Supplement of

A Vacuum Ultraviolet Ion Source (VUV-IS) for Iodide-Chemical Ionization Mass Spectrometry: A Substitute for Radioactive Ion Sources

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Figure S1. CIMS ion current at m/z 145 (I(H₂O)) as a function of voltage across the krypton lamp. Note that the lamp ignites at voltage of ~280 V.
Figure S2. TOF-CIMS (a) reagent signal levels (b) sensitivity (c) normalized sensitivity as a function of CH$_3$I at 30 torr.
Sample Calculation of Absorption of VUV light by CH$_3$I

To calculate how much of the VUV light is absorbed, the Beer-Lambert Law is applied,

$$\frac{I(\lambda)}{I_0(\lambda)} = \exp(-\sigma(\lambda)nL)$$

where $I(\lambda)$ is the intensity of light at wavelength $\lambda$ after absorption, $I_0(\lambda)$ is the original light intensity at wavelength $\lambda$, $\sigma(\lambda)$ is the absorption cross section of the absorber molecule at wavelength $\lambda$, $n$ is number concentration of the absorber molecule, and $L$ is the path length over which the light can be absorbed.

Sample calculation:

For 86.5 ppmv of CH$_3$I at a pressure of 20 torr

$n = 5.70 \times 10^{13}$ molecule cm$^{-3}$

$\sigma(\lambda) = 7 \times 10^{17}$ cm$^2$ molecule$^{-1}$

$L = 21$ cm

$$\frac{I(\lambda)}{I_0(\lambda)} = \exp(-\sigma(\lambda)nL) = 0.92$$

Therefore, in this example ~8% of the light emitted from the VUV lamp is absorbed by the methyl iodide.