Systematics Studies of (n,α) reaction cross sections at 14.5 MeV neutrons energy

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Abstract

A new semi-empirical formula for the calculation of the (n,α) cross section at 14.5 MeV neutron energy is obtained. It is based on the pre-equilibrium exciton and evaporation models and uses the Droplet model of Myers and Swiatecki to express the reaction energy $Q_{(n,\alpha)}$. The systematics behavior of the different terms of the Droplet model involved in $Q_{(n,\alpha)}$ was checked individually before choosing the pertinent terms and setting up the formula. Fitting this formula to the existing cross section data on 120 nuclei with $40 \leq A \leq 209$, the adjustable parameters have been determined and the systematics of the (n,p) reaction have been studied. The predictions of this formula are compared with those of the existing formulae and with the experimental data. The formula with five parameters is found to give a better fit to the data than the previous comparable formulae.