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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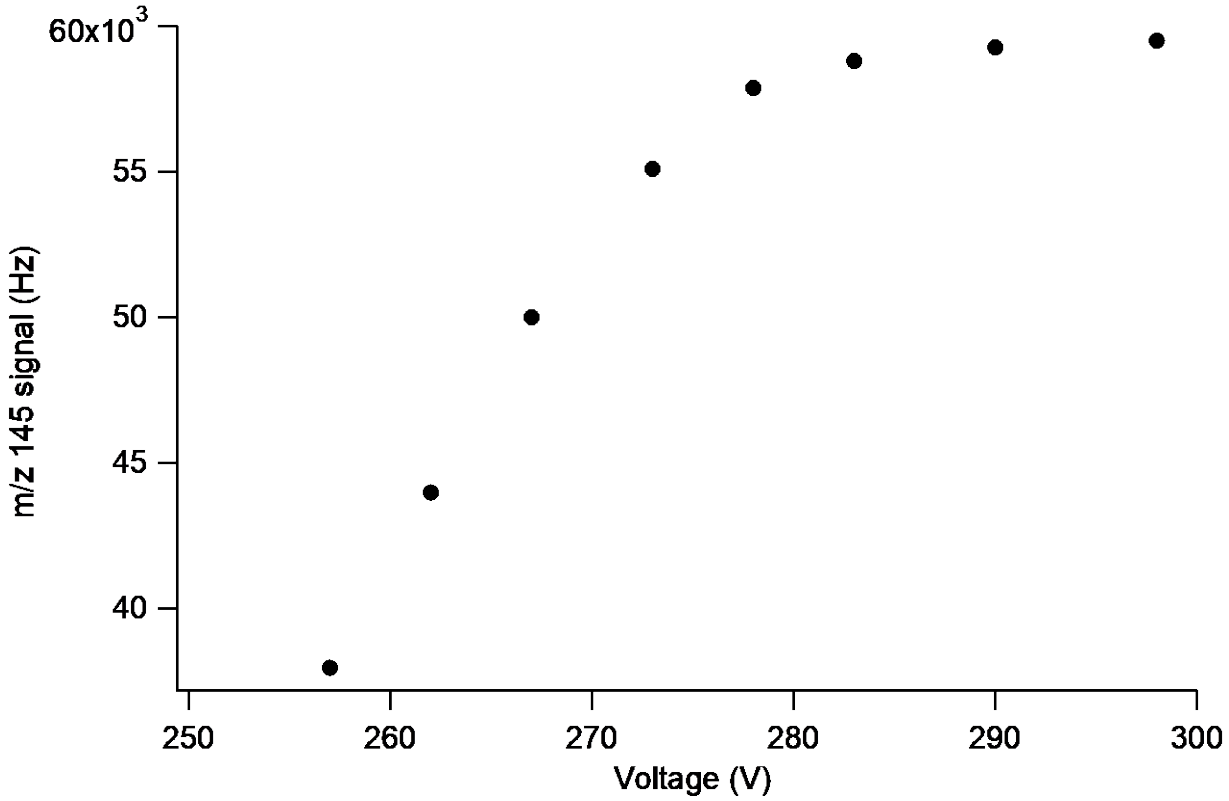

Figure S1. CIMS ion current at m/z 145 ($I^-(H_2O)$)as a function of voltage across the krypton lamp. Note that the lamp ignites at voltage of ~280 V.

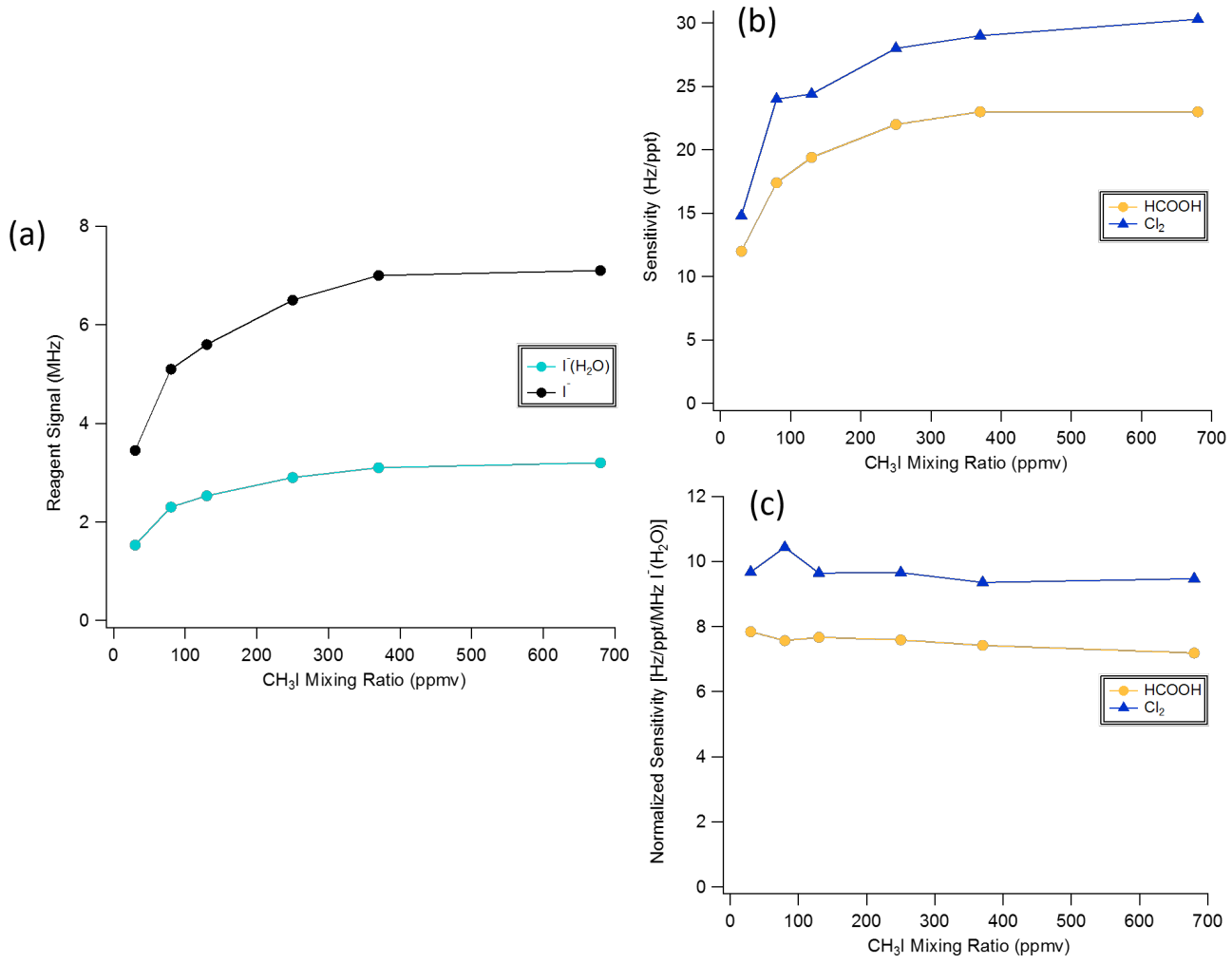

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Figure S2. TOF-CIMS (a) reagent signal levels (b) sensitivity (c) normalized sensitivity as a function of CH_3I at 30 torr.

Sample Calculation of Absorption of VUV light by CH_3I

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 λ after absorption, $I_0(\lambda)$ is the original light intensity at wavelength λ, $\sigma(\lambda)$ is the absorption cross section of the absorber molecule at wavelength λ, 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_3I at a pressure of 20 torr

$n = 5.70\times10^{13}$ molecule cm^{-3}

$\sigma(\lambda) = 7\times10^{17}$ 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.