SPECTROSCOPY AND PHOTODISSOCIATION DYNAMICS OF HYDROCARBON RADICALS: ALLYL, PROPARGYL, AND ETHYL

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Polyatomic radicals are uniquely favorable for investigations of dissociation dynamics because of their simple electronic structure and low energy dissociation limits. They are furthermore important intermediates in a variety of gas-phase processes of practical importance, such as combustion and chemical vapor deposition. Building on earlier spectroscopic work from our group, we report the picosecond and nanosecond dissociation dynamics of three radicals that represent three important cases. A combination of time- and energy-resolved work identifies the product channels and allows the extraction of microcanonical rates over a wide range of internal energies. These are compared to the results of high-level ab initio calculations and statistical models. A solution is proposed for the anomalous behavior of ethyl radical.