

Gas Phase Ion Chemistry of Polycyclic Aromatic Hydrocarbons

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Abstract.

Recent research suggests that cations of polycyclic aromatic hydrocarbons (PAHs) may be responsible for the observed diffuse interstellar bands (DIBs). It is the focus of this research to understand the viability and kinetics of PAH cations that could play an important role in the interstellar medium (ISM). Determining the reaction rate constants and reactivity trends of these ions with species relevant to the ISM will help lead the search for specific DIB carriers and develop pathways for their transformation. These experiments were carried out using a flowing afterglow - selected ion flow tube (FA-SIFT) coupled to a quadrupole mass spectrometer. Recently, the reaction rate constants of coronene cation with H atom, O atom, N atom, and H₂, have been measured to be 1.4×10^{-10} cm³/s, 1.3×10^{-10} cm³/s, $< 1 \times 10^{-12}$ cm³/s, and $< 1 \times 10^{-13}$ cm³/s, respectively. This work represents the largest PAH cation kinetics study to date.
