Molecular Survival in Planetary Nebulae: Seeding the Chemistry of Diffuse Clouds?

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Planetary nebulae contribute a significant amount of material to the interstellar medium. This material gets recycled into diffuse clouds and may eventually seed the chemistry that occurs in dense molecular clouds. The majority of stars in the sky will end their lives as planetary nebulae which are characterized by a hot, UV emitting central star surrounded by its ejected circumstellar envelope. It was previously thought that there would not be any appreciable molecular content in this environment due to the extreme UV radiation emanating from the central star. However, studies by Bachiller et al. (1997) and Tenenbaum et al. (2009) suggest that a number of molecules survive into this stage, even in the oldest planetary nebulae, such as the Helix. Currently, we are studying a number of planetary nebulae, including the Helix, in order to try and further characterize the molecular content of these sources. Molecular line observations are being carried out for H$_2$CO, CS, HCO${^+}$, and C$_3$H$_2$. Thus far HCO${^+}$ and maybe H$_2$CO appear to be common constituents of these objects. Other, more complex species may be present as well. A summary of the current observations and an analysis of complexity as a function of age will be given.