ABSOLUTE VUV PHOTOIONIZATION SPECTRA FOR HCHO, HO_2, AND H_2O_2 FROM 10.5-12.0 eV

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The absolute vacuum ultraviolet (VUV) photoionization spectra of formaldehyde (HCHO), the hydroperoxy radical (HO_2) and hydrogen peroxide (H_2O_2) have been measured. The ability to quantify these species is critical for photoionization mass spectrometry studies of the kinetics of atmospheric and combustion reactions, which require accurate cross sections over a wide range of ionization energies. Experiments were performed at the Advanced Light Source (ALS) synchrotron at the Lawrence Berkeley National Laboratory. HCHO, HO_2, and H_2O_2 were generated from the oxidation of methanol which is initiated by pulsed-laser-photolysis of Cl_2 in a low pressure flow cell. Sampled gas was ionized by tunable VUV radiation from the ALS synchrotron and detected by time-resolved multiplexed photoionization mass spectrometry using the Sandia Multiplexed Chemical Kinetics Reactor.[c] The photoionization spectra were obtained by scanning the photon energy from 10.5 to 12.0 eV. Absolute cross sections were determined relative to methanol from measurements of the depletion of precursors and kinetic modeling of the initial chemistry (< 10 ms). The absolute photoionization spectrum of HCHO and the relative photoionization spectra of HO_2 and H_2O_2 are in good agreement with previous work.[d,e]

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