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43. Karl Kratzl

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Personalities in Polymer Science



Karl Kratzl

Karl Kratzl is one of the world leaders in Wood Chemistry. He has investigated not only cellulose, but even more importantly, lignin, one of the most important natural polymers. Other components of wood, such as resins and terpenes were also investigated. His work on the biogenesis of lignin from glucose is a classic and fundamental contribution to the understanding of the chemistry of wood. He has also contributed to the use of lignin as a precursor of chemical intermediates.

Karl Kratzl, Professor Emeritus of the Organic Chemical Institute of the University of Vienna was born in Vienna on October 2, 1915. His father was Karl Kratzl and his mother, the former Fanny Haas.

Young Karl grew up in Vienna in an artist milieu, his father and especially his grandfather were conductors in orchestras in Vienna and throughout Europe and his grandfather, also a Karl Kratzl, was an accomplished and widely acclaimed composer.

Karl Kratzl went to a selective Elementary School in the third district of Vienna and then to the renowned Middle and High School in the Stubenbastei, the first district of Vienna. During his High School years his interest concentrated on drawing and geometry but in his later years his fascination in chemistry was aroused by his teacher.

After graduation from the High School in the Stubenbastei in 1934 Karl Kratzl enrolled

in the University of Vienna, and studied at the Chemical Institutes. He has most of the prominent Professors of the "Vienna School" at that time as his teachers, Spaeth, Mark and Wacek. It was Wacek that he chose to have as the Advisor for his thesis, which was entitled *Synthesis of Model Compounds for Degradation Products of Lignin*. Karl Kratzl received his PhD in 1939. For about 10 years he was involved with the synthesis and the reactions of model compounds of lignin sulfonic acid; these investigations led to the verification of the partial structure of lignin sulfonic acid. In 1948 he became Docent, in 1956 Associate Professor and in 1971, he was appointed Full Professor of Organic Chemistry.

Kratzl's dedication to research on wood and especially lignin, one of the key components of wood was reflected in his function as one of the founders of the Austrian Wood Research Institute and became the director of its Chemical Department. In 1968 he became the Director of the entire Section of Chemical Technology of Wood.

The scientific work of Karl Kratzl can be characterized as follows: 1.) Structure, reactivity and biogenesis of lignin; 2.) Theory of bleaching with oxygen and the oxygen pulping of wood and 3.) Synthesis of pharmaceuticals starting from lignin.

Basic contributions were made by the Kratzl school in the 50's and 60's on the biosynthesis of lignin precursors and of lignin using carbon 14 labeled glucose and other carbon 14 labeled intermediates. The incorporation of ring and side-chain carbon atoms of lignin from the carbon atom of glucose was carefully worked out. Those were results for the biogenesis of aromatic compounds in the plant organisms. Later the work shifted to the acidic and alkaline as well as the thermal and oxidative degradation of lignin.

Bleaching of cellulose with ozone and oxygen was also carefully studied. This work, which continued for 20 years, was done in cooperation with a well known cellulose and paper company in the US. Lignin, itself a macromolecular compound was used as a starting material for various condensations reactions. Other products of wood were also the subject of Kratzl's investigations, for example investigations of tall oil and resins from trees. The determination of small quantities of terpenes from wood bark and needles of trees were also investigated and methods for the general use of this techniques

were developed. These investigations were carried out in connection with problems the damage of forests.

Especially important was the synthesis of an analeptic, synthesized from vanillin which can readily be obtained from the degradates of the bisulfite solution of wood pulping. This drug has now been produced industrially for the last 50 years.

Karl Kratzl's scientific work, the chemistry of wood and, more particularly of lignin is documented in about 200 publications, two books and a number of patents. Twenty of his 72 PhD students are Professors and are teaching in Universities all over the world.

Karl Kratzl was and is a significant member of the scientific community especially in Austria. He has traveled and lectured widely all over the world, especially in countries where wood is the dominant material: Canada, the former Soviet Union, China, Japan, Mexico, especially the US and Sweden and throughout Europe.

Kratzl's contributions to science and technology were recognized by several Awards. He received the Wegscheider Prize of the Austrian Academy of Sciences in 1958, the Kellner medal of the Association of Cellulose and Paper chemists in 1969. In 1983 he was elected a Fellow of TAPPI, and in 1990 he received the Richard S. Hunt Prize from TAPPI. In 1971 Kratzl was elected a Fellow of the International Academy of Wood Science and served their General Secretary from 1972 to 1980.

In 1983 Karl Kratzl was awarded an honorary doctoral degree from the University of Agriculture in Vienna and in 1987, received the Gold Medal of the City of Vienna.

The personality of Karl Kratzl is not limited to his scientific contributions, he was also a great humanist. In his younger years he was an enthusiastic mountain climber, played soccer, skied and was and is an excellent photographer.

The main hobby of Karl Kratzl over the years, especially since his retirement, painting, especially water color. He is a highly accomplished in graphic and cartoon drawings especially in humorous drawing. In 17 exhibitions, Kratzl's paintings and drawings were displayed, including, exhibitions in Chicago and at the Künstlerhaus in Vienna.

Karl Kratzl is also an accomplished writer and his *Self-portrait of a Caricaturist*

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widely read in the German community, and his *4 Little Cartoon Books* are also well appreciated. He has written 3 additional books of satyr, cartoons and humor. He was recently offered a position as Adjunct Professor in *Caricature Art* at the Vienna Academy of Arts.

In 1947, Karl Kratzl married the former Edith Bruck, his former student, who is a chemist and also an recognized artist; a goldsmith and a painter on silk. A few months ago the Kratzl's celebrated their golden wedding anniversary. Karl and Edith Kratzl have two children, a daughter Sissy, who has a Ph.D. from the University of Vienna and a son Karl Ferdinand who is a poet and actor. The Kratzl's have 6 grandchildren.

This article was prepared by **Otto Vogl**, Department of Polymer Science and Engineering, University of Massachusetts, Amherst, MA, 01003, USA.
