

## The 70th Anniversary of Professor Alexander Tkáč

The 17th of May, 1992 is a date of distinction for our scientific community. On this day, Professor Ing. RNDr. *Alexander Tkáč*, DrSc., the scientist that gained recognition for the development of our science of physical chemistry, lives to a notable jubilee of 70 years.

After finishing studies at the Faculty of Chemical Technology of the Slovak Technical University in 1947, Professor Tkáč, a native of Bratislava, continued his studies of physical chemistry at the Faculty of Natural Sciences of the Comenius University in Bratislava. He graduated in 1949 and received a degree of *Rerum Naturalium Doctor*. He started his scientific and educational career at the Slovak Technical University. Initially, he was engaged as an assistant lecturer at the Institute of Chemical Wood Technology and then, since 1949, he has been working at the Institute of Physical Chemistry, where he still occupies responsible posts. In 1953 he was promoted to an associate professor and in 1968 to a professor of the physical chemistry. In 1964 he achieved the Candidate scientific degree (Ph.D.), and one year later, the degree of the Doctor of Chemical Sciences. In 1957 he was commissioned to lead the scientific institute established at the Department of Physical Chemistry. Until the present days, he was engaged there as a chief scientist. Of the important functions that he held successfully, it is necessary to mention the post of vice-president of the Slovak Technical University (1990–1991).

After university graduation, Professor Tkáč devoted his time to systematic scientific research and he, as the disciple of Professor *B. Stehlík*, focused on the problems of chemical structure. The investigation of the combined effect of osmosis and diffusion through membranes enabled him to find some laws of formation of molecular compounds created by the hydrogen bonds. The introduction of modern physical, especially spectral methods, namely infrared spectroscopy, electron spin and nuclear magnetic resonances, is to Professor Tkáč's credit. He took an advantage of these and many other methods when studying kinetic stability of important polymers and liquid hydrocarbons under the exposure to light, heat, and force fields in the environment of different gas atmospheres.

The scientific activity of Professor Tkáč is extremely fruitful not only as far as the number of presentations (about 300 scientific papers, numerous chapters in scientific monographs, great number of lectures at home and abroad) is concerned, but also as to the scope of interest, characterized by several research areas, e.g. the study of reactivity and structure of free radicals, the study of microheterogeneous catalysis and associated biochemical and biophysical processes and particularly the research and development of highly-vacuum film distillation aimed at the preparation and isolation of technically important materials.

The common denominator of all the mentioned orientations is chemical kinetics, especially kinetics of radical processes. The study of characteristics of free radicals resulted in several conclusions that led to further elaboration of the theory of chain reactions of combustion. These problems closely relate to the detailed study of the mechanisms of catalysis that resulted in defining the rules of electron transmission in the presence of trace amounts of transition metals. It is of a great importance for a stereospecific and stereoselective catalyses. The study of enzyme catalysis is closely related to the radical chemistry of transition-metals catalysis. On the basis of knowledge concerning the relationships between the structure and reactivity of free radicals Professor Tkáč was able to formulate laws valid for slow "cold" combustion of alkanes and alkenes, oxidation aging under higher temperatures, enzyme oxidation during the respiration processes at the cellular level, as well as the pyrolysis of polymers. A special attention should be devoted to the unique way of preparing stabilized peroxy and alkoxy radicals linked to transition metals applicable to the preparation of secondary radicals by hydrogen and electron transmission at room temperature and in extremely high concentrations. This



knowledge also represents the basis for biochemical and biophysical research on the function of radical complexes during respiration and recently for noteworthy results in the research of radical carcinogenesis.

The investigation of radical chemistry of oxygen in normal and pathogenic biosystems focused on psychopathology and psychopharmacology could be classified as biophysical research.

Research activity focused on the study of vacuum and molecular distillations and their utilization in preparation of defined materials is closely connected with industrial practice resulting in remarkable economic profit. Dozens of patents registered at home and abroad were used in our economy, in the production of pure chemicals, pharmaceutical preparations as well as in recycling raw materials (e.g. mineral oils). Remarkable contribution of Professor Tkáč consists in the projection and construction of relevant technological equipment (especially vacuum film evaporators) that is gradually produced by industrial companies.

However, Professor Tkáč is not only an outstanding scientist, but the great deal of work he had done in the field of education of our new scientific and technical generation is also remarkable. At the Faculty, he gave lectures not only on basic physical chemistry, but he cooperated on the initiation of new lectures on progressive areas, such as colloid science and chemical physics. He is a coauthor of the first Slovak textbook on physical chemistry for university students. At present, many of them engaged in research at the Slovak Academy of Sciences, universities, and research institutes are thankful to him for the introduction to methods and practice of scientific work.

Fruitful activity of Professor Tkáč, his erudition, scientific as well as technical invention and exceptional tenacity contributed to our science and economy. His mental as well as physical vitality convince us that future years of his life will bring many successful results in science and in useful combination of research and practice.

All the Czech and Slovak scientific communities highly appreciate the great merits of Professor Tkáč and wish him all the best – good health, enthusiasm, and creativity to help him reach all the aims and resolutions he has made.

*V. Kellö*