

VIBRATIONAL PREDISSOCIATION OF THE \tilde{A} STATE OF THE C_3Ar COMPLEX IN THE EXCITATION ENERGY REGION OF 25410-25535 cm^{-1}

YI-JEN WANG, YEN-CHU HSU, *Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan.*

About 11 C_3Ar bands near the $0\ 4^- \ 0-000$ and $0\ 2^+ \ 0-000$ transitions of the $\tilde{A}^1\Pi_u - \tilde{X}^1\Sigma_g^+$ system of C_3 have been studied by both laser-induced fluorescence and wavelength-resolved emission techniques. Two prominent pairs of C_3Ar features were observed to the red of each of these two C_3 transitions. Each pair consists of a type A band and a type C band, with the type C band lying about $3\ cm^{-1}$ above the type A band. Rotational analysis showed that three of the bands are comparatively sharp, with line widths of $0.035\ cm^{-1}$, but the pair at 25504 and 25507 cm^{-1} shows clear evidence of diffuseness. The spectral widths of the rotational lines do not depend on the excitation energies in any simple way. Most of the features in the wavelength-resolved emission spectra can be assigned as emission from vibrationally excited levels of the \tilde{A} state of the C_3 fragments down to the ground electronic state. Two different types of vibrational excitation of the C_3 fragments have been found: pure C_3 -bending and antisymmetric C-C stretching. The branching ratios of the C_3 product states, the C_3 -Ar vdW binding energy, and propensity rules for vibrational predissociation processes will be presented.