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TI Ionization cross sections of small cationic carbon clusters in high-energy collisions with helium atoms and stability of multiply charged species
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ID MODEL-CALCULATIONS; ELECTRON-CAPTURE; MOLECULAR-IONS; GAS-PHASE; FRAGMENTATION; IMPACT; C-60; TOOL
AB Single, double, triple, and quadruple ionization cross sections of small cationic carbon clusters C-n(+) colliding with helium atoms at a fixed velocity (2.6 atomic units) have been measured. The size ranges from n=1 to n=10 for single to triple ionization, from n=5 to n=10 for the quadruple ionization. The dependence of the cross sections with the cluster size is found to be well reproduced by predictions of the independent atom and electron (IAE) collision model. This extends the applicability of this simple model to higher n values and to a higher ionization degree than previously done [M. Chabot , Eur. Phys. J. D 14, 5 (2001)]. The branching ratios of multiply charged C-n(q+) clusters remaining intact over a 100 ns time window have been measured (n=3-10, q=2-3). Branching ratios of nonfragmented doubly charged clusters have been interpreted on the basis of calculated internal energies of C-n(2+) due to single ionization of C-n(+) clusters using the IAE model. This allowed estimates of the minimum energies required to fragment these C-n(2+) species to be derived.
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