

Cross Sections for Collisions of Charged Particles with n-Butane

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Domain : Combustion

Hydrocarbon plasmas are found in ignition, combustion and industrial reactors, as well as in interstellar medium and planetary atmospheres. The modeling of these plasmas requires a basic data set on the collision processes of charged particles as well as neutral particles. Recently we have measured absolute cross sections of electron impact ionization of n-butane in an energy range of 10 to 200 eV. The energy dependencies of the total and partial cross sections will be presented for the dissociative ionization channels forming thirteen ions including the parent ion and major fragment ions of $C_2H_{3-5}^+$, $C_3H_{3,5-7}^+$ and $C_4H_9^+$. The cross sections for the collisions of selected fragment ions with their parent gas molecule also have been measured. The ion-molecule reactions studied proceed mainly via a H^- transfer mechanism. Based on the observation of the H^- transfer reactions and the calculated heats of reactions using the thermochemical data available in the literature, the structures of two of the major fragment ions from the electron impact ionization of n-butane, $C_3H_3^+$ and $C_3H_6^+$, are expected to be cyclic forms.