



Reactions of important OVOCs with hydrogen peroxide and ozone in the tropospheric aqueous phase

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Besides research on the microphysics of cloud droplets and similar aqueous systems in the troposphere, the chemistry of volatile organic compounds (VOCs) from anthropogenic and biogenic sources cannot be neglected for the understanding of tropospheric processes such as the organic particle mass formation. Emissions of biogenic volatile organic compounds (BVOCs) can exceed those of VOCs from anthropogenic sources by a factor of $10^{[1]}$. Oxidation products of BVOCs like glyoxal, methylglyoxal, glycolate, glyoxylate and pyruvate, glycolaldehyde, and the unsaturated compounds methacrolein and methyl vinyl ketone are known precursors for less volatile organic substances found in secondary organic aerosols^[2,3]. Yet, the main decomposition of these substances is believed to occur via radical reactions. However, Tilgner and Herrmann^[2] showed evidence that the turnovers by non-radical reactions with H_2O_2 or ozone and some non-oxidative organic accretion reactions may even exceed those from the most reactive species in the lower troposphere, the hydroxyl radical OH.

This work investigated the reactivities of the atmospheric relevant oxidation products including pyruvic acid and glyoxylic acid towards O_3 and H_2O_2 in the aqueous phase. Furthermore, pH effects were studied by measuring the kinetics of both the protonated and deprotonated forms. The measurements were performed using a UV/VIS-spectrometer (conventional and in addition a Stopped Flow technique) and capillary electrophoresis.

In some cases the results indicate higher turnovers of H_2O_2 and ozone reactions compared to interactions with atmospheric radicals. The experimental data obtained will be presented and their implications for atmospheric multiphase chemistry are discussed.

[1] Guenther et al., 1995, *Journal of Geophysical Research – Atmosphere*, 100(D5), 8873-8892.

[2] Tilgner and Herrmann, 2010, *Atmospheric Environment*, 44, 5415-5422.

[3] van Pinxteren et al., 2005, *Atmospheric Environment*, 39, 4305-4320.