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Wolfgang Schirmer—*In memoriam* and Recognition of his Merits

Wolfgang Schirmer, a distinguished, prominent German scientist in the field of adsorption on molecular sieves, passed away on April 16, 2005, shortly after his 85th birthday on March 3, 2005.

Born into the family of a commercial clerk two years after the end of World War I, Wolfgang Schirmer as a child and pupil experienced the Weimar Republic in his birth place Berlin. He took his school-leaving examination, *Abitur*, in 1938, when the Nazis were in power and preparing for World War II. Fortunately, he started his studies of chemistry and physics at the University of Berlin before the commencement of the war and finished his studies in 1943. His diploma work was entitled "The decomposition of hydroxylamine at low pressures" and supervised by Max Bodenstein, the Head of the Institute of Physical Chemistry in Berlin at this time. So began his affection for physical chemistry which he maintained for the rest of his life.

After the war W. Schirmer went, firstly, to the "Stickstoffwerke Piesteritz", where he became Head of a Chemical Test Laboratory. During this time he studied for his PhD Thesis, Dr. rer. nat., under the guidance of H.H. Franck. He researched the liquid-phase oxidation kinetics of the nitrogen tetroxide to nitric acid reaction. In 1948, he received his Dr. rer. nat at the TH Berlin-Charlottenburg. One year later W. Schirmer was appointed the Head of the Department of Technical Inspection at Stickstoffwerke Piesteritz, and in 1950—as a young man of 30—he was appointed the Director of the Stickstoffwerke. The German Democratic Republic, the state, he chose to live in, was founded one year earlier, and this society had a great need of experts and qualified personnel with antifascist convictions. A

particular reason for this decision was that the administration of many East German factories was transferred from Russian—as they were after 1945—into German hands, mainly during the early fifties, to become state-owned companies.

During his three years at the Stickstoffwerke, W. Schirmer dedicated his scientific efforts to the kinetics of azotation of calcium carbide into Kalkstickstoff. From this research work he graduated Dr. habil. in physical chemistry of the Humboldt University of Berlin in 1954.

From the beginning of his professional career W. Schirmer had always been very keen to be a teacher and researcher at a university. Initially, however, he could not fulfil these desires. A broader field of activities with higher economic, administrative and social responsibilities was awaiting him when he became the Director of the Leuna Werke in 1953. From that time until the unification of Germany in 1989, the Leuna Werke was the largest chemical company of the GDR and employed about 30 000 people which contributed significantly to the country's GDP.

In the mid-fifties, most of the immense war-induced burdens, had been overcome in the GDR, and the economic conditions greatly improved. New questions arose and new problems had to be solved. W. Schirmer did his best to create a new basis to the GDR's energy supply and chemical raw-material economy. However, he still managed to find time to be involved in the education of qualified personnel at universities and technical colleges. Soon he was appointed a Lecturer of Chemical Technology at the newly founded Technische Hochschule Leuna-Merseburg. In 1955, he was promoted to the Professorship of Physical Chemistry with strong teaching commitments.

In the sixties, W. Schirmer was appointed a member of the GDR Research Council, a position that gave him considerable opportunities to influence both the scientific research and the development of the country's policy in science and technology. In 1960, he was elected a Member of the "German Academy of Sciences at Berlin", which became the main sphere of his activities during the years to follow. In 1963, W. Schirmer was appointed the Deputy Director of the Institute of Physical Chemistry of the Berlin Academy, whose director was P.A. Thiessen at this time. He also became Professor of Chemical Technology at the Humboldt University of Berlin in 1963. After P.A. Thiessen's retirement in 1964, W. Schirmer was appointed the Director of the Institute of Physical Chemistry.

Stimulated by both his industrial experience and actual needs of the country's chemical industry, W. Schirmer began, enthusiastically, to set up a new laboratory of applied and fundamental research of adsorption on molecular sieve adsorbents, specifically zeolites. He could not have chosen a better time to begin R&D in this novel class of crystalline, microporous inorganic materials and their syntheses. The petroleum industry had a very strong interest in the development of new, highly selective, separation processes for the various product streams which arose in petroleum refining. The high selectivity of these microporous materials towards the components of these streams was, quickly, recognised. These materials were excellent molecular sieves, showed great differences in the interaction energies and intraporous molecular transport rates of the various components present in the various refining streams. From his time at the Leuna Werke, W. Schirmer had been aware of a strong need to replace the Fischer-Tropsch synthesis route to long-chain *n*-paraffins as raw material for biodegradable detergents, by their direct isolation from petroleum fractions rich in mixtures of *n*- and *iso*-paraffins. At that time, it was known already, that certain types of synthetic zeolites, specifically the LTA type, are able to separate *iso*-paraffins from the desired *n*-paraffins, but there was no ad- and desorption data for such hydrocarbon-zeolite systems. W. Schirmer, together with a team of young talented people and in collaboration with an engineering group at Leuna, made it their task to create the basic knowledge for such type of processes and, specifically, for the Leuna Parex Process as it was later referred to.

Development of this process serves as an excellent example of mutual stimulation and acceleration of a systematic fundamental research work with a large-scale industrial process development. This became particularly evident, when during the development of the process, as a result of fundamental research, the planned desorption-process step was substituted by a new one; *viz.*, using ammonia as the desorbing species.

During this research, W. Schirmer's interdisciplinary approach to solutions of complex tasks was clearly demonstrated and became extremely valid and characteristic for other, later, R&D projects executed by the Schirmer group. Such solutions combined the expertise that existed in the Berlin Institute with those provided by the strong collaboration with the groups of Klaus Wehner at Leuna and with Harry Pfeifer at the

University of Leipzig—utilising, newly developed, solid-state NMR methods—as well as the group of Michail M. Dubinin at the USSR Academy of Sciences in Moscow.

Large is the list of new scientific results and findings in the area of molecular sieve adsorption developed or stimulated by Wolfgang Schirmer and his group. One such important area was the study of the high-temperature adsorption of hydrocarbons with boiling points up to about 450 K. Such studies dealt specifically with the thermodynamics of adsorption, sorption kinetics and rate-limiting steps, and molecular dynamics of such systems as well as the development of a series of theories to describe, interpret and predict such adsorption in microporous sorbents, based specifically on statistical thermodynamics and Monte Carlo approaches. Quantum-mechanical interpretation of the relationships between the structures and properties of both solids and sorbing species, the relationships between acidity and structure, et al., was an important, new powerful concept during these early days.

After some five years, the Schirmer group had published more than 100 scientific papers in these fields. The numbers increased to more than 250 by the time that W. Schirmer retired in 1985. However, his greatest success was to bring the Leuna Parex Process on stream at the Schwedt Refinery in 1973, and to guarantee a successful start-up of another dozen of such plants in the former Soviet Union, each with an annual capacity of about 100,000 tons of *n*-paraffin product.

Although his own researches demanded most of his attention, Wolfgang Schirmer never neglected other scientific responsibilities at the Berlin Institute. This followed from his deep conviction that the compartmentalisation that exists in the sciences has to be replaced with an integrative process between the various scientific disciplines. He was guided by this conviction when the physico-chemically orientated Berlin laboratories and Institutes of the Academy of Sciences were shaped into one Central Institute of Physical Chemistry, a process he initiated in 1968. His main efforts was now devoted to interconnecting the various disciplines in order to achieve the maximum benifits from such integration.

Wolfgang Schirmer's leadership will be remembered for his kindness and mutual understanding, which was based upon exchange of scientific views and arguments, strongly and friendly, without any administrative barriers. Such thoughtfulness is the main reason why many of his former co-workers and colleagues have remained loyal to him right up to his last days. All will have very fond memories of the years spent with him and these memories will last for many years to come. It is not surprising that Wolfgang Schirmer—in recognition of his research work and his merits in organising natural sciences and developing the chemical industry of his country—was honoured with and awarded many prizes.

After retirement in 1985, Wolfgang Schirmer remained attached to the Institute for several years and gave advice and assistance to his successors while his health allowed.

It can be stated, unequivocally, that Wolfgang Schirmer created a School of adsorption research in the former GDR, and many of the representatives from this school are now well known world-wide as prominent scientists in the fields of adsorption and microporous systems.

His former colleagues and many friends world-wide will remember him with strong feelings of close friendship and great respect. He set standards as a scientist, as a principal and last, but not least, as a human being which will always be remembered.

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