

Highly oxygenated molecules and their chemistry in polluted urban environment

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Highly oxygenated molecules (HOMs) are important atmospheric oxidation products that may contribute to new particle formation and initial particle growth. Thousands of such compounds were quantified in both winter and summer of 2016 in Beijing by using online nitrate ion chemical ionization time-of-flight mass spectrometry. Strong diel profiles and significant differences in gaseous HOMs between normal urban conditions and heavily-hazed conditions were observed. We also observed ppb levels of gaseous nitrated phenols, which were contributed by both primary and secondary urban sources and showed nighttime enhancement under certain conditions. Positive-matrix factorization of the time series of organic mass spectra identified at least three major groups of gaseous HOMs corresponding to different atmospheric oxidation processes. Their contributions to new particle formation and secondary organic aerosol formation are also explored in this study.