Title: Molecular targeted therapies for cutaneous squamous cell carcinoma: recent developments and clinical implications

Author: Mehdi Hassanpour, Mohammadreza Rezaie, Marzieh Hassanpour, Mohammad Rashed Iqbal Faruque, Mayeen Uddin Khandaker, Sabirin Abdullah

Abstract: Accurate determination of cross-sections for residual radionuclide products (spallation fragments) resulting from proton spallation reactions is imperative for the detection of primary and secondary particles etc. Experimental measurement of these cross-sections faces challenges due to the complexities associated with target preparation and detection of spallation fragments. Monte Carlo simulations have emerged as a potent tool for estimation of spallation fragments yield. This research, with introducing an innovative formulation method based on spallation yield, focuses on calculating the cross-section for the detection of primary and secondary particles in particle interaction with matter. Investigations indicate that the introduced method achieves remarkable agreement, ranging from 85.4% to 95.15%, with experimental outcomes at MeV energies. Consequently, this method can confidently be utilized for calculating the spallation cross-section fragments. In a case study, the spallation fragment cross-section was calculated for proton beam interaction with 222Rn in the range of 10 MeV to 60 MeV for the application of 222Rn detection. Among the 28 common spallation products of radon with the proton interaction in the energy range of 10 MeV to 60 MeV, elements 106Mo, 109Tc, 118Cd, 112Ru, 110Pd, and 114Rh exhibit dominant spallation cross-sections, emphasizing their exceptional significance.

Keywords: Proton, Radon, Compound nucleus, Spallation reactions, Cross-section, Radioactive

DOI: https://doi.org/10.1016/j.aej.2023.12.067

https://www.sciencedirect.com/science/article/pii/S111001682400005X