STUDY OF THE KINETICS AND PRODUCT YIELDS FOR THE REACTION OF CRIEGEE INTERMEDIATE CH_2OO WITH HNO_3 USING MID-INFRARED TIME-RESOLVED DUAL-COMB SPECTROSCOPY

PEI-LING LUO, *Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan*.

The reaction of Criegee intermediates with HNO_3 have been thought to be important in the oxidation of atmospheric HNO_3 because of the fast reaction rates, over 3 orders of magnitude larger than that of the OH + HNO_3 reaction.[a] In particular, a new catalytic conversion of the simplest Criegee intermediate CH_2OO to OH and HCO radicals by HNO_3 was proposed in recent theoretical study.[b] Herein, the mid-infrared dual-comb spectrometers[c] with the capability of widely wavelength tunability and switchable dual-comb and continuous-wave operation modes were employed to investigate the reaction kinetics and determine the branching ratios of the primary product channels in the reaction CH_2OO + HNO_3. Based on quantitative determinations of CH_2OO, CH_2O, OH and HO_2 radicals under various experimental conditions, the pressure-dependent yields of the OH and HO_2 product channels of the reaction CH_2OO + HNO_3 were evaluated in this work.

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