ELECTRONIC SPECTRA OF METAL-DILIGAND COMPLEXES: $Cu(NH_3)_2$ AND $Cu(ND_3)_2$

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Zero electron kinetic energy (ZEKE) photoelectron spectroscopy was used to study the electronic spectra of metal-diammonia and its deuterated species. The adiabatic ionization potential of the copper complex was measured to be 29532 cm^{-1}, a shift of more than a factor of two relative to that of the copper atom (62317 cm^{-1}); deuteration further decreased the ionization potential of the complex by 219 cm^{-1}due to the shift of the zero point vibration energies. Furthermore, the ZEKE spectra revealed the copper-ammonia vibrations and ammonia torsion. For example, in $Cu(NH_3)_2$ the metal ion -ligand symmetric stretching and bending frequencies were measured to be 436 and 139 cm^{-1}, whereas the NH_3 torsion was determined as 32 cm^{-1}.