ELECTRONIC SPECTROSCOPY OF THE JET-COOLED ARSENIC DICARBIDE (C_2As) FREE RADICAL

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The linear arsenic dicarbide (C_2As) free radical has been identified by observation of the $^2\Delta$ - $^2\Pi$ band system in the 585.0 - 687.3 nm region by laser-induced fluorescence (LIF) and supersonic expansion cooling techniques. The radical was produced in a pulsed electric discharge jet using a precursor mixture of methane (or acetylene), arsenic trichloride vapor and argon. All three excited state vibrational modes have been identified in the LIF spectra of $^{12}C_2As$ and $^{13}C_2As$. Single vibronic level emission spectra exhibit an isotope-independent ground state spin-orbit splitting of 874 cm^{-1} and activity in the bending and both stretching modes. The measured ground state energy levels have been successfully fitted to a $^2\Pi$ state Renner-Teller model. High resolution spectra of the 0_0^0 bands of both isotopomers have been recorded and analyzed to obtain the rotational constants and ground and excited state molecular structures. The experimental derived parameters will be compared to *ab initio* predictions and experimental data available for the analogous C_2N and C_2P radicals.