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Kinetic studies of halon replacements.

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Despite their excellence as fire suppressants, the production of halons (bromofluorocarbons) is being phased out because of the danger they pose to the Earth's stratospheric ozone layer. A number of bromine free substances have been proposed and tested, but the effort to find replacements continues to return to bromine-containing compounds because of the properties of bromine as a chemically active flame suppressant. The primary approach to this problem has been to test candidate replacement compounds that have short atmospheric lifetimes or/and lack bromine, the halogen atoms that catalyze ozone destruction.
Various chemical classes (alkanes, ethers, alkenes) have been studied both earlier and recently. The reaction with atmospheric hydroxyl radicals dictates the residence time and accumulation in the atmosphere of all potential halon replacements. Therefore, we improved a flash photolysis – resonance fluorescence apparatus to provide the most accurate OH reaction rate constants measured over the atmospheric temperatures. Supplementary UV absorption spectra were measured to allow the estimation of ODPs.
Although a thorough 3-D modeling is required to assess ODPs, the simplified estimations can be made based on the compounds lifetimes.