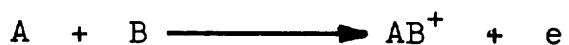


Associative Ionization Reactions and Secondary Reactions  
of Ions formed in Magnetically Confined Plasmas\*

W. L. Fite, H. H. Lo and P. Vasu

Associative Ionization between thermal energy ground-state species, i.e.,



produces molecular ions which are energetically forbidden from becoming neutralized by the normal dissociative recombination with electrons. A number of such systems are now known, a brief review of which will be given, along with absolute cross sections where they are known. Among the best understood of the associative ionizers is the Uranium atom. Experiments have been performed in which a Uranium atom beam crosses a magnetic bottle field in a vacuum to which  $O_2$  or  $N_2O$  has been added. Both primary and secondary ions are mass spectrometrically detected upon leakage from the magnetic mirror at one end of the bottle field. With  $N_2O$  added, the  $UO_2^+$  ion is apparently formed from the  $UO_3^+ + N_2O$  reaction whose cross section can be estimated. With  $O_2$  added, the  $UO_3^+$  ion is formed, and its appearance suggests that the accepted energetics of the Uranium oxygen system may be in error.

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Dr. W. L. Fite  
Department of Physics  
University of Pittsburgh  
Pittsburgh, Pennsylvania 15260  
USA