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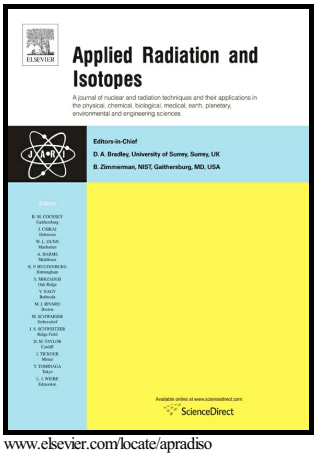

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Utilization of GEANT to calculation of production yield for ^{89}Zr by charge particles interaction on ^{89}Y, ^{nat}Zr and ^{nat}Sr

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Abstract

The ^{89}Zr, is one of the radionuclide with near-ideal properties for PET due to its suitable half-life and decay properties. The cross-section of ^{89}Zr via ^{89}Y(p,n)^{89}Zr, ^{89}Y(d,2n)^{89}Zr, ^{nat}Sr(α,xn)^{89}Zr and ^{nat}Zr(p,pxn)^{89}Zr, were calculated by the TALYS-1.8 code to predict the optimum range of charge particle energy. The Monte Carlo code GEANT4 was used to simulate the formation of ^{89}Zr in the target body. The simulated ^{89}Zr yield was in good agreement with published experimental results in the optimum energy range.According to the calculations, the ^{89}Y(p,n)^{89}Zr was superior to the other reactions useful to medical application.

Keywords: Radionuclide; ^{89}Zr; PET; Production yield; Monte Carlo.

1. Introduction

The radionuclide zirconium-89 can be employed in positron emission tomography (PET) because of its suitable half-life ($T_{1/2}$ = 78.41 h), emission of low energy and suitable