

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} .