

O(¹D) INSERTION REACTION FOR THE FORMATION AND SPECTRAL ANALYSIS OF CARBONIC ACID

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The first excited singlet state of atomic oxygen (O(¹D)) has relevance in numerous disciplines of chemistry including combustion chemistry, astrochemistry, and atmospheric chemistry. O(¹D) is known to react via highly exothermic insertion mechanisms with X-H bonds, where X is H, C, N, or O. Our lab uses these reactions to generate unstable prebiotic molecules and study them in the gas phase using a supersonic expansion and rotational spectroscopy. This technique has been benchmarked by producing and detecting methanol from O(¹D) insertion into methane, and vinyl alcohol from O(¹D) insertion into ethylene. We now wish to apply this approach to the production of prebiotic molecules of astrochemical interest. We present here our efforts to investigate the reaction between formic acid (HCOOH) and O(¹D) to produce carbonic acid (H₂CO₃).