FORMAMIDE 193 NM PHOTODISSOCIATION DYNAMICS INVESTIGATED WITH TIME-RESOLVED CHIRPED-PULSE MILLIMETER-WAVE SPECTROSCOPY AND AB INITIO THEORY

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Formamide, NH_2CHO, is invoked in the prebiotic chemistry on Earth and outside of our planet because it is the simplest molecule containing a peptide linkage $[-NH-C(=O)-]$ that has a relatively high boiling point of 210 °C. There are few laboratory studies on its photodissociation possibly because the formamide vapor pressure is too low for supersonic jet experiments. In this work, we use a low-pressure (1 μbar) flow-tube reactor and *in situ* chirped-pulse Fourier transform millimeter-wave (CP-FTmmW) spectroscopy in the 260–290 GHz region to study the post-photolysis kinetics of the HCN, HNC, $HNCO$, and HCO products of the 193 nm photodissociation of formamide. The time evolution of the HCN and HNC CP-FTmmW signals is analyzed alongside complementary ab initio quasiclassical trajectory and transition state theory calculations to understand the dynamics on the NH_2CHO potential energy surface following absorption of a UV photon. The HCN/HNC branching is deduced, with good agreement demonstrated for the experimental and theoretical results.