LABORATORY DETECTION OF THE CARBON CHAINS $HC_{15}N$ AND $HC_{17}N$

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The linear cyanopolyynes $HC_{15}N$ and $HC_{17}N$ were detected in the laboratory by Fourier-transform microwave spectroscopy. Enough rotational lines of each species were measured in the 5-11 GHz frequency range so that precise values for the rotational and centrifugal distortion constants can be determined and the entire rotational spectra of both molecules predicted to high accuracy (i.e., better than 1 km $s^{-1}$ in equivalent radial velocity). Although there is a nearly constant decrement in line intensity from $HC_3N$ to $HC_9N$ of about seven, the decrement decreases by at least a factor of two on reaching $HC_{17}N$. As a result the lines of $HC_{17}N$ are nearly an order of magnitude stronger than predicted by extrapolation from the shorter cyanopolyynes.