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# Reactivity Study of Br-atoms with Tropospherically Important Oxygenated Organic Compounds in Aqueous Solution

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The oxidative capacity of the atmosphere determines the life time and ultimate fate of atmospheric trace species. It is controlled by the presence of highly reactive radicals. Among the highly reactive radicals, halogen and halogen related radicals (Cl, Br, $BrCl^{-}$) are of current research interest as these compounds may react rapidly with atmospheric trace compounds such as organic compounds. The primary and secondary products of the oxidation reaction of the above radicals with organic compounds might have negative effects to human, plants, animals, and materials. The available kinetic data for the Cl-radical reactivity with several organics indicates a comparable reactivity to OH radical. However, in the case of Br reactivity, the kinetic data are quite sparse. Therefore, kinetic investigations of Br-atom reactions in aqueous solution were performed. In this study, a Laser Photolysis Long Path Laser Absorption (LP-LPA) technique has been applied to study the direct decay kinetics of Br atom with some tropospherically important organics such as methanol, ethanol, 1-propanol, 2-propanol, propionaldehyde, butyraldehyde, isobutyraldehyde, formic acid, ethyl formate, tetrahydrofuran, hydrated formaldehyde and diethyl ether in aqueous solution. As a summary of many individual measurements, the following correlation has been derived between the logarithm of rate constant per most loosely bonded hydrogen atom ($\log k_H$) at T = 298K and the bond dissociation energy (BDE) of the weakest C-H bond of the investigated organic compounds.

$\log k_H$ / ($M^{-1}s^{-1}$) = (42 $\pm$ 6) - (0.09 $\pm$ 0.01) BDE / ($kJmol^{-1}$), n = 14, r = 0.96