

SHIFTS AND BROADENING IN THE CN $A^2\Pi - X^2\Sigma^+$ (2-0) BAND INDUCED BY ARGON COLLISIONS

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Selected P-and R-branch transitions of the CN $A^2\Pi - X^2\Sigma^+$ (2-0) band have been recorded at room temperature as a function of argon pressure, using frequency modulation spectroscopy. The experimental line shapes have been successfully fit using a Quadratic Speed-Dependent Voigt (QSDV) model at total pressures ranging from 1 - 160 Torr. The pressure broadening coefficients derived from the QSDV analysis are nearly independent of the rotational quantum state and rotational branch. The pressure-dependence of the line shifts, in contrast, displays a distinctive variation with rotational state and branch, with larger and strongly J-dependent shifts for P-branch lines, compared to smaller and more J-independent shifts for R-branch lines. The pressure-induced shifts provide a challenge to first principles scattering calculations on validated potential energy surfaces. Previously puzzling measurements on fewer lines in the (1-0) band are confirmed and extended by the present measurements.

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