Development of $^{82}Sr/^{82}Rb$ generator system for medical applications

Yeong Su Ha[1*], Minjung Kwon[1], Sang-Pil Yoon[1], Yong-Sub Cho[1] and Kye-Ryung Kim[1]
[1]Korea Multi-purpose Accelerator Complex, Korea Atomic Energy Research Institute, Gyeongju, Republic of Korea
[*]E-mail: ysha19840704@kaeri.re.kr

Keywords: ^{82}Sr, ^{82}Rb, generator, myocardial perfusion imaging, proton accelerator

Nuclear imaging is one of the most powerful means available for non-invasive diagnosis of myocardial disease. Several radioisotopes are available for myocardial perfusion imaging. The most validated radioisotopes for the measurement of cardiac blood flow are: ^{13}N, ^{15}O, ^{99m}Tc, ^{201}Tl and ^{82}Rb. Among these radioisotopes, ^{82}Rb and ^{99m}Tc can be conveniently obtained from a generator system. Especially, not only ^{82}Rb as a positron emitter allows the full advantages of positron emission tomography (PET) such as image quantification with superior sensitivity, but also several reports have shown superior diagnostic performances of ^{82}Rb-PET as compared to conventional ^{99m}Tc-single photon emission computed tomography (SPECT). Up to the present, since no history of the use of ^{82}Rb radioisotope for research or medical purpose in Korea, Korea Atomic Energy Research Institute (KAERI) has plan to develop and supply $^{82}Sr/^{82}Rb$ generator system. Therefore, we optimized ^{82}Sr purification procedure to produce certain purity of parent ^{82}Sr radioisotope and developed $^{82}Sr/^{82}Rb$ generator including inlet, outlet, ion exchange column, and a thick shielding. A half dozen studies were performed to validate an optimized purification procedure. The results shows that not only superior recovery yield of Sr (96.97±1.67%) but also the low concentration of various impurities such as Rb (0.005±0.002%), Se (0.051±0.016%), Be (0.286±0.109%), and Fe (0.472±0.116%) are satisfied to meet appropriate specifications for final Sr product. Moreover, loading yields of Sr into the generator column show higher than 96% (96.36%), elution yields of Rb from the generator column show 14.4%. In future work, we plan to find satisfying elution conditions for higher elution yield in the generator system.

한국원자력연구원
KAERI Korea Atomic Energy Research Institute

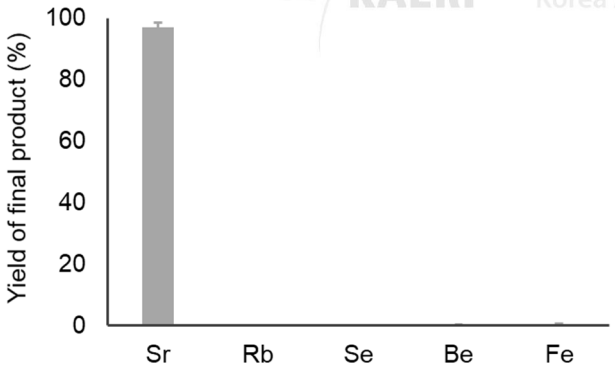

Fig. 1. Results on the final yield of Sr and other impurities such as Rb, Se, Be, and Fe purified by an optimized procedure. (n = 6)

Acknowledgments
This work was conducted as a part of R&D project (NRF-2017M2A2A6A05016601) and partially supported by the operation fund of KOMAC (Korea Multi-purpose Accelerator Complex) of the MSIT (Ministry of Science and ICT).

중성자·동위원소응용연구부/2020-11-11 15:05