

# Glyoxal oxidation in aqueous solution: Spectroscopy and Kinetics

Thomas Schaefer and Hartmut Herrmann  
TROPOS - Leibniz-Institut für Troposphärenforschung  
Permoserstr. 15, D-04318 Leipzig, Germany

Volatile and semivolatile organic compounds (VOCs) are introduced into the troposphere in large amounts from biogenic and anthropogenic sources. Oxidation products of these VOCs, e.g., glyoxal, are important for the formation of secondary organic aerosol (SOA). Glyoxal can partition into the aqueous phase of cloud droplets, fog, rain and deliquescent particles and are oxidized by radicals, like OH and NO<sub>3</sub>.

Two concepts exist in the literature to describe the glyoxal oxidation pathway via alkyl radicals to the peroxy radicals by the addition of molecular oxygen. The first one<sup>[1]</sup> states the peroxy radical formation with a rate constant of  $k = 1 \times 10^9 \text{ M}^{-1} \text{ s}^{-1}$ . The second concept<sup>[2]</sup> assumes that this is a minor reaction pathway because of the lower rate constant of  $k = 1 \times 10^6 \text{ M}^{-1} \text{ s}^{-1}$ . To clarify the difference in the rate constant of the oxygen addition, spectroscopic and kinetic investigations of the alkyl and peroxy radicals have been performed by use of a laser photolysis - long path absorption (LP-LPA) setup. In this study a rate constant for the addition reaction of molecular oxygen of  $k = 8 \times 10^8 \text{ M}^{-1} \text{ s}^{-1}$  was measured.

- 1 Buxton, G. V., Malone, T. N. and Salmon, G. A., J. Chem. Soc. Faraday Trans., **1997**, 93, 2889-2891.
- 2 Lim, Y. B., Tan, Y., Perri, M. J., Seitzinger, S. P. and Turpin, B. J., Atmos. Chem. Phys., **2010**, 10, 10521-10539.