AU Peterson, JR, Le Padellec, A, Danared, H, Dunn, GH, Larsson, M, Larson, A, Peverall, R, Stromholm, C, Rosen, S, af Ugglas, M, van der Zande, WJ
TI Dissociative recombination and excitation of N-2(+): Cross sections and product branching ratios
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AB The absolute dissociative recombination and absolute dissociative excitation rate coefficients and cross sections have been determined for N-2(+) and electrons for collision energies between 10 meV and 30 eV. The ion storage ring CRYRING has been used in combination with an imaging technique with a position-and-time-sensitive detector. Information is retrieved on the ion beam vibrational state populations and on the product branching in the dissociative recombination process at 0 eV collisions. A hollow cathode ion source has been used to lower the vibrational excitation in the ion beam; a more traditional hot-cathode ion source was used as well. The most important findings are the following. The rate coefficient for an N-2(+) ion beam (46%, upsilon = 0, 27% upsilon = 1) versus electron temperature (K) is alpha(T-e) = 1.75(+/-0.09) x 10(-7)(T-e/300)(-0.30) cm(3) s(-1). The dissociative recombination rate is found to be weakly dependent on the N-2(+) vibrational level. At 0 eV collision energy, the upsilon = 0 product branching is found to be 0.37(8):0.11(6):0.52(4) for N(S-4) + N(D-2):N(P-2) + N(S-4) + N(D-2) + N(D-2) fragments. The dissociative recombination cross section does not have a high-energy peak as was found in a number of lighter molecular systems. The dissociative excitation signal starts only slightly above the energy threshold for dissociation, and peaks near 25 eV. From the dissociative excitation data and literature data, information is retrieved on the dissociative ionization of N-2(+). The comparison of these results with earlier DR measurements is extensively discussed. (C) 1998 American Institute of Physics.
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