Abstract Submitted
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Electron attachment to the interhalogens ClF, ICl, and IBr.[1] T. M. MILLER, J. P. WIENS, J. C. SAWYER, N. S. SHUMAN, A. A. VIGGIANO, Air Force Research Lab, M. KHAMESIAN, V. KOKOOULINE, University of Central Florida, I. I. FABRIKANT, University of Nebraska — Electron attachment rate coefficients have been measured for the interhalogens ClF, ICl, and IBr over the range 300-900 K using a flowing-afterglow Langmuir-probe apparatus. The ClF case was also studied theoretically. ClF was found to attach electrons somewhat inefficiently with a rate coefficient of 7.5x10^{-9} cm^3/s at 300 K, doubling by 700 K. Even so, attachment to ClF is more efficient than seen earlier for F_2 and Cl_2, which brings up the interesting distinction that attachment to F_2 and Cl_2 is known to have p-wave threshold behavior, while in ClF the inversion symmetry is broken, allowing an s-wave component. The increase in the rate coefficient for attachment to ClF with temperature was found to be less pronounced than with F_2 and Cl_2. *Ab initio* potential energy curves were calculated for ClF and ClF^-, and R-matrix theory was used to obtain the resonance widths and energies for the ground state curve crossing, which takes place near the equilibrium internuclear separation in ClF. A local complex potential model was used to calculate attachment cross sections and thermal rate coefficients. There is reasonable agreement between theory and experiment within the estimated 25% uncertainties in the data. Cl^- is the only product ion from thermal electron attachment to ClF. Attachment to ICl is even less efficient by almost an order of magnitude than to ClF, namely, 9.5x10^{-10} cm^3/s at 300 K. Attachment to IBr is small enough that we place an upper limit of $<10^{-10}$ cm^3/s at 300 K.

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