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Charge exchange cross-section for C-He collision at 70-220 keV

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Using helium as the stripping medium has become a dominant trend in 14C-AMS miniaturization. In order to explore how to utilize lower-energy beam for 14C analysis, more experimental data on low-energy C-He collisions are needed. In this work, the charge state yield versus target thickness after C- and helium collisions at 70-220 keV was investigated using the GXNU-AMS system, and the charge state yields and charge exchange cross-section data in C-He collision in 70-220 keV are obtained. The results show that the charge state yield of C+ increases significantly with decreasing incident carbon ion energy. The charge state yield of C+ increases from 50.4% to 74.8% when the incident energy of C- decreases from 220 keV to 70 keV. The equilibrium state yields of C2+, C3+, and C4+ show the opposite trend to C+. Compared with the cross-section σ_1,i_(i = -1, 0, 2, 3), the cross-section σ_i,1_(i = -1, 0, 2, 3) is relatively large and tends to increase with decreasing energy. These data can provide theoretical support for low-energy AMS construction below 100 keV.

Student Submission

Yes

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