

Laboratory kinetic and mechanistic studies on the OH-initiated oxidation of acetone in the aqueous phase

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Small organic compounds, such as acetone and its oxidation products, are released in the atmosphere by numerous natural and anthropogenic sources. The degradation or transformation of these compounds can occur either in the gas phase or in the liquid phase of cloud droplets, fog, rain or hygroscopic particles within the troposphere. The OH radical plays a decisive role as it is one of the most reactive radicals in the atmosphere.

The objective of this work is to identify and characterize the various transient species (e.g. organic peroxy radicals) formed in the OH radical reaction towards acetone and their first stable oxidation products. To study the OH initiated radical reaction in the aqueous phase, a thermostated laser photolysis long path absorption set-up was used. In order to characterize the optical properties of the peroxy radicals this set-up was coupled with a CCD-camera / grating combination. With this technique time resolved spectra of the reactants and products were recorded. The optical characterization of the formed transient compound is necessary to measure rate constants of elementary reaction steps in the degradation process of the small organic compounds.

In this contribution the spectrum of the acetyl peroxy radical and its T-dependent rate constants of recombination will be presented.

In addition to clarify the degradation mechanism of acetone in the aqueous solution the product distributions have been studied with different analytical techniques such as HPLC-UV and HPLC-MS. Identified reaction products are mainly functionalized carbonyl compounds and carboxylic acids.