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PROFESSOR WOJCIECH ŚWIĘTOSŁAWSKI
In memoriam

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Professor Wojciech Świętosławski

Twenty five years ago, on April 29, 1968 died Professor Wojciech Świętosławski, one of the most prominent Polish physicochemists, after whom the Polish Society of Calorimetry and Thermal Analysis was named. Świętosławski was renowned for his fundamental research work in thermochemistry and calorimetry as well as for development of very precise methods of ebulliometric measurements. He also contributed to our knowledge of phase equilibria, especially the azeotropy in multicomponent systems of organic substances, and in some branches of applied chemistry, mainly in physicochemistry of coal and the products of coal utilization. During his long and creative life Świętosławski was many times honoured by the scientific community. He was a member of the Polish Academy of Sciences, Honorary Doctor of six universities, and a Honorary Member of many scientific societies. He was twice awarded the National Science Prize.

At the 25th anniversary of Świętosławski's death, let me present a brief summary of his investigations in the field of thermochemistry and microcal-

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orimetry, and show how his activities influenced the present developments within that field.

Wojciech Świętosławski was born on June 21, 1881, at Kiryjowka (in the Ukraine). He studied chemistry at the Kiev Polytechnic Institute. In 1906 Świętosławski graduated in organic chemistry, particularly in the chemistry of dyestuffs and his early research along this line has influenced considerably his later scientific activities. His first paper published in 1908 in 'Chemik Polski' was concerned with thermochemistry of organic compounds. His idea was to derive the values of the energy of molecular bonds in the molecule of organic substance from experimental values of the combustion heat by the use of the laws of thermochemistry. He introduced the definition of 'thermochemical characteristic of atomic bond' and proposed a simple algebraic method of calculating numerical values of this thermochemical characteristic. He continued this trend of research with some collaborators and undergraduated students, first at the Kiev University and then in Moscow, as in 1911 he became the Head of the first Russian Thermochemical Laboratory (founded by Russian thermochemist professor Luginin and granted to the Moscow University). Świętosławski's D. Sc. thesis 'Thermochemistry of Diazo Compounds' presented 1917 at the University of Kiev was highly estimated as important contribution to the knowledge of the structure of diazo-compounds and the stereochemistry of trivalent and pentavalent nitrogen atoms. Due to the value of his thesis the author was conferred a highest scientific degree in Tsarist Russia. As wrote one of his celebrated pupils, prof. T. Urbański: 'Świętosławski became one of the pioneers in the application of physical methods to elucidate the problems of structure of organic compounds and mechanisms of organic reaction and certainly the first chemist who used thermochemical analysis for this purpose'.

At the end of Work War I, in 1918, Świętosławski left Moscow for Poland, and took Chair of Physical Chemistry at Warsaw University of Technology (Politechnika Warszawska), where he continued his investigations on thermochemistry. In 1928 and again in 1933 he published his book 'Thermochemistry', which is recognized as a classic work on this subject. Świętosławski's activity at Warsaw University of Technology was not limited to thermochemistry and calorimetry. He developed simple and very precise ebulliometers with numerous applications in study of phase equilibria, solubility, adsorption, azeotropy and other problems. He described them in his monographs: 'Ebulliometry' and 'Ebulliometric Measurements' published in Polish (1935) and in English (1936 and 1947). In 1927 he became the Head of Coal Department at the Chemical Research Institute in Warsaw (Chemiczny Instytut Badawczy), where he started a research work on utilization of coal. He continued his research in this field during the second Word War at the Mellon Institute in USA,

and later after 1947 in Poland. The results of this research are subject of five monographs and numerous scientific papers and patents.

Świętosławski's thermochemical studies were closely related to his investigations into the theoretical foundations of calorimetric measurements. At the beginning of the XXth century, the most extensively used calibration methods of calorimetric system were burdened with considerable errors; Świętosławski recognized the necessity of measuring the combustion heat of organic substances in various laboratories under identical conditions in order to obtain comparable results. His principal ideas was to introduce the physicochemical standard to calibrate the measuring system and to use, instead of absolute, comparative methods of physicochemical measurements. Due to his achievements and experimental works his collaborators as well as his permanent activity in I.U.P.A.C., benzoic acid was accepted as international physicochemical standard in combustion calorimetry and the comparative methods of physicochemical measurements were generally recommended. Świętosławski had applied Richard's adiabatic calorimeter since his first thermochemical investigations, and in 1914 he presented a new construction of this calorimeter, which he applied for a precise determination of the combustion heat of benzoic acid. In the middle of twenties Świętosławski's affiliation with Mme Marie Skłodowska-Curie in Paris initiated his interest in microthermal measurement, as the precise quantification of radioactive decay was of considerable scientific importance. Very fruitful and intense period of microcalorimetric investigations started then in Świętosławski's laboratory at Warsaw University of Technology, different experimental techniques were examined, new calorimeters were designed, built and carefully tested, such as: adiabatic microcalorimeter single and twin, the Bunsen ice calorimeter and labirynth flow calorimeter. In short period of ten years thirty important papers on this subject were published by Świętosławski and his collaborators. Different phenomena were studied: radioactive decay (Al. Dorabialska, I. Złotowski) adsorption and vaporization, phase changes in metals, hardening of cement and explorative studied on the use of flow calorimetry in physiology and biology, which were started at the end of thirties. Świętosławski with his collaborators were always in the frontline of research and in some areas of calorimetry far ahead of their contemporaries. The second World War interrupted this period of successful research and the plans to build a flow calorimeter for experiments with animals up to 100 kg of weight.

In 1946, while Świętosławski was in USA, he wrote the book 'Microcalorimetry', in which has sums up his rich experience and very deep insight into the fundamentals and practice of experimental thermo- chemistry. Two years later, in the paper and lecture entitled 'Investigations of Small Quantities of Heat' (in Polish), he presented the principal ideas and methods of his microcal-

orimetric researches to the Warsaw Scientific Society, for which he received the scientific prize of the Society. Then due to the efforts of Świętosławski and the enthusiasm of his young coworker at the University of Warsaw and at the Institute of Physical Chemistry new calorimeters and microcalorimeters were built. Intensive scientific work was initiated in the field of thermochemistry of solutions and microcalorimetry, which was a part of basic and applied researches in phase equilibria, azeotropy and separation processes of coal tar and another organic raw materials.

During sixty years of his scientific activity Professor Świętosławski had educated several hundreds of graduated students and promoted to D. Sc. and Ph. D. several dozen of coworkers. In this short review only those working in thermochemistry and calorimetry should be named. At the University of Kiev there were: E. Skrzyszewski, S. Szczegolow, Z. Gierycz, W. Osmulski and Al. Dobrowolski; at the Moscow University belonged to them: St. Wierzyński, M. Strużyński, A. Monossan, I. Pakowicz and M. Popow. The latter was then the Head of the Thermochemical Laboratory at Moscow University and continued the experimental thermochemical research with his collaborators.

Significant contributions to the developments of calorimetry at Warsaw University of Technology were given by: the sisters H. and Z. Błaszkowska, H. Starczewska, Al. Dorabialska, I. Złotowski, W. Sołodkowska, S. Rosiński, J. Salcewicz, J. Pomorski, L. Keffler and M. Łaźniewski. Professor Al. Dorabialska continued her research in the microcalorimetry of radioactive decay and natural radioactivity at the Lvov Institute of Technology, Łaźniewski built the dynamic calorimeter at the University of Lodz. To the youngst Świętosławski's team working at the Warsaw University belonged: Wł. Wóycicki, M. Krzysztofowicz-Wóycicka, K. Sadowska, A. Kostrzyńska-Zielenkiewicz and W. Zielenkiewicz. Now Zielenkiewicz with his coworkers continue Świętosławski's work in calorimetry at the Institute of Physical Chemistry of the Polish Academy of Sciences. The team displays intensive activity in the field of calorimetry, which resulted in 13 promotions to D. Sc. grade and publication of over 250 papers.

Professor Wojciech Świętosławski died 25 years ago, but despite of an immense progress in the field of calorimetry and thermal analysis, which has updated many of old measurements, his principal ideas are still alive today. He lives also in the memory and works of his numerous coworkers and former students, who have been continuing his work.