

## In Memoriam Professor J. W. Ciborowski (1918–1986)



ON 17 JULY 1986 death took away Professor Janusz Ciborowski, an eminent Polish scientist in the field of chemical and process engineering. Professor Ciborowski was a member of the Polish Academy of Sciences, Head of the Chemical Engineering Department at Warsaw Technical University, Chairman of the Chemical Engineering Committee of the Polish Academy of Sciences, and a member of the Honorary Advisory Board of the *International Journal of Heat and Mass Transfer*, *International Chemical Engineering* and *Journal of Engineering Physics*. He represented Poland in the European Federation of Chemical Engineering.

Professor Ciborowski was born on 26 January 1918 in Warsaw. In 1942 he received the M.Sc. degree from the clandestine university program, and his M.Sc. thesis was later officially confirmed by Warsaw Technical University after the liberation of Poland. In 1947 he took the Ph.D. degree and in 1949 the D.Sc. degree at the Chemical Faculty of the same university.

In 1946–47 he had a visiting appointment at the Chemical Engineering Department of Massachusetts Institute of Technology. After returning home, Professor Ciborowski undertook the enormous and responsible task of creating a separate study in chemical engineering in Poland. In 1947 he organized the chair of chemical engineering at Warsaw Technical University. In 1950 he was nominated an associate professor, in 1954 a professor, and in 1962 a full professor of this university. He was elected a corresponding member of the Polish Academy of Sciences in 1967 and then a full member in 1974. In 1952, he published the first Polish academic textbook *Chemical Engineering* which was followed by *Numerical Problems in Chemical Engineering* (1954), *Fundamentals of Chemical Engineering* (1965), and *Process Engineering* (1973). These books determined the objectives and range of chemical engineering study not only in Poland but also in several other countries. Professor Ciborowski also worked out a detailed

syllabus of chemical engineering studies, which has become a basis for all other technical universities in Poland.

Professor Janusz Ciborowski was also a founder of the new Chemical Engineering Department at Warsaw Technical University. Owing to his initiative a newly built Institute of Chemical Engineering was opened in 1975.

His scientific activities were mainly concerned with fluidization and drying. His pioneering studies dealt with heat and mass transfer in fluidized beds, electrostatic effects during fluidization in gas-solid systems and direct electric heating of fluidized beds. The above studies resulted in a monograph "Fluidization" published in 1957. Further topics connected with fluidization, studied by Dr Ciborowski and his co-workers, dealt with drying of different materials in a fluidized bed, sublimation and resublimation of solids in a fluidized bed, combustion, decomposition of mineral raw materials and inorganic substances in a fluidized bed, and application of a fluidized bed in different catalytic and non-catalytic processes. Other fields of his scientific activities include thermodynamic and kinetic problems of heat and mass transfer in drying, sublimation and resublimation, selected problems in two-phase systems (two-phase flow in horizontal tubes, gas entrainment by plunging liquid jets,

wet dust removal in scrubbers), and some selected problems in chemical reactors.

His scientific contributions include over 130 published research papers, 11 patents, numerous papers submitted at various specialized conferences, and numerous papers referring to organization of science.

Professor Ciborowski had supervised 22 Ph.D. theses, 10 of his students later received D.Sc. degrees, and 14 of them became professors and associate professors. Professor Ciborowski had been very active in the field of organization of science and education. He had been Dean and Head of the Institute of Chemical Engineering, he performed numerous responsible and significant tasks at his university and in other consulting bodies. In recognition of his eminent scientific achievements he was conferred the title of Doctor Honoris Causa by the Leningrad Technological Institute in 1969.

An outstanding scientist, educator and science organizer has passed away, a man of exceptional energy and sense of duty, highly respected by the scientific world. He left behind splendid work and a feeling of profound grief in the hearts of his co-workers and students.

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