Evidence for the Presence of H_n-PAHs in Post AGB Stars

Christopher K. Materese[1,2], Jesse D. Bregman[1], and Scott A. Sandford[1]

1) NASA-Ames Research Center, Mail Stop 245-6, Moffett Field, CA 94035

2) Bay Area Environmental Research Institute, 625 2nd St., Suite 209, Petaluma, CA 94952, USA

Polycyclic aromatic hydrocarbons (PAHs) are believed to be ubiquitous in space therefore represent an important class of molecules for the field of astrochemistry. PAHs are relatively stable under interstellar conditions, account for a significant fraction of the known Universe's molecular carbon inventory, and are believed responsible for numerous telltale interstellar infrared emission bands (1-3). PAHs can be subdivided into numerous classes, one of which is Hydrogenated PAHs (H_n-PAHs). H_n-PAHs are multi-ringed partially aromatic compounds with excess hydrogenation, leading to a partial disruption of the aromatic system. The infrared spectra of these compounds produce telltale signatures that make them distinct from ordinary aromatic or aliphatic molecules (or a mixture of both).

H_n-PAHs may be an important subclass of PAHs that could explain the spectra of some astronomical objects with anomalously large 3.4 μm features (4). The 3.4 μm feature observed in these objects may be associated with the aliphatic C—H stretching vibrations of the excess hydrogen. If this presumption is correct, we also expect to observe methylene scissoring modes at 6.9 μm. We have recently conducted a series of follow-up observations to compliment our laboratory experiments into the properties of H_n-PAHs (5). Here we present our laboratory and observational results in support of the hypothesis that H_n-PAHs are a viable candidate molecule as the emission source for numerous post-asymptotic giant branch objects with abnormally large 3.4 μm features.

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