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The effects of nuclear level density model and alpha optical model potential to the excitation functions of novel therapeutic radionuclides

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Abstract
In this study, the theoretical cross sections of 209Bi(α,2n)211At, 65Cu(α,n)68Ga, 100Ru(α,n)103Pd, and 121Sb(α,n)124I are calculated using TALYS 1.96, incorporating the effects of the alpha optical model potential and nuclear level density models. The validation process involves comparing the calculated cross sections with experimental data and utilizing statistical deviation factors. This comparison allows us to determine the optimal combination of nuclear model parameters for each reaction. The result shows that theoretical calculations which utilized semi microscopic level density models and alpha OMP managed to describe the excitation functions close to the experimental data. The comparison of nuclear model calculations with experimental data plays a crucial role in ensuring the reliability of the data, making it an essential aspect of modern evaluation procedures. © 2023 Elsevier Ltd

Author Keywords
Alpha optical model potential; Excitation functions; Nuclear level density models; TALYS 1.96

Index Keywords
Alpha optical model potential, Density modeling, Excitation function, Model potential, Nuclear level densities, Nuclear level density model, Optical modelling, TALYS 1.96, Therapeutic radionuclides, Validation process; antimony 121, astatine 211, bismuth, copper 65, gallium 68, iodine 124, palladium 103, radioisotope, ruthenium 100, unclassified drug; alpha optical model potential, Article, calculation, controlled study, model, nuclear level density model, simulation, validation process

Chemicals/CAS
astatine 211, 15755-39-2; bismuth, 7440-69-9; gallium 68, 15757-14-9; iodine 124, 14158-30-6; palladium 103, 14967-68-1

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