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## Phosphorus, Sulfur, and Silicon and the Related Elements

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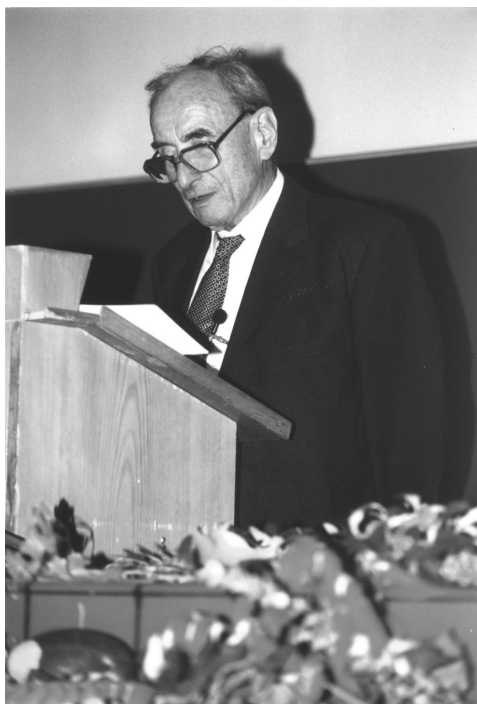
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## ■ LEOPOLD HORNER (1911–2005)



### **PIONEER OF THE ORGANIC CHEMISTRY AND STEREOCHEMISTRY OF PHOSPHORUS**

Leopold Horner was born on August 24, 1911, in Kehl am Rhein, Germany. From childhood, he was acquainted with chemistry as his parents ran a dyehouse. His father died in 1919 after his return home from the First World War. Five years later, his mother died, leaving young Leopold and his sister orphans. However, thanks to the great help of an uncle and an aunt he could study chemistry, first in Heidelberg (1931) and then in Munich. In 1935, Leopold Horner graduated from the University of Munich. His postgraduate studies were of great importance, since he did a research under the supervision of Heinrich

Wieland—the Nobel Prize winner, 1927—who introduced him to natural product chemistry. As an assistant lecturer to H. Wieland, he was educated in inorganic and organic chemistry, as well as in some elements of biochemistry. In 1937, Leopold Horner received his doctor degree for the work on vomicine, a member of the strychnos alkaloid family. His habilitation—completed in 1942—was devoted to the synthesis of oxyindoles. After habilitation, Horner moved to the German Research Institute for Plastics in Frankfurt am Main, where he worked until 1953. His research in Frankfurt was concentrated on the mechanisms of polymerization induced by single-electron transfer from amines. As a natural extension, he also investigated the behavior of phosphines in these processes.

In 1953, Leopold Horner joined the Institute of Organic Chemistry at the University in Mainz, Germany, becoming an associate professor in 1953 and a full professor in 1962. Since 1979, he was active as emeritus professor. On October 5, 2005, he passed away at the age of 94.

In Mainz, L. Horner carried out extensive studies in many fields of chemistry. He made important contributions to the chemistry of orthoquinones, photochemistry of diazo compounds, electrochemical and catalytic hydrogen transfer, corrosion, and even to the chemistry of solid interfaces. However, the main attention was paid to the organic phosphorus chemistry, which in the 50s was a fallow land. Horner's comprehensive studies led to fundamental discoveries of new reactions and structures of organophosphorus compounds and provided the basis to his well-known studies on phosphorus stereochemistry. Two of the most significant results should be briefly mentioned here. The first is the synthesis of optically pure tertiary phosphines based on the electrochemical cleavage of quaternary phosphonium salts. Horner was also the first to use chiral tertiary phosphines as ligands for organometallic complexes in asymmetric hydrogenation. In this way, he opened a new field of research—enantioselective catalysis. From the view point of organic synthesis of great significance is the discovery of the P(O)-activated olefination. Horner was the first to describe the use of phosphine oxides and phosphonates as CH acidic olefination reagents. Horner olefination reaction plays important role in preparative chemistry and especially in the total synthesis of natural products and bioactive compounds.

Horner's scientific achievements were honored both at home and abroad. He received an honorary doctorate from the University of Karlsruhe, and he was awarded the Hanuš Medal of the Czech Chemical Society. He was also a member of the Deutsche Akademie der Naturforscher, Leopoldina and received its gold Cothenius medal. In 2005, he became the Honorary Member of the German Chemical Society.

As part of the 17th International Conference on Phosphorus Chemistry (ICPC-17), a special session in memory of the late Professor Leopold Horner has been organized. This issue of Phosphorus, Sulfur and Silicon, and the Related Elements contains the papers that are based on the lectures delivered at the session and dedicated to this great organophosphorus chemist.

M. Mikołajczyk