

SPECTROSCOPIC SIGNATURES OF HHe_n^+ ($n = 2 - 6$)

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The combination of cryogenic ion trap machines, operated close to 4 K, with different laser sources allowed the first experimental characterization of the antisymmetric stretch (ν_3) and bending (ν_2) fundamentals of the linear $\text{He-H}^+\text{-He}$ core of the HHe_n^+ complexes for $n = 3 - 6$. The found band origins, at around 1290 cm^{-1} for ν_3 and around 850 cm^{-1} for ν_2 , are fully supported by first-principles quantum-chemical computations. These results are consistent with the structure for HHe_3^+ being of T-shaped C_{2v} symmetry and HHe_6^+ being of D_{4h} symmetry, while HHe_4^+ is suggested to exhibit interesting dynamical phenomena related to large-amplitude motion. Very recently, using a quantum cascade laser, the linear HHe_2^+ has been probed in high resolution, yielding molecular parameters for this fundamental three-nucleus-four-electron system for the first time.