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Probing role of two neutron excess projectile: An exclusive study on incomplete fusion dynamics

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Study of heavy-ion induced nuclear reactions has been an active area of investigation for last couple of decades [1-3]. In the present work, the excitation function of fusion-evaporation residues populated through complete fusion (CF) and incomplete fusion (ICF) for 18O + 103Rh system are measured in the energy range of 3 to 6 Mev/A. The off-line γ -ray spectroscopy associated with high purity HPGe Clover detector method was employed. The measured residual cross were analyzed with the theoretical estimations from statistical model code PACE4 to understand the reaction mechanisms involved in the low energy region. It has been observed that the measured excitation functions of xn and pxn emission channels agree well with the theoretical predictions of PACE-4. Furthermore, the measured excitation functions of α -emission channels are found to be significantly enhanced over their theoretical predictions. The enhancement of cross-section values over theoretically obtained may be assigned to incomplete fusion process. An attempt has also been made to evaluate the incomplete fusion strength function for 18O+103Rh and is compared with that obtained for the 16O+103Rh system [4]. It has been found that two neutron excess projectile (18O) contributes more to incomplete fusion as compared to 16O projectile. The reason may be due to alpha-Q value of projectile. Moreover, a strong dependency of incomplete fusion fraction has been found with Coulomb factor and mass asymmetry of interacting partners.

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