

§4. Conclusions

Earlier studies on electron impact dissociation of CF_4 were limited to partial ionization cross sections based on ion measurements^{1,2,4)} along with the total dissociation cross section based on pressure measurements.³⁾ The present paper reports the first detection of neutral radical CF_n ($n=1-3$) produced by electron impact on CF_4 , using threshold ionization mass spectrometry.⁵⁻⁷⁾ The threshold energy for dissociation into each neutral radical was found to be 12.5 eV, 15.0 eV and 20.0 eV for CF_3 , CF_2 and CF , respectively, while the difference between these thresholds approximately coincides with the known value of dissociation energy of the CF_2-F bond or $\text{CF}-\text{F}$ bond. The cross section for dissociation into CF_n radical was measured as a function of electron energy from 10 eV to 300 eV and the absolute value of the cross section was determined in the procedure described previously.⁷⁾ The branching ratio at energies higher than 100 eV is $\text{CF}_3:\text{CF}_2:\text{CF} \approx 2:1:1$. Finally, the cross section for dissociation into a neutral-neutral pair was estimated and compared with available data.

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