AU Mahajan, T, Beroff, K, Pons, B, Illescas, C, Chabot, M, IdBarkach, T, Launoy, T, Le Padellec, A, Jallat, A, Jorge, A, Aguirre, NF, Diaz-Tendero, S
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TI Excitation, ionization, neutralization and anionic production in collisions of C+, N+ and CnN+ (n=1-3) with He atoms at 2.2 a.u. velocity; cross sections and dissociation branching ratios
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DE molecule-atom collisions ; CnN+ molecules; cross sections; energy deposit; IAE and CTMC models; fragmentation branching ratios; dissociation energies
ID CHARGE -TRANSFER ; ELECTRON-CAPTURE ; MOLECULES ; IONS ; HYDROGEN ; REMOVAL ; SINGLE
AB We present measurements of absolute cross sections for projectile ionization and electron capture for C+, N+ and CnN+ (n = 1-3) projectiles impinging on He atoms with velocity v = 2.2 a.u. Single and multiple electron processes are considered, as well as projectile dissociative excitation in the case of incident molecular cations. The measurements are compared to Classical Trajectory Monte Carlo (CTMC) calculations for C+, N+ + He collisions in the framework of the independent electron approximation. CnN+ + He systems are described by means of the independent atom and electron (IAE) model which represents the molecule as a set of independent atoms. The impact parameter probabilities for excitation, ionization and electron transfer in C, C+, N-He collisions, underlying the IAE calculations, are also obtained by means of CTMC computations. A good agreement is generally found between measured and calculated cross sections, except for anionic production of C- and CnN-. The internal energy deposit due to electron excitation in CnN+ is also calculated with the IAE/CTMC model and compared to semi-empirical estimates based on either measured dissociation branching ratios for C2N+ and C3N+ (IdBarkach et al 2018 Mol. Astrophys. 12 25) or measured fragments kinetic energy release for CN+. Finally, measured dissociation branching ratios of excited CnN- and CnNQ+ species, with 1 <= n <= 3 and 0 <= Q <= 4, are reported.
C1 [Mahajan, T ; Beroff, K.] CNRS, INP, Inst Sci Mol Orsay, F-91405 Orsay, France. [Mahajan, T. ; Beroff, K.] Univ Paris Sud, F-91405 Orsay, France. [Pons, B.] Univ Bordeaux, CNRS, CELIA, UMR CEA 5107, 351 Cours Liberat, F-33405 Talence, France. [Illescas, C. ; Jorge, A. ; Diaz-Tendero, S.] Univ Autonoma Madrid, Dept Quim, E-28049 Madrid, Spain. [Chabot, M. ; IdBarkach, T. ; Jallat, A.] CNRS, IN2P3, Inst Phys Nucl Orsay, F-91406 Orsay, France. [Chabot, M. ; IdBarkach, T. ; Jallat, A.] Univ Paris Sud, F-91406 Orsay, France. [Launoy, T.] Univ Libre Bruxelles, Lab Chim Quant & Photophys, B-1050 Brussels, Belgium. [Le Padellec, A.] UNiv Toulouse 3, CNRS, INP, Inst Rech Astrophys & Planetol, F-31028 Toulouse, France. [Aguirre, N. F.] Los Alamos Natl Lab, Theoret Div, Los Alamos, NM 87545 USA. [Diaz-Tendero, S.] Univ Autonoma Madrid, Inst Adv Res Chem Sci IAdchem, E-28049 Madrid, Spain. [Diaz-Tendero, S.] Univ Autonoma Madrid, Condensed Matter Phys Ctr IFIMAC, E-28049 Madrid, Spain. [Jorge, A.] York Univ, Dept Phys & Astron, Toronto, ON M3J 1P3, Canada.
RP Beroff, K (reprint author), CNRS, INP, Inst Sci Mol Orsay, F-91405 Orsay, France. ; Beroff, K (reprint author), Univ Paris Sud, F-91405 Orsay, France. ; Pons, B (reprint author), Univ Bordeaux, CNRS, CELIA, UMR CEA 5107, 351 Cours Liberat, F-33405 Talence, France.
EM karine.beroff@u-psud.fr ; bernard.pons@u-bordeaux.fr
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