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Electron Capture in Low-Energy Ne^{4+} - H_2O Collisions ASAD HASAN, American University of Sharjah, Physics Department, P.O. Box: 26666 Sharjah, UAE, OSAMA ABU-HAIJA, Tafila Technical University, Physics Department, P. O. Box 179, Zip Code 66110. Tafila, Jordan, ASGHAR KAYANI, EMANUEL KAMBER, Western Michigan University, Physics Department, Kalamazoo, MI 49008-5252, USA — Using translational energy-gain spectroscopy technique, we have measured the energy-gain spectra and absolute total cross sections for single-electron capture in collisions of Ne^{4+} recoil ions with H_2O at laboratory impact energies between 60 and 1200 eV and scattering angles between 0° and 8°. At the lowest impact energy, the zero-angle translational energy-gain spectrum shows capture into $Ne^{3+}(2p^2(^1D)3d)$ to be the most important reaction channel, with contributions due to transfer excitation in the 3d excited state of the Ne^{3+} accompanied by excitation of the target product into the excited state ($^2A_1$) of H_2O^+. There are also some contributions from capture into 4s and 4p states. However, as the scattering angle and impact energy are increased, contributions from transfer excitation and capture into 3d and 3p′ become more pronounced relative to the dominant channel. The final state populations will be discussed on the basis of the reaction windows, which are calculated using the single-crossing Landau-Zener model and the extended version of the classical over-the-barrier model.

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