

INFRARED SPECTROSCOPY OF $(\text{CH}_3)_3\text{N-H}^+(\text{H}_2\text{O})_n$ ($n = 1-22$)

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The magic number behavior of $\text{H}^+(\text{H}_2\text{O})_{21}$ has been well known. Furthermore, this magic number is observed even in the mixed clusters $\text{H}^+(\text{H}_2\text{O})_m(\text{NH}_3)_n$ and $\text{H}^+(\text{H}_2\text{O})_m(\text{MeOH})_n$ ($m + n = 21$). This means that NH_3 or MeOH molecules are compatible with water molecules in the hydrogen bond network of the magic number cluster.

In the present study, infrared spectroscopy is applied to $(\text{CH}_3)_3\text{N-H}^+(\text{H}_2\text{O})_n$ ($n = 1-22$), and structures of these clusters are determined with help of density functional theory calculations. As a result, it is demonstrated that no magic number is seen in the case of $(\text{CH}_3)_3\text{N-H}^+(\text{H}_2\text{O})_n$. $(\text{CH}_3)_3\text{N}$ is not a spectator to the hydrogen bond network of protonated water clusters, and it is largely changes the network structure.