Preface

The present thesis mainly focuses on the study of threshold and breakup threshold anomaly by elastic and quasi elastic scattering channels that involves stable but weakly bound nuclei, namely ^{6,7}Li and tightly bound ^{10,11}B on heavy mass target ^{232}Th. With this objective, two different experiments have been performed at around the Coulomb barrier energies.

A detailed study of the elastic scattering angular distributions for ^{6,7}Li+^{232}Th, systems have been carried out for different energies close to the Coulomb barrier. The experimental results have been analyzed for the above systems using the optical model ECIS code with phenomenological Woods-Saxon and Sao Paulo double-folding form of the potentials. The energy dependence of the volume-type real and imaginary part of the optical potentials were derived from the best fit of the experimental angular distribution data. The usual threshold anomaly has been observed for the ^{7}Li + ^{232}Th system, whereas there is an indication of a breakup threshold anomaly in case of the ^{6}Li + ^{232}Th system. Results on total reaction cross sections obtained from the optical model analysis for both systems have been interpreted to understand the role of projectile breakup on the reaction mechanism.

In the case of ^{10,11}B + ^{232}Th systems quasi-elastic scattering and transfer angular distributions have been measured simultaneously in a wide range of bombarding energies around the Coulomb barrier. The quasi-elastic angular distribution data are analyzed using the optical model code ECIS with phenomenological Woods-Saxon potential. The obtained potential parameters suggest the presence of usual threshold anomaly, confirming tightly bound characteristic for both the projectiles. The reaction cross sections were obtained from the fitting of quasi-elastic angular distribution data. The reduced cross section at sub-barrier energies were compared with ^{6,7}Li + ^{232}Th systems that show a systematic dependence on projectile breakup energy. The angular distribution of the transfer products show similar behavior for both the systems.