Abstract

^{52}Fe is the solitary radioisotope of iron that can be employed for diagnostic applications in the future, due to its in vivo visualization distribution. The radionuclide may be beneficial for patient-specific PET dosimetry due to its suitable half-life (T1/2= 8.27 hours) and specific activity($E_{\gamma} = 168\ keV, 99.2\%$).The main attribute that makes ^{52}Fe significant is that it has a mode of decay that involves both positron emission (56%) and electron capture (44%) and therefore is well-suited for imaging with both conventional "Gamma-ray and Positron emission tomography (PET)". It is also useful for the indirect production of short-lived radionuclide ^{52m}Mn (T1/2= 21.1mins), which may further serve as a tracer in nuclear medicine.

In this research, experimental data for excitation functions and cross-sections will be analyzed for the radionuclide ^{52}Fe produced via alpha and He-3 reactions , $^{nat}Cr(\alpha,xn)^{52}Fe$ and $^{nat}Cr(He\text{-}3,xn)^{52}Fe$ up to 100 MeV. The experimental excitation functions and previous experimental results are compared with theoretical calculations from "TALYS-based Nuclear Data Library (TENDL), ALICE-IPPE and EMPIRE 3.2.3".Impurity analysis is also carried out in order to optimize the purity levels of our product ^{52}Fe.