
OPTICAL POTENTIALS FOR EVALUATING DATA FOR NUCLEAR PROCESSES INVOLVING ALPHA PARTICLES*

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A prescription to obtain alpha-nucleus global optical model potential for use to study the nuclear processes involving alpha particles in the entrance and exit channels has been developed. Both the phenomenological and microscopic approaches have been used to determine the alpha-nucleus optical potential. Use has been made of the well-behaved quantities of the nuclides like (i) the volume integral, (ii) the mean squared radius, (iii) the radius at which the Wood-Saxon potential is 2.4 MeV, and (iv) the slope of the potential at that radius. These quantities for real as well as imaginary potentials are related to the corresponding parameters (V_0 , R and a) of the Wood-Saxon form of the potential. From the systematics of these quantities observed for nuclides of varied mass numbers over a range of alpha energies, the parameters for real as well as imaginary parts of the optical potential are self-consistently obtained for a specific nucleus at a given alpha energy. This potential has been validated in many cases in predicting the angular distribution of the elastically scattered alpha particle at different energies, the energy distribution of the outgoing alpha particle in HI reactions and also by the cross section evaluation for nuclear reactions where alpha is in entrance or exit channel.

*Work is done under IAEA sponsored CRP on Reference Input Parameter Library (RIPL).