



Vapor pressures of substituted naphthalenes derived from diffusion-controlled evaporation rates of single particles levitated in an electrodynamic balance.

Ulrich Krieger, Nir Bluvshtein, and Claudia Marcolli

ETH Zürich, Institut für Atmosphäre und Klima, Zürich, Switzerland (ulrich.krieger@env.ethz.ch)

The partitioning of compounds between the aerosol and gas phase is essential for the formation and fate of secondary organic aerosol. To predict atmospheric partitioning based on explicit models for gas phase chemistry, saturation vapor pressures of the relevant compounds need to be estimated. The further development of such models requires reliable data sets of saturation vapor pressures. Often, vapor pressures of semi-volatile and low volatile compounds reported in the literature differ by several orders of magnitude between measurement techniques [1,2].

Recently, a debate evolved concerning the saturation vapor pressures of substituted naphthalenes with differences in saturation vapor pressure of up to 4 orders of magnitude between measurements using a Knudsen effusion mass spectrometer setup and predictions using quantum chemistry calculations (COSMOtherm) [3-5]. Here, we will report and discuss pure compound saturation vapor pressures and enthalpies of vaporization for 2-naphthol, 1,3-dihydroxynaphthalene and 2,3-dihydroxynaphthalene derived from measuring diffusion-controlled evaporation rates of single particles levitated in an electrodynamic balance.

References:

- [1] Bilde, M. et al.: Saturation Vapor Pressures and Transition Enthalpies of Low-Volatility Organic Molecules of Atmospheric Relevance: From Dicarboxylic Acids to Complex Mixtures. *Chem. Rev.* 115, 4115-4156 (2015).
- [2] Huisman, A. J., Krieger, U. K., Zuend, A., Marcolli, C., and Peter, T.: Vapor pressures of substituted polycarboxylic acids are much lower than previously reported. *Atmos. Chem. Phys.* 13, 6647-6662 (2013).
- [3] Bannan, T. J. et al.: Measured Saturation Vapor Pressures of Phenolic and Nitro-aromatic Compounds. *Environ. Sci. Technol.* 51, 3922-3928 (2017).
- [4] Wania, F., Awonaike, B., and Goss, K.-U.: Comment on "Measured Saturation Vapor Pressures of Phenolic and Nitro-Aromatic Compounds". *Environ. Sci. Technol.* 51, 7742-7743 (2017).
- [5] Topping, D., Riipinen, I., Percival, C. J., and Bannan, T. J.: Response to Comment on "Measured Saturation Vapor Pressures of Phenolic and Nitro-Aromatic Compounds". *Environ. Sci. Technol.* 51, 7744-7745 (2017).