

PRODUCTION OF MEDICAL RADIONUCLIDE ^{82}Rb USING PHOTONUCLEAR REACTIONS

Friday, 15 July 2022 15:30 (10 minutes)

The ^{82}Rb isotope has found application in medicine, where it is used to diagnose diseases of the heart and blood vessels. Being a biological analogue of potassium, rubidium is absorbed by tissues, after which the absorption pattern is visualized by positron emission tomography. A very short lifetime forces the use of mobile ^{82}Rb generators, in which the isotope is produced during the decay of ^{82}Sr and is isolated chemically immediately before the procedure.

The method of induced activity was used to study photonuclear reactions on a natural mixture of strontium isotopes. The experiment was performed on a bremsstrahlung of an RM-55 electron accelerator at an electron energy of 55 MeV. The study examined the possibility of producing ^{82}Sr isotope in photonuclear reactions on a natural mixture of strontium isotopes. ^{82}Sr has no gamma lines; therefore, it is not possible to experimentally determine the yield of this isotope by the usual method from the peak in the residual activity spectrum. Due to the large difference in the half-lives of ^{82}Sr and ^{82}Rb , which decays this isotope (25.55 days and 1.27 minutes, respectively), it is possible to determine the experimental yield of ^{82}Sr from the ^{82}Rb gamma lines in the last spectra, using the secular equilibrium formula. Experimentally determine the yield of ^{82}Rb impossible due to the fact that the target transfer time from the accelerator to the detector is several times the half-life of ^{82}Rb .

Experimental data on the cross-sections of photoproton reactions on Sr isotopes are not available in the literature. The yields of the formation of ^{83}Sr , ^{85}Sr , $^{85\text{m}}\text{Sr}$, $^{87\text{m}}\text{Sr}$ isotopes as a result of $\text{natSr}(\gamma, \text{in})$ reactions, the target nuclide ^{82}Rb and the side nuclides ^{81}Rb , $^{82\text{m}}\text{Rb}$, ^{83}Rb , ^{84}Rb , ^{86}Rb as a result of $\text{natSr}(\gamma, \text{in1p})$ reactions were measured. The experimentally obtained yields of photonuclear reactions are compared with the yields calculated using theoretical cross-sections of photonuclear reactions from and the TALYS program.

The speaker is a student or young scientist

Yes

Section

1. Nuclear technology and methods in medicine, radioecology

Primary authors: Mr ALIEV, R; BELYSHEV, Sergey (Faculty of Physics, Lomonosov Moscow State University, Russia. Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Russia.); Mrs FURSOVA, N (Lomonosov Moscow State University, Department of Physics); Dr KHANKIN, Vadim (Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University); KUZNETSOV, Alexander (Lomonosov Moscow State university, Faculty of Physics; Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University); RASULOVA, Fazilat (Institute of Nuclear Physics of AS RUz)

Presenter: RASULOVA, Fazilat (Institute of Nuclear Physics of AS RUz)

Session Classification: Nuclear technology and methods in medicine, radioecology.