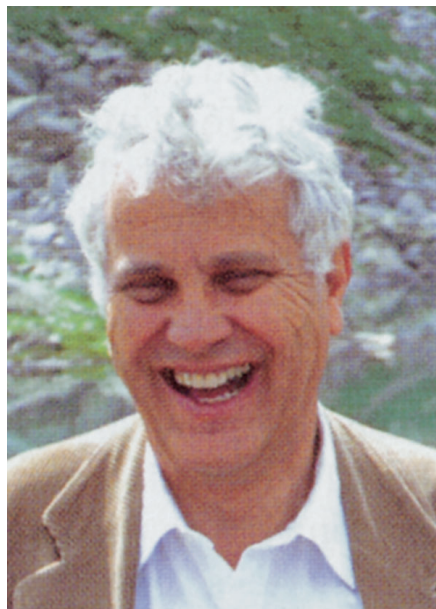


REMEMBERING

Werner Stumm (1924–1999)

Werner Stumm, a member of the Advisory Board of *Croatica Chemica Acta* (1992–1998) and the most cited author ever published in this journal, passed away on April 14 at his home in Switzerland. He was Professor Emeritus at the Federal Institute of Technology (ETH) in Zürich.

Werner Stumm became a founder of the modern discipline of *Aquatic Chemistry* by bringing the environmental chemistry of fluid-solid interfaces to new heights and introducing a molecular view and thinking about the processes on atomic and molecular scales. He was guided by the idea that in order to gain an insight into global geochemical cycles, anthropogenic perturbations and the fate of pollutants, chemical processes need to be understood at the atomic and molecular levels. The most important part of his research activities focused on the processes at the particle-water and air-water interfaces and on the application of adsorption, dissolution and redox reactions to processes in natural waters and water technology (coagulation-flocculation, dissolution and nucleation of minerals). The surface complexation model developed by Werner Stumm and Paul Schindler (University of Bern) postulates chemical binding between adsorbed cations and ligands and oxide surfaces. This model provides the basis for understanding the dissolution reactions of oxides as well as for the catalysis of redox reactions at surfaces and it has shaped the aquatic surface-chemistry field. As elaborated by Garrison Sposito of the University of California, Berkley, »the conceptual development of the surface complexation mechanism for adsorption processes, recorded in a remarkable series of six articles, based on lectures presented at summer conferences sponsored by Ruđer Bošković Institute, reflects the ever-broadening and deepening perspective of Stumm's ideas to match the growing success of his own *Weltanschauung* concerning surface chemical reactions«.



*THE CROATICA CHEMICA ACTA SERIES OF ARTICLES**

- (1) »Specific Chemical Interactions Affecting the Stability of Dispersed Systems«:
W. Stumm, C.P. Huang, S.R. Jenkins, **42** (1970) 223–245.
- (2) »Interaction of Metal Ions with Hydrous Oxide Surfaces«:
W. Stumm, H. Hohl, F. Dalang, **48** (1976) 491–504.
- (3) »A Ligand Exchange Model for the Adsorption of Inorganic and Organic Ligands at Hydrous Oxide Surfaces«:
W. Stumm, R. Kummert, L. Sigg, **53** (1980) 291–312.
- (4) »The Role of Surface Coordination in Precipitation and Dissolution of Mineral Phases«:
W. Stumm, G. Furrer, B. Kunz, **56** (1983) 593–611.
- (5) »Surface Complexation and Its Impact on Geochemical Kinetics«:
W. Stumm, B. Wehrli, E. Wieland, **60** (1987) 429–456.
- (6) »The Coordination Chemistry of the Oxide-Electrolyte Interface; The Dependence of Surface Reactivity (Dissolution, Redox Reactions) on Surface Structure«:
W. Stumm, B. Sulzberger, J. Sinniger, **63** (1990) 277–312.

The papers on cationic surface complexes (1) and chemical modelling of metal adsorption (3) became Citation Classics (Science Citation Index Classic, 1990).

Werner Stumm graduated from the University of Zürich with a Ph.D. in inorganic chemistry and worked briefly at the Swiss Federal Institute for Water Resources and Water Pollution Control (EAWAG), a division of the Swiss Federal Institute of Technology, where he first encountered water quality problems. He became interested in the chemistry of Swiss waters and the role that fundamental chemistry might play in understanding actual water composition. His U.S. academic career began in 1954 as a research fellow in sanitary engineering at Harvard University. He was appointed assistant professor in 1956 and was later promoted to Gordon McKay Professor of Applied Chemistry, a position that he held until 1970 when he returned to his native Switzerland to direct EAWAG and to teach as Professor of Aquatic Chemistry. Between 1970 and 1992 Stumm led EAWAG to its position as the world preeminent environmental research laboratory. The latest in the series of distinguished scientific recognitions, the 1999 Stockholm Water Prize, was awarded to him and his closest collaborator, James Morgan of the California Institute of Technology, »for outstanding

* G. Sposito, Adsorption as a Problem in Coordination Chemistry. The Concept of the Surface Complex. In: *Interfacial and Interspecies Processes* (Eds. C. P. Huang, C. R. O'Melia and J. J. J. Morgan), ACS, Washington, 1955, pp. 33–56.

contributions to aquatic chemistry of great importance for the understanding of chemical reactions in the water environment and development of techniques for treatment of wastewater and drinking water«.

Our first contacts with Werner Stumm date from 1969 when he came to Cavtat to pay respect to the work of professor Božo Težak and the Zagreb school of colloid chemistry as a lecturer at the first International Conference on Solid/Liquid Interfaces. Since then, Werner Stumm took a significant part in all subsequent Conferences on Solid/Liquid Interfaces and International Symposia on Chemistry of the Mediterranean that were organized by Ruđer Bošković Institute in a traditional sequence of every two years. Friendship and collaboration with Werner Stumm has influenced the environmental research and education here in Ruđer Bošković Institute for almost three decades. At the same time, he fully respected and promoted the electrochemical approach to aquatic chemistry and marine research developing at Ruđer Bošković Institute. Our intellectual debt to him is enormous, for the way in which he has changed the science of aquatic chemistry and for his great generosity and inspiration. It seems appropriate to quote Jim Morgan's statement on the occasion of receiving the Stockholm Water Prize:

»Werner Stumm really believed in science. He never stopped thinking about it, even in his free time, perhaps not even when he was asleep. Stumm was affectionate both in work and his relation to other people, and was therefore one of the greatest scientists and friends we've had the pleasure to know.«

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