Hygroscopic Behavior and Chemical composition evolution of Aerosols Generated from Mixture Solutions of 3-Methyl-1,2,3-butanetricarboxylic Acid (MBTCA) and NaCl

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Introduction

Secondary organic aerosols (SOAs) are formed and transformed through complex physico-chemical processes in the atmosphere, which lead to their complex chemical compositions. And the interactions between the organic and inorganic components may alter their hygroscopic properties [1]. Recently, 3-methyl-1,2,3-butanetricarboxylic acid (MBTCA), a later generation product of the monoterpenes, has been proposed as one of the most relevant tracer compounds for biogenic SOA formation [2]. MBTCA was thus selected for this study, allowing to improve our knowledge about its properties.

Results and discussion

In the present work, laboratory generated, micrometer sized, pure MBTCA and NaCl-MBTCA mixture aerosol particles of 4 mixing ratios (molar ratios: 1:1, 2:1, 3:1, 1:2), were examined to observe their hygroscopic behavior and obtain chemical micro-structures using in-situ Raman microspectrometry (RMS). Observation and Raman analysis indicated only mono-sodium tricarboxylate (MSMBTL) can be formed regardless of the mixing ratios. The mixtures under mixing ratios of 1:1 and 1:2 showed no ERH and DRH, while the rest experienced single-stage efflorescence due to heterogeneous nucleation onto the excess NaCl.

[1] Li et al. (2017) *Environ. Sci. Technol* **51** (1), 263-270. [2] Kostenidou et al. (2018) *Environ. Sci. Technol* **52**, 1150-1155.