



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

Department of Chemistry Kolthoff Lectureship in Chemistry

Professor Scott McLuckey Department of Chemistry Purdue University

Website: <http://www.chem.purdue.edu/mcluckey/>

Faculty Host: Steven Kass

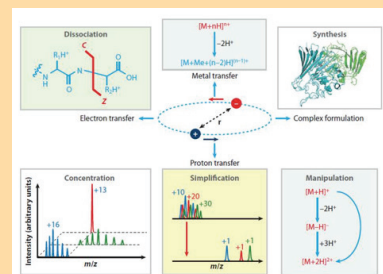


Scott McLuckey is the John A. Leighty Distinguished Professor at Purdue University. He earned his Bachelor of Science degree in chemistry from Westminster College in New Wilmington, PA, and his doctorate in chemistry from Purdue University. Professor McLuckey is an award-winning scientist whose honors include the American Chemical Society Field and Franklin Award in Mass Spectrometry, Fellow of the American Association for the Advancement of Science, ANACHEM Award from the National Federation of Analytical Chemistry and Spectroscopy, and American Chemical Society Division of Analytical Chemistry Award in Chemical Instrumentation. His service to the chemistry community includes serving as president of the American Society of Mass Spectrometry, and editor for the *International Journal of Mass Spectrometry*. His research initiatives are heavily directed toward relatively large polymeric species including peptides, proteins, oligonucleotides, and synthetic polymers. Current projects include the application of electrospray and ion/ion chemistry to the rapid sequencing of DNA, the study of the dissociation chemistry of multiply-charged macro-ions, and the combination of ion/ion chemistry and unimolecular dissociation chemistry for the rapid identification of proteins in complex mixtures.

Lecture #2

New Reactions for Tandem Mass Spectrometry I: Proton Transfer and Electron Transfer Ion/Ion Reactions 9:45 a.m. Tuesday, April 5, 2016, 331 Smith Hall

Technological developments often create unanticipated opportunities for the development of new research areas. The emergence of electrospray ionization and electrodynamic ion traps in the 1980s, for example, has enabled the study of the reactions of oppositely charged ions within the context of an MSⁿ experiment. Gas-phase ion/ion reactions involving multiply-charged ions is a relatively new class of chemical reactions that can be used in conjunction with mass spectrometry to address issues in (bio)chemical analysis. The unusually strong attractive potential associated with oppositely charged ions in the absence of a dielectric medium provides gas-phase ion/ion reactions with a number of highly desirable characteristics for analysis. Many examples of the utility of ion/ion reactions have already been demonstrated and several instrument vendors now offer products that make a limited set of ion/ion reactions accessible to the wider mass spectrometry community. These examples are dominated by reactions that involve single small charged particle transfers; i.e., either proton transfer or electron transfer. This presentation will review fundamental aspects of ion/ion reactions, to contrast them with the more familiar ion/molecule reactions, with emphasis on implications for chemical analysis. Applications of ion/ion proton or electron transfer reactions for complex mixture analysis, gas-phase concentration and purification, top-down protein analysis, increasing ion charge, etc. will be presented to illustrate the unique characteristics of ion/ion chemistry. The presentation will also illustrate how a line of research can emerge from distinct developments that when combined provide unexpected possibilities for research.



Gas-phase ion transformation via ion/ion reactions

Izaak Maurits Kolthoff was born on February 11, 1894, in Almelo, Holland. He died on March 4, 1993, in St. Paul, Minnesota. In 1911, he entered the University of Utrecht, Holland. He published his first paper on acid titrations in 1915. On the basis of his world-renowned reputation, he was invited to join the faculty of the University of Minnesota's Department of Chemistry in 1927. By the time of his retirement from the University in 1962, he had published approximately 800 papers. He continued to publish approximately 150 more papers until his health failed. His research, covering approximately a dozen areas of chemistry, was recognized by many medals and memberships in learned societies throughout the world, including the National Academy of Sciences and the Nichols Medal of the American Chemical Society. Best known to the general public is his work on synthetic rubber. During World War II, the government established a comprehensive research program at major industrial companies and several universities, including Minnesota. Kolthoff quickly assembled a large research group and made major contributions to the program. Many of Kolthoff's graduate students went on to successful careers in industry and academic life and, in turn, trained many more. In 1982, it was estimated that approximately 1,100 doctorate holders could trace their scientific roots to Kolthoff. When the American Chemical Society inaugurated an award for excellence in 1983, he was the first recipient.

