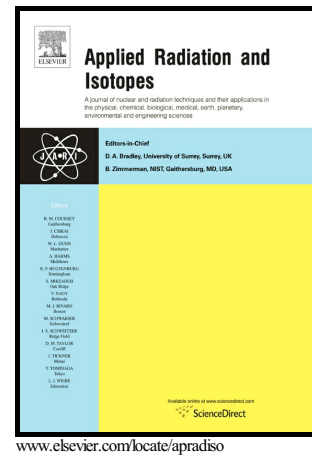


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Assessment and estimation of ^{67}Cu production yield via deuteron induced reactions on $^{\text{nat}}\text{Zn}$ and ^{70}Zn

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Abstract

^{67}Cu radioisotope is a beta particle-emitting nuclide used in radioimmunotherapy (RIT) as well as for imaging, tracer kinetic studies and dosimetry. ^{67}Cu can be produced by bombarding $^{\text{nat}}\text{Zn}$ with deuterons. In this study, the physical yields of ^{67}Cu via $^{\text{nat}}\text{Zn}(d,x)^{67}\text{Cu}$ reaction channel as well as via subreactions of $^{68}\text{Zn}(d,2p)^{67}\text{Cu}$, $^{67}\text{Zn}(d,2p)^{67}\text{Cu}$, $^{70}\text{Zn}(d,2p3n)^{67}\text{Cu}$, $^{68}\text{Zn}(d,x)^{67}\text{Ni}(T_{1/2}=21\text{ s})\rightarrow^{67}\text{Cu}$ and $^{70}\text{Zn}(d,x)^{67}\text{Ni}(T_{1/2}=21\text{ s})\rightarrow^{67}\text{Cu}$ in the $^{\text{nat}}\text{Zn}$ target have been calculated by using the MCNPX-2.6, TALYS-1.8 and SRIM codes. Also, the total cross sections for production of ^{67}Cu from $^{\text{nat}}\text{Zn}(d,x)^{67}\text{Cu}$ reaction channel in the energy range of 15-45 MeV have been estimated by TALYS code. The best reaction to produce ^{67}Cu radionuclide in a carrier free form was chosen with deuteron energy around 30 MeV on ^{70}Zn thick target. Good agreement between the calculated results and the

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