

Evaluating gas phase cation reactivity with selected reaction gases in collision cell ICP-MS/MS

AMANDA D FRENCH, KALI MELBY, ERIC J BYLASKA,
ISAAC J ARNQUIST, KIRBY P HOBBS, DR. KHADOUJA
HAROUAKA AND RICHARD COX

Pacific Northwest National Laboratory

Presenting Author: amanda.french@pnnl.gov

Atomic MS/MS techniques allow for many analyte/interference separations, either through dissociative collisions, or through selective gas phase analyte or interferent product ion formation that effects a separation through a mass shift. These separations occur inline during the measurement, which results in quicker and more effective analyses. To determine useful reactions for inline separations in the instrument, a general idea of the reactivity of the incident ions with the reaction gas must be known. Product ion formation of ions over much of the periodic table have been explored with O₂, NH₃, H₂, CH₃F, N₂O, CO₂, OCS, and H₂S using commercial ICP-MS/MS. Using the Agilent 8900 triple quadrupole ICP-MS (QQQ-ICP-MS) we have continued to explore product ion formation with additional gases to compare reactivity with selective ion flow tube inductively coupled plasma mass spectrometry (SIFT-ICP-MS) and guided ion beam mass spectrometry (GIBMS) experiments. Higher order products (e.g., polyatomic species and ion-gas clusters) are more prevalent in ICP-MS/MS reactions due to the multi-collisional environmental; thus, it is important to study ion reactivity within the ICP-MS/MS under non-thermal conditions to leverage reactivity of various gases for applied analytical measurements. Here we present the theoretical understanding of the collision/reaction cell and the reactivity of various reaction gases using the Agilent 8900 to provide a basis for gas phase separations.