E1-17 Effects of residual gas pressure on the mass resolution and the molecular ion yield of a time-of-flight mass spectrometer

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A time-of-flight mass spectrometer fitted with two vacuum systems, one close to the acceleration gap end and the other close to the field free region/stop detector end has been used to study the effects of residual gases on the mass resolution and the molecular ion yield. Mass spectra were obtained for different residual gas pressures with the inorganic and organic compounds CsBr and Berberine.

The analysis revealed that both the mass resolution and the molecular ion yield were pressure dependent for residual gas pressures above 1×10^{-5} mbar. In the case of CsBr, a 18% increase in the mass resolution and a 28% increase in the yield of the Cs^+ peak were observed when the pressure inside the mass spectrometer was reduced from 8×10^{-5} mbar up to 1×10^{-6} mbar. This effect was found to be more significant for molecular ions with higher masses than for lower mass ions such as H^+ and Na^+.