

Cosmic rays play a vital role in initiating the chemistry that occurs in molecular clouds. The ionization of H and H₂ begins a network of ion-molecule reactions responsible for generating many of the diatomic and small polyatomic molecules observed in the interstellar medium. A few such species---HCO⁺, DCO⁺, OH⁺, H₂O⁺, and H₃⁺ in particular---are formed and destroyed by rather simple processes, making them powerful probes of the cosmic-ray ionization rate. I will discuss the current status of observations of these molecular ions within our Galaxy, as well as the conclusions that can be drawn from this ever-growing sample. Additionally, I will describe ongoing research to combine this molecular analysis with the observation and analysis of gamma rays generated by inelastic collisions of high energy protons with gas in the ISM.

Cheers,

Nick