

This study investigates the formation of secondary organic aerosols from the photooxidation of furan at different NO<sub>x</sub> and RH levels. SOA yields were measured using NaCl seeds to provide surface area for the partitioning of SOA-forming vapors. The chemical composition, in particular organic functional groups and a selection of molecular products, was characterized by FTIR and ESI-MS. The authors found a strong dependence of the measured SOA concentration, mass yield, and the intensity of individual functionalities on the initial VOC/NO<sub>x</sub> ratios and RH levels in a series of experiments conducted, and suggested that NO<sub>x</sub> and RH play an important role in the SOA formation from furan oxidation by altering the chemical pathways, e.g., aqueous phase chemistry, that essentially lead to SOA. This conclusion, however, is heavily drawn from the inadequate data analysis and interpretation, and lacks fundamental understanding of the predominant chemistry that occurs in the chamber experiments performed.

#### NO<sub>x</sub> dependence of SOA yields

In this study, photolysis of NO<sub>2</sub> was used to generate O<sub>3</sub>, which further undergoes photolysis and reaction with H<sub>2</sub>O to generate OH radicals. The initial VOC/NO<sub>x</sub> ratio in the performed experiments ranges from ~7 to ~48. With the presence of hundreds of ppb levels of furan at the beginning of the experiment, furan is not completely oxidized at the end and the measured SOA mass is mostly composed of the very first few generations of oxidation products. As the initial VOC/NO<sub>x</sub> ratio decreases, more NO<sub>2</sub> will be available for the formation of O<sub>3</sub> and consequently OH radicals. **The observed 'NO<sub>x</sub>-effect' here is essentially the OH effect: higher OH levels result in more furan consumed, thus producing more SOA mass and higher SOA yield. This OH effect on SOA production has been well studied and understood in the community.**

#### RH dependence of SOA yields

Again, as H<sub>2</sub>O is used to generate OH radicals, higher RH levels result in more OH radicals, which lead to more SOA mass produced from furan photooxidation. **The observed 'RH effect' is essentially another 'OH effect' by promoting the generation of OH radicals and accelerating the oxidation processes of furan.** The authors suggest that relative humidity affects the SOA yield through aqueous phase chemistry. However, the deliquescence point of sodium chloride is around 70% RH, below which the water content in the NaCl particles is close to zero, meaning that there would be minimal aqueous phase chemistry occurring in the particle phase.

#### SOA measurements at high RH levels

It is well known that using DMA to measure aerosol size distribution and mass loadings under high RH is subject to many certainties, e.g., arcing at high voltage

caused by high water content in the aerosols. While the authors used a diffusion drier in front of the DMA inlet, which could certainly minimize the arcing effect that interferes the measurement of big particles, the drying efficiency was not characterized. Have the authors measured the RH of the aerosol flow upon the exit of the diffusion drier? Did aerosols generated under high RH (e.g., 80%) still carry a certain amount of water after drying? Additionally, the authors need to consider how the drying processes affect the repartitioning of water-soluble components between gas and particle phases in order to obtain an accurate SOA yield.

#### Treatment of wall losses

The particle and vapor wall loss rates are chamber specific quantities that depend on a number of different parameters, i.e., the chamber size (volume to surface area ratio), the wall materials, the humidity in the enclosure air that affects the static charges on the chamber wall surface, and the mixing conditions (static or active mixing), among many others. The interaction patterns of particles with the chamber walls have been well studied for decades, and the particle wall loss rate has been found to vary substantially, by orders of magnitude, among different chamber environments. That the authors simply took the particle wall loss parameterizations obtained in other chambers to correct their own experiment would no doubt introduce significant uncertainties in their SOA mass measurements, resulting in unreliable SOA yield calculations.