ELECTRONIC GAS PHASE SPECTRA OF LARGER POLYACETYLENE AND PROTONATED POLYACETYLENE CATIONS

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A new approach has been developed for the purpose of measuring electronic transitions to bound excited states for cations that have been collisionally relaxed to low vibrational and rotational temperatures (∼25 K). This has been used to obtain the first gas phase spectra of three new polyacetylene cation chains ($HC_{12}H^+$, $HC_{14}H^+$, and $HC_{16}H^+$) as well as two different protonated species ($HC_6H_2{}^+$ and $HC_8H_2{}^+$) using a two-color ion-photodissociation approach applied to ions held in a 22-pole trap. Specifically, the origin bands of the $\tilde{A}\ ^2\Pi$ - $\tilde{X}\ ^2\Pi$ electronic transitions of $HC_{12}H^+$, $HC_{14}H^+$, and $HC_{16}H^+$ were located at 10811, 9333, and 8739 cm^{-1}, respectively, while the $\tilde{B}\ ^1A_1$ - $\tilde{X}\ ^1A_1$ transitions of $HC_6H_2{}^+$ and $HC_8H_2{}^+$ (C_{2v} geometry) were recorded at 26404.0 and 21399.8 cm^{-1}.