Tuning Gas-Phase Mobility Separation Factors via Selective Ion-Neutral Clustering

Abstract: The remarkable performance and accessibility of modern mass spectrometry provides researchers across disciplines with tools to measure mass-to-charge ratios with exquisite resolution and mass measurement accuracy. These increases in performance also prompt researchers to pursue additional modes of separations that capture molecular parameters (e.g. stereochemistry and alternative conformations) that transcend $m/z$. For select chemical systems ion mobility measurements can fulfill that experimental need. Despite these successes, few options have historically been available to alter gas-phase mobility separation factors. However, recent experiments at WSU conclusively demonstrate the ability of selective gas-phase interactions to provide yet another dimension of separation. Not only are the mobility shifts as a function of neutral gas vapor concentration reproducible, the selective alteration of mobility separation factors are closely linked to existing chemical functional groups. Such information may prove advantageous in elucidating chemical class and resolving interferences. Using a series of amino acids and select chemical warfare agent simulants as examples, we detail the impact chemical modification of the drift gas has on observed mobility and its potential to resolve interfering species. In addition to a discussion of the experimental modifications that enable enhanced separation factors, a detailed model for the selective interaction of the vapor dopants with the target analytes will be presented.

Refreshments served at 1:45 pm in 240 Willamette Hall

Hosted by Jim Prell