

VIBRATIONAL PREDISSOCIATION SPECTRA OF THE Ar-TAGGED  $[\text{CH}_4 \cdot \text{H}_3\text{O}^+]$  BINARY COMPLEX: SPECTROSCOPIC SIGNATURE OF HYDROGEN BONDING TO AN ALKANE

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Vibrational predissociation spectra of the Ar-tagged  $[\text{H}_3\text{O}^+ \cdot \text{X}]$ ,  $\text{X} = \text{CH}_4$ ,  $\text{CD}_4$ ,  $\text{N}_2$ , and Ar complexes are analyzed to explore the hydrogen bonding acceptor properties of an alkane. The observed redshift in the OH stretching transition of the donor is found to be significantly smaller than anticipated by the previously reported trend in this value with the proton affinity of the acceptor. Specifically, the alkane-induced redshift of the OH stretching frequency is less than that caused by the conventional proton acceptor,  $\text{N}_2$ , even though the latter is a weaker base than methane. The origin of this effect is discussed in the context of the structures of the complexes and the molecular rearrangements required for complete proton transfer to hydrocarbons as opposed to the situation in conventional H-bond acceptors.