SPECTROSCOPY, DISSOCIATION DYNAMICS AND POTENTIAL ENERGY SURFACES FOR CN(A)-Ar

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The $A^2\Pi$-$X^2\Sigma^+$ band system of CN-Ar has been examined using fluorescence depletion and action spectroscopy techniques. Eight vibronic bands of the complex were observed in association with the monomer 3-0 transition. Pump-probe measurements were used to characterize CN($A^2\Pi_{3/2}$, v=3) fragments from direct photodissociation of CN($A^2\Pi$, v=3)-Ar, and CN($X^2\Sigma^+$, v=7) fragments from CN($A^2\Pi$, v=3)-Ar predissociation. The latter showed a marked preference for population of positive parity diatomic rotational levels. Bound state calculations were used to assign the A-X bands, and to obtain fitted potential energy surfaces for the A state. The average potential obtained from fitting had a well depth of D_e=137.8 cm^{-1}. High-level ab initio calculations were used to obtain equilibrium Jacobi coordinates of $\theta_e = 94°$ and R_e=7.25 bohr. The near symmetric character of the fitted potential energy surface was consistent with the symmetry preference observed in the predissociation dynamics.