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EFFECT OF LEVEL DENSITY PARAMETER IN THE DECAY DYNAMICS OF $^{12,13}C + ^{12}C$ REACTIONS

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The decay for number of compound nuclei formed in low energy heavy ion reactions have been successfully studied using dynamical cluster decay model (DCM) [R. K. Gupta, W. Scheid, C. Beck et al., Phys. Rev. C {68} (2003) 014610]. In a previous study the decay of $^{24,25}Mg^*$ compound nuclei (CN) for the experimentally observed intermediate mass fragments (IMFs) that are ^{6,7}Li and ^{7,8,9}Be have been explored [Rupinder Kaur, Sarbjeet Kaur et al., Phys. Rev. C {101} (2020) 034614.] within DCM. The role of the α-cluster structure of the complementary fragments was explored, which results in the enhanced preformation probability (ΣP_0) with respect to other fragments. These enhanced ΣP_0 values accordingly affect the yields of the respective IMF. In the present approach of DCM, we have extended this work to study the effect of level density parameter on the clustering effects of compound systems $^{24,25}Mg^*$ formed via respective entrance channels namely $^{12}C+^{12}C$ and $^{13}C + ^{12}C$, within the collective clusterization approach of Quantum Mechanical Fragmentation Theory (QMFT). The fragmentation and preformation profiles with the inclusion of level density parameter have been compared with the previous work at critical l value and for both the spherical and deformed configurations. The investigations show that by including modified level density parameter fragmentation profile, preformation profile and penetrability (P) are modified with small changes. But there is no major change in there cross section ratios. There is decrease in ΣP_0 but the enhancement in P accordingly affects the yields of the respective fragment. The calculated ratios of ΣP_0 of the IMFs show the trend of ratio of experimental cross sections and are in fair agreement with the experimental data [S. Manna, T. K. Rana, C. Bhattacharya et al., Phys. Rev. C {94} (2016) 051601(R)].

Experimental nuclear physics

Theoretical nuclear physics

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