR Academy of Sciences invited him to complete his degree at the Laboratory of Chain Reactions of the Leningrad Institute of Chemical Physics, where he has remained to this day.

In autumn 1938, he became a post-graduate. This was the period of most extensive research on the chain theory and the theory of combustion and explosion. Emanuel's diploma on the kinetics of slow degenerate branched chain oxidation of hydrogen sulphide was an important part of the studies devoted to experimental warranting of the chain theory. Later on, the kinetic methods that were developed in his candidate thesis and were based on the kinetics of chemical systems became widely known.

The first monograph by Emanuel "Intermediates in Complex Gas Reactions" was published in 1946.

On June 23, 1941, N. M. Emanuel was called up for army duty. He served as a lieutenant in the 163 Special Infantry Regiment in battles at the Estônia front, and in the defence of Leningrad.

At that time the Institute of Chemical Physics was evacuated towards the east, to Kazan. The Institute became involved with military topics: production of incendiary mixtures (against tanks), high explosion compounds, powders, bombs,

shells, etc. In December 1941, the Academy of Sciences Leadership recalled Emanuel from the Army to do research connected with these topics. In 1942, he was awarded a chemical science degree for his thesis "Hydrogen Sulphide Oxidation."

In 1944, he received his first medal for "Defense of Leningrad," and then, in 1945, the medals for "Constructive Labor" and "Victory over Germany in the Great World War of 1941–1945." In 1948, he was awarded the Bach Premium for his research on gas oxidation intermediates.

In 1949, he defended his Doctor in Science Thesis on the kinetics and mechanisms of gas oxidation processes.

In 1953, he was granted a second medal for "Constructive Labor." In parallel with his research at the Institute of Chemical Physics while acting as a lecturer at the Moscow State University, Chemical Kinetics Faculty.

In 1954, N. M. Emanuel started research on liquid phase oxidation reactions. In 1958 he was awarded the USSR High State Premium for his studies on the features and specificities of chain reactions. The research conducted by N. M. Emanuel and his colleagues contributed considerably to the development of the organic liquid phase oxidation theory (kinetics and mechanisms), and the theory of inhibitors and catalysts in oxidation processes.

The results on liquid phase oxidation kinetics were published in 1965 in the monograph "Chain Reactions of Hydrocarbon Oxidation in Liquid Phase" by N. M. Emanuel, E. T. Denisov and Z. K. Maizus (translated into English in 1967 and published by Pergamon Press) and later on, in 1973, in the monograph "Oxidation of Organic Compounds. Role of the Medium in Radical Reactions" by N. M. Emanuel, G. E. Zaikov and Z. K. Maizus. An amended and supplemented edition of this monograph was published by Pergamon Press in 1984.

A monograph "Cyclohexane Oxidation" by N. M. Emanuel, I. V. Berezin and E. T. Denisov was published in 1962 (English edition by Pergamon Press in 1965). Another monograph "Inhibition of Fat Oxidation Processes" written together with Yu. N. Lyaskovskaya was published in 1961 (English edition by Pergamon Press in 1967). From 1965 to 1967 N. M. Emanuel was a member of more than ten editorial boards of chemical journals issued under the Academy of Sciences.

In 1958 he was elected member-correspondent of the USSR Academy of Sciences, and in 1966—member of the Academy from 1968 to 1984 he was member of the Editorial Board of the International Journal of Chemical Kinetics (USA).

Since the middle sixties, the fundamental research on aging and stabilization of polymers became one of the main fields at the Department of the Kinetics of Chemical and Biological Processes of the Institute of Chemical Physics, under the general guidance of N. M. Emanuel. In less than ten years, a group of laboratories was formed involving 150 specialists concerned with all the fundamental aspects of the problem, such as the rules for thermal, thermoxidative, light-, chemi-, mechanical degradation of polymers and especially the stabilization principles. Special attention was paid to stabilization of thermostable polymers and prediction of the reliable service time and duration of polymer materials.

The nature and reactivity of active centers responsible for aging processes and the types of elementary reactions involved in aging were also studied by N. M. Emanuel. The basis kinetic rules for the aging of polymer materials were classified,

a number of mathematical functions enabling numerical description of aging processes was suggested, and general equations were derived.

The ultimate results in the field of aging and stabilization of polymers were published in the monograph "Chemical Physics of Aging and Stabilization of Polymers" by A. L. Buchachenko and N. M. Emanuel (1982) and "Chain Reactions. Historical Aspect" by N. M. Emanuel, G. E. Zaikov and V. A. Kritsman (1989).

In 1974 N. M. Emanuel was elected member of the New York Academy of Sciences (USA), foreign member of Sweden Royal Academy of Sciences, Doctor honoris causa of Szeged University. In 1974–1984 he was member of the Journal Polymer Science editorial board. In 1984 he received the State Premium for development of research on radiobiology in USSR.

Great advancements in the field of the liquid phase oxidation theory, stabilization of polymers, kinetics and mechanisms of many important biological processes, ascertainment of the basic principles of new drugs are connected with N. M. Emanuel's name. Of late he was heading at the Institute of Chemical Physics Department consisting of 650 persons. Under his guidance about 150 persons became candidates and 50 persons doctors in science. His disciples are engaged in 45 research centers in USSR and abroad.

Professor N. M. Emanuel passed away in 1984 in the prime of his life, full of scientific projects, plans and ideas about the organization of research in his Department and in various institutes of the General and Applied Chemistry Section of the USSR Academy of Sciences. Distinguished scientist and organizer, lecturer and disseminator of scientific knowledge he devoted all his life to science.

G. E. Zaikov