PHOTOIONIZATION SPECTRA OF ATOMIC SULFUR FROM PHOTODISSOCIATION OF SULFIDES AT 193 NM DETECTED WITH PHOTOIONIZATION MASS SPECTROSCOPY

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Photodissociation dynamics of ethylene sulfide and trimethylene sulfide (TMS) at 193 nm are investigated using the method of photoionization mass spectroscopy (PIMS). The product sulfur atoms from photolysis channels of $C_2H_4S \rightarrow C_2H_4$ + S and $C_3H_6S \rightarrow C_3H_6$ + S are ionized by VUV synchrotron radiation generated from the undulator at NSRRC U9CGM beamline then are detected by the quadruple mass spectrometer. The autoionizing spectra of sulfur atoms are resulted from one single photon excitation of the VUV light. The resolving power (E/ΔE) of this work is determined by the resolving power of the spectrograph located at the beamline and the value is about 60000 at E = 10 eV. Because of the high spectral resolution of the light source, most lines are resolved and assigned to be autoionization series: $(^2D_o)nd^3S^o$, $^3P^o$, $^3D^o$, the ns^3D^o series appear to be quasi-discrete. According to the assigned transitions and their spectral intensities we determine the branching ratio of sulfur atoms produced in the electronic states S ($^3P_{2,\ 1,\ 0}$) and S ($^1D_2$) from both TMS and ethylene sulfide after 193 nm photolysis. As the results in this work we find that the branching ratio of S (^3P) to S (^1D) from ethylene sulfide is 1.2 similar to the previous results. This work shows production of S (^3P) from TMS that was not observed previously.