ZEKE SPECTROSCOPY OF METAL COMPLEXES WITH A MULTIDENTATE LIGAND: M($H_2NCH_2CH_2NH_2$) (M = Al, Ga, In)

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Metal coordination to an ethylenediamine ligand may form a chain-like or a cyclic structure. The complex is expected to be a chain if the metal atom is bound to a single nitrogen atom or a five-member ring if the metal is attached to both nitrogen atoms. ZEKE (zero-electron-kinetic-energy) spectra show that M($H_2NCH_2CH_2NH_2$) and M^+($H_2NCH_2CH_2NH_2$) (M = Al, Ga, In) complexes have a cyclic conformation. These cyclic complexes have significantly lower adiabatic ionization potentials (AIPs) and metal-nitrogen stretching frequencies than simple metal-primary amines. For example, the AIP of Ga($H_2NCH_2CH_2NH_2$) was determined to be 33322 cm^{-1}, 6008 cm^{-1} less than that of Ga(H_2NCH_3). The Ga^+-N stretching frequency was measured to be 204 cm^{-1} in gallium-ethylenediamine and 299 cm^{-1} in gallium-methylamine.[a]

[a] S. Li, G. K. Rothschopf, D. Pillai, B. R. Sohnlein, B. M. Wilson, D. -S. Yang, *J. Chem. Phys.* **115**, 7968 (2001)