CONSTRUCTION AND IDENTIFICTION OF (MAGNESIUM)$_m$-(CYANOACETYLENE)$_n$ MOLECULES IN LIQUID HELIUM DROPLETS

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Superfluid helium droplets can serve as an ideal matrix for the formation and stablization of metastable species.[a] Vibrational spectra of magnesium clusters with cyanoacetylene molecules are presented. By recording the free and bonded C-H stretch vibratonal spectra of the (Mg)$_m$-(HCCCN)$_n$ clusters, and measuring their dependence on the magnesium and cyanoacetylene pressure, the number of m and n were assigned as 1-4 and 1-2 individually. Interestingly, the experimental evidence suggests that there're multiple structural isomers. With high resolution IR measurements, rotationally resolved spectra for the smaller isomers were acquired. The structures of the complexes were determined by comparing the experimental data with the results of ab initio calculations.

[a] K. Nauta, and R. E. Miller, *Science* **287**(2000), 293.