A SEARCH FOR HCO^+ AND HCN EMISSION IN PLANETARY NEBULAE

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It was initially believed that molecular material from the AGB (asymptotic giant branch) phase of a 1-8 solar mass star's evolution would be photodissociated by intense ultraviolet radiation from the star as it evolves during the subsequent planetary nebula stage. However, detections of CO and H_2 in numerous planetary nebulae (PNe) have shown that the chemistry of these objects is more complicated than previously anticipated. A fuller understanding of the molecular abundances of PNe is vital to our understanding of their environments; thus, it is necessary to build up the sample of PNe which have had their molecular content studied in depth. We are conducting a search for HCO^+ and HCN in seventeen planetary nebulae that have previously been detected in CO, as both molecules are expected to be readily detectable if present and could be used to locate the highest density material in PNe. Observations of the $J = 1 \rightarrow 0$ transitions of HCO^+ and HCN (at 89 GHz and 88 GHz respectively) are being conducted using the 12-Meter Telescope of the Arizona Radio Observatory (ARO), while measurements of the $J = 3 \rightarrow 2$ transitions (at 265 GHz for HCN and 267 GHz for HCO^+) are being made with the ARO Sub-Millimeter Telescope (SMT). The most current results of this search will be presented, including radiative transfer analysis of the spectra to establish physical conditions and molecular abundances.