Rate coefficients for vibrational and electronic excitation of the CO molecule

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Low energy electron impact vibrational and electronic excitation cross sections of the CO molecule are measured by use of a high resolution crossed-beams double trochoidal electron spectrometer [1,2]. Rate coefficients for vibrational excitation of the carbon-monoxide molecule, via the $^2\Pi$ shape resonance in the energy region from 0 eV to 5 eV have been calculated. Calculations are performed for a Maxwellian electron energy distribution. By using extended Monte Carlo simulations the electron energy distribution functions and rate coefficients are determined in non-equilibrium conditions, in the presence of homogeneous electric and magnetic fields. Integral cross sections and rate coefficients for vibrational excitation of the excited carbon-monoxide molecule, via the $^2\Pi$ shape resonance in the energy region from 0 to 5 eV have been calculated. Cross sections are calculated by using measured cross sections for the ground level CO excitation and the most recent cross sections for elastic electron scattering, applying the principle of detailed balance. Calculations are performed [3,4] for typical, moderate values of the electric field over gas number density ratios, E/N.

The energy dependences of the near threshold resonant excitation of the valence and Rydberg states of the CO molecules have been measured. The cross sections of the near threshold resonant excitation of the a $^3\Pi$ valence state, and the b $^3\Sigma^+$ and B $^1\Sigma^+$ Rydberg states have been determined [5,6]. Rate coefficients for electronic excitation of the a $^3\Pi$ valence state, and the b $^3\Sigma^+$ and B $^1\Sigma^+$ Rydberg states of the carbon-monoxide molecule are performed for both Maxwellian and non-equilibrium electron energy distributions in the presence of homogeneous electric and magnetic fields in the energy region from 0 to 10 eV.

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