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Cross sections and products of electron ionization of m-xylene, p-xylene and o-xylene CHARLES JIAO, UES, STEVEN ADAMS, Air Force Research Laboratory — Xylenes are contained in many jet fuels and are one of the components in surrogate mixtures for JP-8. In this study using Fourier-transform mass spectrometry to measure the electron ionization cross sections of m-xylene, p-xylene and o-xylene, it is found that the total cross sections of the three xylene isomers are approximately equal at low energies (<25 eV), and become slightly different at higher energies, reaching maxima of 2.24, 2.10 and 2.05×10^{-15} cm². respectively, at 80 eV. The electron ionization on these xylenes produces similar products, mainly the parent ion $C_8H_{10}^+$ and fragment species including $(C_8H_9^+ + H)$, $+ H + H_2$, $(C_7H_7^+ + CH_3)$, $(C_6H_7^+ + C_2H_3)$, $(C_6H_6^+ + C_2H_4)$, and $(C_8H_7^+)$ $+ C_2H_5$). The results indicate that the major by-products of the electron $(C_{6}H_{5}^{+})$ ionization of xylenes are CH₃ and H. The latter is believed to play an important role in fuel ignition because it is involved in both chain branching and chain breaking steps, and it triggers the fuel oxidation.

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