

1+1' TWO-COLOR PHOTOIONIZATION SPECTROSCOPY OF ACETYLENE

SHUENN-JIUN TANG, JIM JR-MIN LIN, KENNY NI, and YEN-CHU HSU, *Institute of Atomic and Molecular Sciences, Academia Sinica, P.O. Box 23-166, Taipei, Taiwan, R.O.C. and Department of Chemistry, National Taiwan University, Taipei, Taiwan, R.O.C.*

1+1' two-color photoionization spectrum of C₂H₂ via a single rovibrational level of \tilde{A}^1A_u as the intermediate was recorded under nearly field-free condition in the range of 91900-92700 cm⁻¹. If the first color was frequency-tuned to excite a single rotational level ($J' = 1 - 4, e$ parity) of V₄K₁ of the \tilde{A}^1A_u state, sharp autoionizing spectral lines with the line width of $\Delta\nu = 0.13-0.20$ cm⁻¹ were obtained except that where near the ionization threshold, extensive diffuseness ($\Delta\nu = 2.1- 4.1$ cm⁻¹) was observed. The prominent autoionizing features have been assigned as two Rydberg series converging to the vibronic state ($K^+ = 0^-, V_4^+ = 1$) of C₂H₂⁺($\tilde{X}^2\Pi_u$). However, if a single rotational level ($J' = 2 - 4, e$ parity) of V₄K₂ of the \tilde{A} state was chosen as the doorway state, no autoionizing Rydberg series was possibly assigned. The interchannel coupling between the vibrationally autoionizing state and the ZEKE state explains the vibronic effect of the ion core on the intensity and spectral line shape of the PFI-ZEKE spectrum of acetylene near the ionization threshold.