Effect of Angular Momentum Variation in Heavy-Ion Induced Fusion Reaction

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In order to examine the nucleus at high spin or high temperature, fusion reactions are useful tool, and the dissipative evolution of compound nuclei is an active area of research in heavy ion induced fusion reactions. In such reactions, the colliding nuclei possess a certain amount of intrinsic angular momentum. In this study, we have calculated the variation of compound nucleus formation time with the angular moment as shown in Fig. 1 for the two different reactions that make the same compound nucleus [1,2]. Dynamical model code HICOL [3] is employed to calculate the formation time of a compound nucleus at different values of angular momentum.

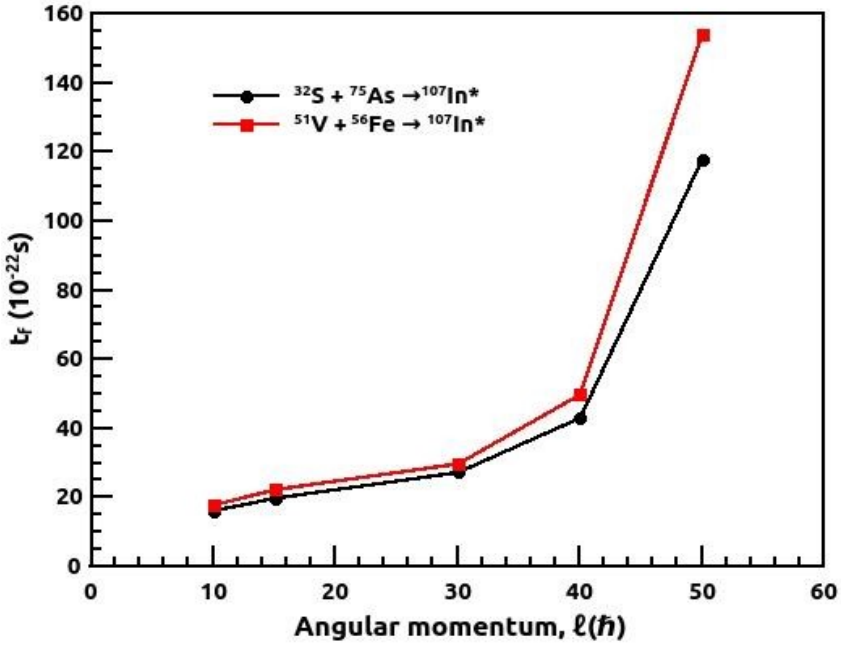

Fig.1: The influence of angular momentum on compound nuclear formation time.

From Fig. 1, it is clear that the compound nucleus (^{107}In*) formed through ^{51}V + ^{56}Fe $\rightarrow$ ^{107}In* has a long formation time compared to the ^{32}S + ^{75}As$\rightarrow$ ^{107}In* and this indicates the dissipation in the nuclear reaction during compound nuclear formation [4], because angular momentum may prevent the energy from being transferred to other degrees of freedom and nuclei in collision experience more distortion at high angular momentum.

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3. H. Feldmeier *et.al.*, Nucl. Phys. A **435**, 229 (1985).
4. N.K. Rai *et.al*., Phys. Rev. C **98,** 024626 (2018).