

## PHOTOCHEMICAL STUDIES OF CH<sub>3</sub>OH ISOLATED IN SOLID PARAHYDROGEN

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Our group is studying the 193.3 nm photochemistry of methanol (CH<sub>3</sub>OH) isolated in solid pH<sub>2</sub> using high-resolution FTIR spectroscopy to explore the low temperature reactions of H-atoms with CH<sub>3</sub>OH. Gas phase studies have shown that the dominant photodissociation channel is CH<sub>3</sub>OH + hν → CH<sub>3</sub>O + H,<sup>a</sup> and thus the *in situ* photochemistry is expected to produce methoxy and H-atom radicals. After photolysis the methoxy radicals are immobilized at these temperatures, but the H-atoms can still readily move through solid pH<sub>2</sub>. For short time 193.3 nm exposures, greater than 90% of the CH<sub>3</sub>OH remains intact and therefore repeated FTIR spectra immediately after photolysis can be used to record the kinetics of reactions of H-atoms with CH<sub>3</sub>OH. We observe exponential growth in the intensities of a number of peaks that can be assigned to the hydroxymethyl CH<sub>2</sub>OH radical. Further, the growth is bi-exponential and we believe there are two processes that lead to the formation of CH<sub>2</sub>OH: (1) fast growth by interconversion of CH<sub>3</sub>O to CH<sub>2</sub>OH and (2) slow growth due to hydrogen abstraction reactions of cold H-atoms with CH<sub>3</sub>OH. We have not observed the methoxy radical. Currently we are performing photochemical experiments on fully deuterated methanol (CD<sub>3</sub>OD) in solid pH<sub>2</sub> to test these kinetic interpretations, and the most recent results and analysis will be presented.

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<sup>a</sup>Y. Wen, J. Segall, M. Dulligan, and C. Wittig, *J. Chem. Phys.* **101**, 5665 (1994).