

THE VIBRATIONAL PREDISSOCIATION OF THE \tilde{A} STATE OF THE C_3Ar VAN DER WAALS COMPLEX WITH VIBRATIONAL ENERGIES OF 1558-1660 cm^{-1}

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The laser-induced fluorescence (LIF) and wavelength-resolved emission spectroscopic techniques have been used to study the rotational levels, the vibrational predissociation (VP) products and the product-state branching ratios of the \tilde{A} state of the C_3Ar van der Waals complex. The excited states were prepared by exciting the complex bands associated with $0\ 8^- \ 0-000$, $0\ 4^+ \ 0-000$ and $0\ 0\ 2-000$ bands of the $\tilde{A}\ ^1\Pi_u - \tilde{X}\ ^1\Sigma_g$ system of C_3 . The superscripts "-" and "+" denote the lower and upper Renner components, respectively. The type A and C bands of the complex bands are in pairs and they are separated by $2\nu_b$ (b, van der Waals bending vibration).^a Of 11 bands, only two, associated with the $002-000$ band of C_3 , are rotationally resolved with a laser of $0.04\ cm^{-1}$ resolution. The lifetimes of these complex bands are in the order of a few to a few tens of picoseconds estimated from the rotational linewidths of the LIF spectra. The VP processes are quite complex; more than one vibrational state of the C_3 fragments was identified from each upper complex level. The fragment states were the pure bending levels ($0\ v_2\ 0$) and the combination levels ($1\ v_2\ 0$) of the \tilde{A} state.

^aA.J. Merer, Y.-C. Hsu, Y.-R. Chen, and Y.-J. Wang, *J. Chem. Phys.* 143, 194304(2015).