

References

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D3 Spectrometry of Charged Particles

N. CINDRO, *Institute "Ruđer Bošković", Zagreb*

D4 Possibility of Finding the α -Clustering Probability from (n, α) and (p, α) Studies

M. L. CHATTERJEE* and M. JURČEVIĆ, *Institute "Ruđer Bošković", Zagreb*

Knock-on and heavy particle stripping processes have been observed in (n, α) and (p, α) reactions. This necessarily implies a transfer of an α -cluster from the target in the initial state and the capture of a neutron or a proton in the final state by the core, which is usually not perturbed. As a consequence one can expect the single neutron or single proton states to be predominantly excited in such a process as in the corresponding (d, p) or (^3He , d) reactions. A test of these conjectures has been provided by the comparison of (d, p) and (n, α) reaction spectra leading to the same final nucleus.

Such comparisons have recently been made in the studies of $^{124, 125, 126, 128}\text{Te}$ (n, α) (ref.¹⁾) and ^{93}Nb (n, α) (ref.²⁾) reactions. The energy spectra both in (d, p) and in (n, α) processes showed considerable single neutron features. In the case of ^{103}Rh (n, α) and ^{115}In (n, α) reactions³⁾ the measured alpha energy spectra were compared with the calculated single neutron levels from the Nilsson model. Since the experimental energy resolution was not very good, the Nilsson neutron levels were smeared out to obtain a level density appropriate to that region. The agreement was fairly good. It was further observed that the best fit between the experimental spectra and the calculated neutron level sequence was obtained for only those values of the deformation parameter δ (which determines the Nilsson model sequence) which were expected from other experimental data and the systematics of the neighbouring nuclei.

The measured energy spectra were also compared with the statistical model calculation¹⁻³⁾. It was found that except in the case of ^{103}Rh (n, α), the energy distributions of alpha particles were far from being statistical. This probably shows that compound nuclear contributions are relatively small.

Very recently Kulišić et al.⁴⁾ also studied the (p, α) reaction on ^{115}In , ^{165}Ho and ^{209}Bi at 40 MeV. The results are at preliminary stage at present.

* On leave of absence from Saha Institute of Nuclear Physics, Calcutta, India.