ELECTRON IMPACT IONIZATION AND DISSOCIATIVE IONL?ATION OF C_2H_2

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By utilizing a crossed electron beam collision geometry, a combination of time-of-flight (TOF) and quadruple mass spectrometers, and the relative flow technique[1] normalized values of cross sections and appearance energies (AP) were obtained for the formation of singly and multiply ionized species resulting from the ionization and dissociation of C_2H_2. Details on the apparatus and technique have been published previously[2,3].

Figure 1 shows spectra of ions obtained at 100 eV electron impact energy. In this figure those species are shown **for which "ionization** efficiency curves " were acquired in the energy range from threshold to 800 eV. The shapes of these ionization efficiency curves were corrected by comparing to similar curves for the rare gas atoms. From these curves the AP for each species was derived. Finally, the ionization efficiency curves were employed to generate normalized values of cross sections by utilizing the relative flow technique and known cross sections for H2, Ne, and N2 at 100 and 250 eV electron impact energies. Previous measurements on this molecule are by Tate et al.[4] and Hangmann 5 For the case of the formation of $C_2H_2^+$ they are shown in fig. 2. For $C_2H_2^+$, C_2H^+, and C_2^+ there is a reasonable agreement between the various results. However, the differences are large in the cross section values for the formation of $C_2H_2{}^{+}$, C_2^{++}, and H^+.

AP's for various ions have also been measured previously by Tate ct al.[4] which agree very well with the present values. These AP's were helpful in identifying the various pathways for the dissociation of C2H2 into ionic species.

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Reference

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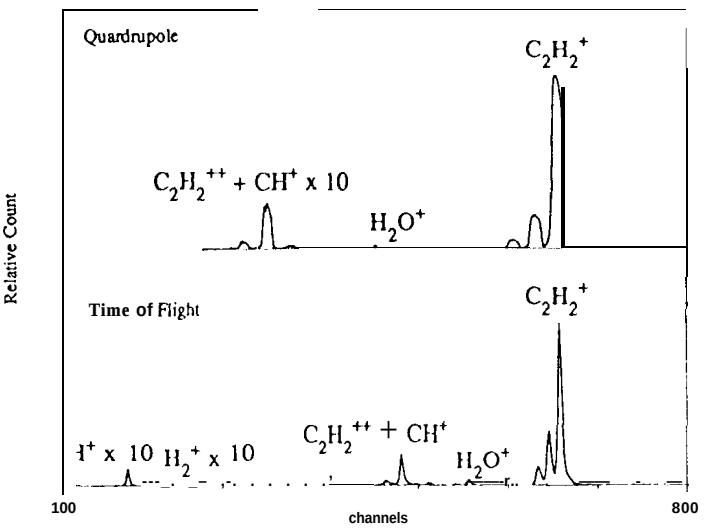

Fig. 1. Spectra of ions resulting from C_2H_2 at 100 eV electron impact energy.

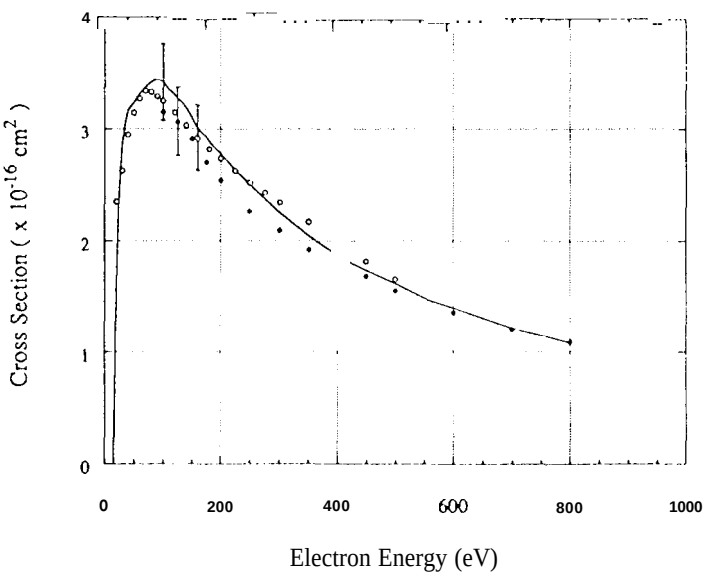

Fig. 2. Cross sections for the formation of C_2I 12+".