

Abstract Submitted
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Electron ionization and ion-molecule reactions of triethylborane

CHARLES JIAO, UES, STEVEN ADAMS, Air Force Research Laboratory — Triethylborane (TEB) is used as a radical initiator in many chemical reactions and as an excellent ignition source for jet engines and rocket engines. In this paper we will report our recent study on the ion chemistries of TEB relevant to the charged particle processes in plasmas involving TEB. The total cross section of electron ionization of TEB is found to have a maximum of $2.2 \times 10^{-15} \text{ cm}^2$ at $75 \pm 10 \text{ eV}$ electron energy. Product ions from the ionization include $\text{C}_2\text{H}_{2-5}^+$, BCH_4^+ , $\text{BC}_{2,4,6}^+$, $\text{BC}_3\text{H}_{4,6}^+$, $\text{BC}_4\text{H}_{8,10}^+$ and $\text{BC}_6\text{H}_{15}^+$, among which $\text{BC}_6\text{H}_{15}^+$, $\text{BC}_4\text{H}_{10}^+$ and BC_2H_6^+ are the most abundant ions. These ions react with TEB via various mechanisms including charge-transfer, alkyl-transfer and association reaction. The common and major product ions from the ion-molecule reactions are $\text{BC}_4\text{H}_{10}^+$ and BC_2H_6^+ , formed by simple ethyl-transfer and ethyl-transfer followed by dissociation (loss of C_2H_4), respectively.

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