

## Acetonitrile and new charged clusters formation

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Keywords: aerosol chemistry, ion mobility, ions, particle formation, trace gases.

Volatile organic compounds (VOCs) are a significant fraction of atmospheric aerosol and their impact into ion-induced aerosol nucleation events could be considered (Enghoff & Svensmark, 2008). Acetonitrile (methyl cyanide,  $\text{CH}_3\text{CN}$ ) is one of the atmospheric pollutants, VOC, emitted from biomass burning. Acetonitrile can reach the stratosphere where it is characteristically associated in positive ion clusters  $\text{H}^+(\text{CH}_3\text{CN})_n(\text{H}_2\text{O})_m$  in the upper regions (Arijs et al., 1983). Previously we reported some results of young (about 1 second age) small positive air ions measurement including effect of  $\text{CH}_3\text{CN}$  on the mobility spectra (Parts & Luts, 2004). These experiments were done in laboratory conditions. Now we measured the spectra of ions in natural air and try to elucidate the relation between young ions and natural ones measured at the same time.

The continuous measurements of the mobility distribution of air ions were carried out in urban environment, in the centre of Tartu, Estonia. The improved version of a unique small air ion mobility spectrometer - KAIS, developed at the University of Tartu, measured the mobility spectra of young ions, produced by corona discharge, in the mobility range from 0.6 to 2.6  $\text{cm}^2\text{V}^{-1}\text{s}^{-1}$  (sizes <1.6 nm). Concurrently the BSMA (Balanced Scanning Mobility Analyzer) measured the mobility spectra of natural ions in the mobility range of 0.032 - 3.2  $\text{cm}^2\text{V}^{-1}\text{s}^{-1}$  (the size range 0.4 - 7.5 nm). In addition, the BSMA can provide the data about aerosol nucleation burst events (Tammets, 2004).

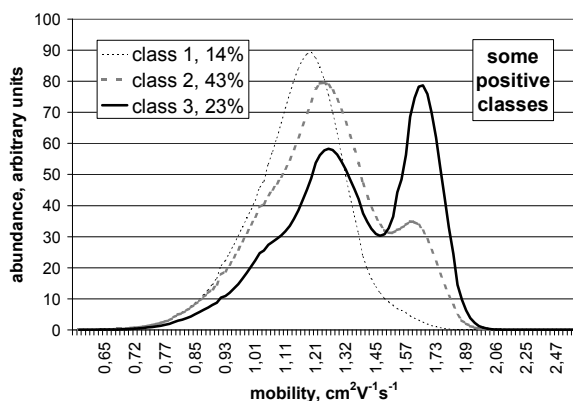


Figure 1. Background spectra of young positive ions.

The common young positive air ion spectra outdoors can have several shapes (Figure 1) depending on the atmospheric conditions (Luts & Parts, 2008).

Acetonitrile, added to natural air, apparently changes the size distribution and masses of ions and in this way the mobility spectra (Figures 2, 3).

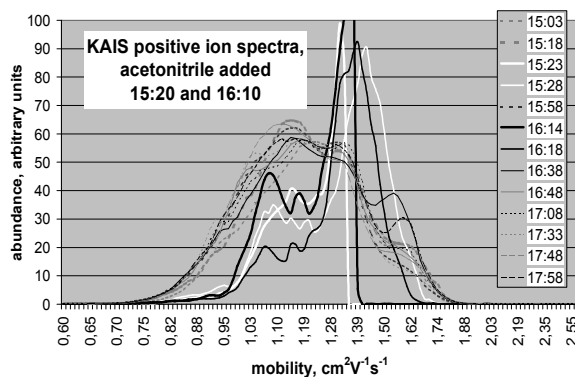


Figure 2. Temporal evolution of KAIS spectra.

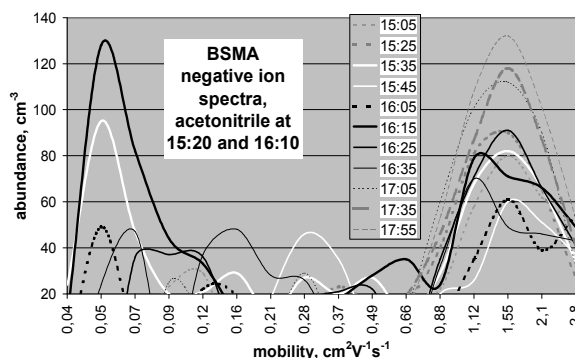


Figure 3. Temporal evolution of BSMA spectra.

Preliminary results show that acetonitrile could be considered responsible for new charged particles formation at some burst events.

This work was supported by the Estonian Science Foundation grant 6988 and by the research project SF0180043s08 of Tartu University.

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