

Abstract

In the present research work, α -induced ^{59}Co reactions in the energy range from 11- 41MeV were used in order to study the role of pre-equilibrium emission. The experimentally measured excitation functions for residues populated via (α, n) , $(\alpha, 2n)$, $(\alpha, 3n)$, $(\alpha, 2p)$, $(\alpha, 3n 2p)$ and $(\alpha, 4n 2p)$ channels in the interaction of $\alpha + ^{59}\text{Co}$ system available in the literature [13] were compared with theoretical predictions obtained using the statistical model code COMPLET. It was observed that at higher energy points the pure compound nucleus predictions, in general, failed to reproduce the measured data at projectile energies ~ 11 -41MeV, this shows significant contributions from pre-equilibrium emission. The study signified both equilibrium and pre-equilibrium emissions were required to reproduce the presently measured excitation functions.

An attempt was made to deduce the contribution coming from pre-equilibrium emission. It was found that the pre-equilibrium contribution increases with increasing projectile energy. Furthermore, the present result revealed a strong correlation between pre-equilibrium contribution and particle multiplicity.