

PRE-EQUILIBRIUM PROCESSES IN (n, α) and (p, α) REACTIONS

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The preequilibrium model seems to provide a useful tool for describing the general features of the emission of alpha particles in (p, α) and (n, α) reactions at moderate energies. Two different assumptions may be adopted when analyzing the emission of α particles in terms of the pre-equilibrium model. According to the first approach, α particles are assumed to be formed by four independently excited nucleons, while according to the second, they can be treated as preformed entities. The formula for the "normal" pre-equilibrium process has been recently modified (I. Rybansky and P. Obložinsky) by taking into account all distinguishable configurations of excited nucleons from which a complex particle can be formed. We used that formula in fitting our spectra.

The analysis performed for the (p, α) reaction on Au¹⁹⁷ at 40 MeV and on some other heavy nuclei shows that the sum of evaporation and "normal" precompound emission gives a good description of the low- and medium-energy spectrum shape. There are still high-energy α particles in the data that cannot be explained by such a mechanism. This tends to indicate the importance of α -particle emission from heavy nuclei, where α particles behave like a nucleon. The analysis of the (n, α) reaction on Pr¹⁴¹ and Ho¹⁶⁵ at 14 MeV shows that the preequilibrium emission in this A region seems to be mainly due to the preformed α particles, while other types of mechanism seem to play a minor role.