



Spectroscopic studies on the oxidation of carbonyl compounds by OH radicals in the aqueous solution

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The atmospheric conversation and degradation of volatile organic compounds (VOCs) is often initiated by radical reactions. One of the most important radical in the atmosphere is the OH-radical. Oxidation reactions of water soluble organic compounds in the atmospheric aqueous phase (cloud droplets, fog, rain, deliquescent particles) can be as fast as in the gas phase, but lead to different reaction products or different product distributions. The objective of this work is to identify and characterize the various transient species formed in the oxidation of carbonyl compounds such as acetone. This characterization is necessary to measure rate constants of elementary reaction steps in the course of the degradation process. The spectroscopic and kinetic information obtained will allow a better understanding of the atmospheric fate of carbonyl compounds. In order to characterize the optical properties of the formed transient compounds (e.g. organic peroxy radicals) a laser photolysis long path absorption apparatus coupled with a CCD-camera / grating combination is used. With this technique time resolved spectra (at different delay times after the excimer laser pulse) of the reactants and products can be recorded. Within this contribution organic peroxy radical spectra of the following parent carbonyl compounds (a) acetone, (b) hydroxyacetone, (c) methylglyoxal and (d) pyruvic acid will be presented, discussed and compared with literature data. OH radicals were generated directly in the reaction cell by the photolysis of hydrogen peroxide (H₂O₂) at 248 nm. All reactions were studied at T = 298K in the aqueous solution.