CAVITY RINGDOWN SPECTROSCOPY OF HC_7H AND HC_9H

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Vibronic bands of the $^3\Sigma_u^- \leftarrow X^3\Sigma_g^-$ transitions of linear HC_7H and HC_9H have been detected in the gas phase using cavity ringdown spectroscopy in the wavelength range 500-600 nm. The 0_0^0 bands of both molecules, as well as an additional vibronic band of HC_9H, were measured. Both molecules were produced in a DC discharge through a dilute mixture of diacetylene in Ar in the throat of a supersonic nozzle. The identifications were confirmed by detecting the singly and doubly deuterated species of both molecules, and by comparison with previous matrix data[a]. Neither molecule could be detected by laser-induced fluorescence. Each band exhibits expected P- and R-branches, and the band origins have been measured to 0.1 cm^{-1} or better. For HC_9H, the wavelength of the 0_0^0 band agrees to within one part in 10^4 with that of the weak diffuse interstellar band at 581.86 nm. Astronomical verification of this assignment could be achieved by detecting the expected P- and R-branches in the DIB, or by detecting the somewhat weaker ν_3 band at 521.91 nm.

[a] J. Fulara, P. Freivogel, D. Forney, and J. P. Maier, *J. Chem. Phys.* **103**, 8805 (1995).