LOW ENERGY INCOMPLETE FUSION REACTIONS: PROBING OF ENTRANCE CHANEEL EFFECTS

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During last couple of years, the probability of incomplete fusion in heavy ion induced reactions for both strongly bound and loosely bound projectiles has been observed at energies as low as 4 – 5 MeV/A [1 – 4]. The HI induced reactions are important in basic research for the fundamental understanding of reaction mechanism and to test the validity of various parameters existing in available nuclear reaction models [5 – 7]. The importance of measured cross-section data has been found in applied research, more particularly, in reactor technology for nuclear energy generation and waste management. Although the dynamics of the multiplicity of processes like complete fusion (CF), incomplete fusion (ICF), and pre-compound (PCN) emission in heavy ion (HI) interactions at low projectile energies depend on various entrance channel parameters, moreover the projectile energy and angular momentum of the compound nucleus systems are some of the key parameters, which play significant role in the characterization of such processes in HI reactions. The entrance channel mass asymmetry, alpha Q-value, neutron thickness, coulomb factor (ZpZt) and target deformation are some important entrance channel parameters, that affects the probability of incomplete fusion in heavy ion reactions. In the present work an attempt has been made to have an exclusive study on aforementioned entrance channel parameters on ^{12}C, ^{13}C, ^{16}O, ^{18} O and ^{14}N induced reactions with various target systems. It is observed that proper account of these entrance channel parameters is very much essential to conclusively explain the incomplete fusion reactions.

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