LABORATORY SUBMILLIMETER SPECTROSCOPY AS A PROBE OF METHANOL PHOTODISSOCIATION

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Radical-radical addition reactions on the ice surfaces of interstellar grains lead to the formation of many complex organic molecules in the interstellar medium. Methanol photodissociation is the dominant source of the three organic radicals CH_3O, CH_2OH, and CH_3. Recent chemical models show that changes to the methanol photodissociation branching ratios directly impact the relative abundances of many complex organics, most notably methyl formate and its structural isomers glycolaldehyde and acetic acid. Neither the condensed-phase nor the gas-phase methanol photodissociation branching ratios required for these models have been quantified in the laboratory. Interpretation of the results from condensed-phase measurements rely upon the use of complicated chemical networks that offer only a limited view of the chemistry and often lead to difficulty in obtaining more than semi-quantitative results. However, gas-phase measurements enable independent, quantitative monitoring of each dissociation channel. We are therefore studying the methanol photodissociation mechanism using submillimeter spectroscopy to directly detect the gas-phase photodissociation products. Here we will present our progress toward the quantification of the gas-phase methanol photodissociation branching ratios, and will discuss these results in the context of interstellar organic chemistry.