Implication of Nano/Micron Dicarboxylic Acids Associated with a Size-segregated Suburban Aerosol

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Abstract. The distribution of nano/micron dicarboxylic acids in size-segregated suburban aerosol of southern Taiwan was studied for a PM episode and a non-episodic pollution period. Oxalic acid, accounting for 77.3% and 83.9%, respectively, of the total dicarboxylic acid mass during both non-episodic and PM periods, was nevertheless the most abundant dicarboxylic acid, followed by succinic, malonic, maleic, malic and tartaric acid. The mass median aerodynamic diameter (MMAD) of oxalic acid was 0.77 μm with a bi-modal presence at 0.54 μm and 18 nm during non-episodic pollution and a MMAD of 0.67 μm with mono-modal presence at 0.54μm in PM episode aerosol. The concomitant formation of oxalic and malonic acid was attributed to in-cloud processes during both periods. During the PM episode, all dicarboxylic acids bar tartaric acid were significant nuclei mode species. Nano and condensation mode malic and succinic acids were almost perfectly correlated (r>0.98), suggesting that malic acid accumulated in the atmosphere prior to decomposition into succinic acid.

Key Words: Dicarboxylic acids; Mass size distributions; Cloud condensation nuclei.