INTERSTELLAR POLYCYCLIC AROMATIC HYDROCARBONS

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Tremendous strides have been made in our understanding of interstellar material over the past twenty years thanks to significant, parallel developments in two closely related areas: observational astronomy and laboratory astrophysics. Twenty years ago the composition of interstellar dust was largely guessed at and the notion of abundant, gas phase, polycyclic aromatic hydrocarbons (PAHs) anywhere in the interstellar medium (ISM) considered impossible. Today the dust composition of the diffuse and dense ISM is reasonably well constrained and the spectroscopic case for interstellar PAHs, shockingly large molecules by early interstellar chemistry standards, is becoming strong.

This paper will review the latest developments in the visible, near-, and mid-IR spectroscopic studies of neutral and ionized PAHs measured in the Ames Astrochemistry Laboratory, and summarize their applications to astrophysics. This spectral database has now enabled us to gain insight into the abundances, size distributions, structures, and ionization balance of the interstellar PAH population. The results indicate that PAHs are widespread throughout the ISM and more abundant than all the known gas-phase interstellar polyatomic molecules taken together.