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Atmospheric Lifetimes of Very Short Lived Substances: OH Reaction Rate Constants of Stereoisomers and Pressure Dependent Reactions.

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The accuracy of OH kinetic data is of primary importance for the comprehensive modeling of any compound's atmospheric behavior and of its environmental impacts, such as its atmospheric residence time and its potential roles in stratospheric ozone depletion, global warming, and local pollution.

Rate constants of OH reactions with hydrocarbons and halogenated hydrocarbons can now be determined with an accuracy of 2-3% over the temperature range 220 K to 370 K. This has been demonstrated in studies of OH reactions with various halogenated and non-substituted organics including alkanes, alkenes, alcohols, and ethers. Lower data scattering and higher measurement accuracy allow for rigorous statistical analysis of the results and can reveal often-missing details about the reactivity, such as the weak dependencies of the rate constant on the temperature, pressure dependences, and the effect of molecular geometry on the reactivity.

This presentation will provide examples of several of these measurement results that were recently obtained in our laboratory. The estimated atmospheric lifetimes and global warming potentials will be reported.