Abstract

Radionuclides play a pivotal role in the field of nuclear medicine, providing invaluable tools for diagnostic imaging, therapy, and research. Their significance lies in their ability to emit radiation that can be detected and measured externally, allowing for non-invasive imaging and targeted treatments. PET uses positron emitters radionuclide for diagnostic imaging.

This study delves into the production of Arsenic-72, a promising positron emitter radioisotope with potential applications in Positron Emission Tomography (PET) diagnostics. The investigation focuses on employing alpha particles on ^{69}Ga and ^{71}Ga targets to produce ^{72}As. The primary objective involves use of extensive EXFOR library for our concerned reaction channel and additional reputable sources to collect experimental data, which forms the basis for our analyses.

We meticulously compare this experimental data with results obtained through the TALYS-1.9 and ALICE-IPPE nuclear codes, aiming to ascertain the most effective production route for ^{72}As. Moreover, impurity analysis is conducted to refine the investigation, ultimately leading to a conclusive determination of the optimal production pathway for Arsenic-72. The findings presented herein have significant implications for enhancing the efficiency and viability of ^{72}As production, further advancing its potential in PET diagnostics.

On the basis of feasibility of optimal reaction channel and impurity analysis, we conclude that ^{69}Ga (α, n)^{72}As reaction is the best reaction for the production of ^{72}As in low energy cyclotrons up to 17 MeV.