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Direct Dissociative Recombination of NO_2 DANIEL J. HAXTON, CHRIS H. GREENE, JILA, the University of Colorado and NIST, and Department of Physics, the University of Colorado, Boulder, CO 80309-0440 — We provide estimates for direct dissociative recombination (DR) rates for collisions of $NO_2^+ + e^-$ via the 2 $^2\Pi$ and $^2\Phi$ states of the neutral. No calculations or measurements of this rate exist in the literature, despite the fact that NO_2 is an important constituent of the atmosphere and DR of the cation may play a role in its atmospheric chemistry. Little is known about the potential energy surfaces of neutral NO_2 at energies near the ionization threshold. However, preliminary calculations suggest that the 2 $^2\Pi$ and $^2\Phi$ states may intersect the ground state potential energy curve of the neutral near its Franck-Condon region. R-matrix calculations are employed to obtain the widths of these states, and the direct DR rate is extracted by employing the multidimensional reflection principle along with the formalism of O'Malley. The calculated rates may help to elucidate whether the direct or indirect mechanism plays a larger role in DR of NO_2^+. This work was supported in part by the DOE Office of Science.

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