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Kinetics of some oxygenated carbon centered free radical reactions with nitric oxide in the temperature range 241 – 473 K

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Several oxygenated carbon centered free radical reactions with NO have been studied in direct time-resolved experiments under pseudo-first order conditions. The reactions were investigated in a temperature controlled tubular flow reactor connected to exciplex laser photolysis and resonance gas lamp photoionization mass spectrometer (LP-PIMS) [1]. Under the experimental conditions covered, all of the studied reactions possess negative temperature dependence.
The investigation also concerns the NO reactions of two isomeric C2H5O species (CH3CHOH and CH3OCH2), which could have theoretical interest as the radicals have the same molecular formula (C2H5O) but differ in their structural properties from each other. From these, only the CH3CHOH + NO reaction has been measured previously by Miyoshi et al. [2] at room temperature and low pressure (2-4 Torr) using similar methods as in the present experiments. Also shown are results from a few other studies on oxygenated carbon centered free radical reactions with NO.
Due to the growing need to decrease fossil fuel consumption, that is the main anthropogenic driving force behind the infamous global warming [3], there is a sought for new fuel replacements and additives. Two possible candidates, that have received a lot of attention, are ethanol (CH3CH2OH) [4] and dimethylether (CH3OCH3) [5]. The abovementioned radicals can be formed from these in simple hydrogen abstraction reactions by the reactive species present and in this way the study may have some industrial importance as well.

References

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