

## THE SPECTRUM OF $\nu_3$ BAND OF $CH_3^+$ IN HELIUM NANODROPLETS

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$CH_3^+$  ions were produced upon electron impact ionization of the He droplets doped with methane molecules. The spectra was obtained by recording the intensity of ions detected based upon upon ejection from the droplet following absorption of multiple mid infrared photons<sup>a</sup>. Perpendicular  $\nu_3$  band of  $CH_3^+$  in He droplets shows three prominent peaks which are assigned to partially resolved rotational structure. The results show that  $CH_3^+$  retains the ability to rotate in liquid helium, however the decrement of rotational constants is larger than previously observed for neutrals. It was concluded that  $CH_3^+$  in helium behaves as a prolate symmetric top, whereas the free ion is reported to be an oblate top<sup>b</sup>.

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<sup>a</sup>D. Verma, E.Swetha, A.F. Vilesov, Infrared Spectroscopy of Water and Zundel cations in Helium Nanodroplets, *The Journal of Physical Chemistry A* 124(34) (2020) 6207-6213.

<sup>b</sup>M.W. Crofton, M.F. Jagod, B.D. Rehfuss, W.A. Kreiner, T. Oka, Infrared-Spectroscopy of Carbo-Ions .III.  $\nu_3$  Band of Methyl Cation  $CH_3^+$ , *Journal of Chemical Physics* 88(2)(1988) 666-678