SPECTROSCOPY OF HIGH OXIDATION STATES: INFRARED STUDIES OF $Mn^{2+}(18crown6)(CH_3OH)_{1-4}$

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Traditionally, gas-phase studies of metal ion solvation have primarily focused on singly charged metal ion systems. However, the solvation of multiply charged metal ions is extremely important in both condensed phase and biological systems. Studies of these multiply charged metal ion systems have been hampered due to experimental complexities associated with dealing with high oxidation states−most notably charge reduction and insufficient number densities for spectroscopic experiments. One method that has been widely used to successfully generate multiply charged ions is Electrospray Ionization (ESI). The ESI technique has been adapted in our laboratory to investigate the various non-covalent interactions in multiply charged ion$\cdots$ionophore systems, where the ionophore is a crown ether. We have performed infrared predissociaton spectroscopy on the $Mn^{2+}(18crown6)(CH_3OH)_{1-4}$ system in the O−H stretch region of methanol. The goals of these studies are to characterize the competing non-covalent interactions and to gain insight on how these interactions lead to ionophore selectivity of multiply charged metal ions in solvated environments.