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An investigation of 28Si (α, α) 28Si elastic scattering at energies from 18 to 240 MeV

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In the present research, the analysis of experimental elastic scattering angular distributions data of alpha particles on 28Si nuclei carried out using SFRESCO computational code in the energy range from 18 to 240 MeV. The data were analyzed using phenomenological Woods–Saxon (WS) potential within the context of the optical model (OM). We created the real potentials in the double-folding (DF) calculations by folding the nucleon- nucleon (NN) interaction into nuclear matter density distributions of alpha projectile and the 28Si target. A density dependent version of M3Y interactions (CDM3Y6), which based on the G-matrix elements of the Reid (NN) potential, have been used. The imaginary potentials kept fixed for each energy during (DF) search as obtained from phenomenological imaginary (WS) potential part. The renormalization factor of folded potential Nr have been extracted at all energies. we have investigated the observed phenomena of anomalous large angle scattering (ALAS)at low energies and rainbow-like structure scattering at high energies for α+28Si nuclear system. The total reaction cross sections σ_R, the (real and imaginary) potential volume integrals (J_V and J_W) as well as the χˆ2/N values have been obtained for fourteen energies. The theoretical (OM) and (DF) calculations of angular distributions in the entire angular range are in a good agreement with the experimental data.

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