

VIBRATIONAL ENERGY DISPOSAL AND RELATIVE REACTIVITY FOR THE VIBRATIONALLY DRIVEN REACTION OF CH_3D WITH Cl IN THE C-H C-D COMBINATION REGION

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Product state distributions and action spectra for the reaction of vibrationally state selected CH_3D with Cl, $CH_3D(\nu) + Cl \rightarrow (CH_2D + HCl)$ or $(CH_3 + DCl)$, reveal the extent to which vibrational energy initially deposited in the reactant survives in the CH_2D and CH_3 products as well the reactivity of different excited vibrational states. There have been several studies of various deuterated methanes with different bonds excited. Most recently, our lab studied the C-H stretch overtone in the 6000 cm^{-1} region, where we found further support for the spectator model. We found that one C-H oscillator survived into the products from states that are composed of 2 separate C-H oscillators as opposed to an overtone in one oscillator. We are studying the lower energy 5000 cm^{-1} to 5500 cm^{-1} region, where we can excite combination bands that involve C-H and C-D motion to determine the relative effect on reactivity of each vibrational mode in this region.