Elastic and inelastic scattering for the B-10+Ni-58 system at near-barrier energies

Abstract
Full angular distributions of the B-10 elastically and inelastically scattered by Ni-58 have been measured at different energies around the Coulomb barrier. The elastic and inelastic scattering of B-10 on a medium mass target has been measured for the first time. The obtained angular distributions have been analyzed in terms of large-scale coupled reaction channel calculations, where several inelastic transitions of the projectile and the target, as well as the most relevant one-and two-step transfer reactions have been included in the coupling matrix. The roles of the spin reorientation, the spin-orbit interaction, and the large ground-state deformation of the B-10, in the reaction mechanism, were also investigated. The real part of the interaction potential between projectile and target was represented by a parameter-free double-folding potential, whereas no imaginary potential at the surface was considered. In this sense, the theoretical calculations were parameter free and their results were compared to experimental data to investigate the relative importance of the different reaction channels. A striking influence of the ground-state spin reorientation of the B-10 nucleus was found, while all transfer reactions investigated had a minimum contribution to the dynamics of the system. Finally, the large static deformation of the B-10 and the spin-orbit coupling can also play an important role in the system studied. (AU)