Production of ^{211}Bi from the Reaction of ^{209}Bi with ^{22}Ne Projectiles

Y. H. Chung, K. E. Gregorich, D. M. Lee, and D. C. Hoffman*

Production of 2.14-min ^{211}Bi was investigated by bombarding 2.5mg/cm^2 ^{209}Bi target with 140-MeV ^{22}Ne ions, whose average energies at the target were ~108 MeV with correction of energy losses in the Be windows, N_2 cooling gas, and the target itself, at the Lawrence Berkeley National Laboratory 88-Inch Cyclotron. The experiments were performed using the helium-jet system to transport the activity via a capillary from the production site to the MG rotating wheel[1] for measurement of alpha activity. Eskola *et al.*[2] studied multi-particle transfer reactions using the ^{208}Pb(^{18}O,pxn)$^{211\text{-}213}$Bi reactions in the 5-10 MeV/nucleon range. In their study the production cross section of ^{211}Bi via p2n-transfers was ~2 mb in the vicinity of 110 MeV, which induced ~55 MeV excitation energy in the compound system. In our study, we deduced the cross section of ^{211}Bi using its two alpha-decay lines: 6.28 and 6.62 MeV. Based on their decay intensities, the excess intensity of the 6.62 MeV line was obtained, and it was found to be due to the 6.65 and 6.66 MeV lines from 2.1-min ^{223}Ac. The excitation energy of the compound nucleus is about 36 MeV, which is lower by 20 MeV than that estimated in Eskola's work. From our data, the preliminary cross section of ^{211}Bi via the 2n-transfer reaction has been estimated to be ~3±1 mb, assuming 70% gas transport efficiency. This result indicates that the 2n transfer cross section is comparable to the p2n transfer, which was observed in the interaction of ^{208}Pb with ^{18}O in this energy regime. Further detailed analysis of data obtained from the interaction of ^{209}Bi with 103- and 117-MeV ^{22}N ions and 128-, 140-, and 149-MeV ^{26}Mg ions is in progress.

Footnotes and References

*Department of Chemistry, Hallym University, Chunchon, Korea 200-702.

1. D. C. Hoffman *et al.*, Phys. Rev. C41, 631(1990).

2. K. Eskola, P. Eskola, M. M. Fowler, H.Ohm, E. N. Treher, J. B. Wilhelmy, D. Lee and G.T. Seaborg, Phys. Rev. C29, 2160(1984).