MATRIX SPECTROSCOPY OF THE PROPARGYL RADICAL AND PROPARGYL PEROXYL RADICAL

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Using a hyperthermal nozzle that we have developed we have produced propargyl radical ($HC{\equiv}CCH_2$) from the pyrolysis of propargyl bromide and butyn nitrite. Matrix isolated IR spectra and linear dichroism spectra were recorded, and vibrational symmetries were assigned. Photoionization mass spectrometry also confirmed the formation of propargyl radical. This hot nozzle thermally decomposes organic precursors in a stream of Ar and produces roughly 10^{13} hydrocarbon radicals/pulse. Using time of flight mass spectrometry and matrix isolated IR spectroscopy we have also observed the bimolecular self reaction of propargyl to form benzene, $C_3H_3 + C_3H_3 \rightarrow C_6H_6$. IR spectra also show that the formation of CH_3-C≡CH and CH_2=C=CH_2 occurs in the hyperthermal nozzle. Co-depositing the propagyl radical with molecular oxygen allows us to synthesize the propargyl peroxyl radical (H-C≡C-CH_2OO), which we have characterized in the infrared as well.