

Abstract Submitted  
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**Electron and Ion Processes in Weak Plasmas** THOMAS M. MILLER, Air Force Research Laboratory, JANE M. VAN DOREN, College of the Holy Cross, A.A. VIGGIANO, Air Force Research Laboratory — **I. New Plasma Effects Observed in a Flowing-Afterglow Plasma.** In a study of electron attachment to  $C_6F_5Cl$  in a helium bath gas), we found the first case we know of in which a thermally-detaching ion product ( $C_6F_5Cl^-$ ) results in competition with a thermally-stable ion product ( $Cl^-$ ), at elevated temperatures (500-550 K). We hypothesize that the heavier ions are more confined to the core of the plasma, releasing fresh electrons all the while. A sudden transition is observed in the electron density decay as the  $C_6F_5Cl^-$  concentration dies away. **II. Electron Attachment to Fluorinated Pyridines.** In this experiment we measured rate constants for electron attachment and electron detachment for  $C_5F_5N$  and  $C_5HF_4N$ . From the attachment/detachment reaction rate constants, electron affinities were determined to be  $EA(C_5F_5N) = 0.70 \pm 0.05$  eV and  $EA(C_5HF_4N) = 0.40 \pm 0.08$  eV. The neutrals are planar, but calculations show the negative ions to have the F or H opposite the N atom to be significantly out-of-plane. Experimental and calculated values show an average decrease in EA of 0.25 eV per substitution of H for F. **III. Ion-Molecule Reactions at High Temperatures.** We will present data on negative ion-molecule reactions with molecules, obtained in a high-temperature flowing afterglow apparatus at temperatures from 300-1440 K.

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