

Symposium on Nuclear Data 2020

Ag102 12.9 m	Ag103 65.7 m	Ag104 69.2m	Ag105 41.29 d	S ymposium on	Ag107 51.839 %	Ag108 2.37 m	Ag109 48.161 %	Ag110 24.6 s	Ag111 7.45 d	Ag112 2.120 h
Pd101 8.47 h	Pd102 1.02 %	Pd103 16.991 d	Pd104 11.14 %	Pd105 22.33 %	N uclear	Pd107 8.36 s	Pd108 26.46 %	Pd109 11.70(2) s	Pd110 11.72 %	Pd111 20.1 m
Rh100 20.8 h	Rh101 3.3 y	Rh102 2.7 y	Rh103 100 %	Rh104 42.3 s	Rh105 37.98 h	D ata	2020 Nov.	Rh108 3.0 m	Rh109 39 s	Rh110 3.3 s

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Type: **Poster Presentation**

Production cross sections of ^{175}Hf in the $\text{natLu}(p,xn)$ and $\text{natLu}(d,xn)$ reactions/ $\text{natLu}(p,xn)$ および $\text{natLu}(d,xn)$ 反応による ^{175}Hf の生成断面積の測定

Thursday, 26 November 2020 17:14 (1h 36m)

A long-lived isotope of Hf, ^{175}Hf ($T_{1/2} = 70$ d), is useful for basic studies for rutherfordium (Rf, $Z = 104$). This isotope is producible in no-carrier-added form in the proton- and deuteron-induced reactions on natLu . However, excitation functions of these nuclear reactions have been scarcely studied. In this work, we measured the excitation functions of the $\text{natLu}(p,xn)^{175}\text{Hf}$ and $\text{natLu}(d,xn)^{175}\text{Hf}$ reactions up to 18-MeV proton and 24-MeV deuteron energies using a stack-foil technique and a γ -ray spectrometry. We performed these experiments at RIKEN and Institute for Nuclear Research (ATOMKI). The target stacks of Ta/Lu/Ti and Lu/Ti foils were irradiated for 2 h with proton or deuteron beams of approximately 180-240 nA. After the irradiation, each foil was subjected to γ -ray spectrometry with Ge detectors. We noticed that the half-life of ^{173}Hf is slightly longer than that adopted in the current nuclear database. Therefore, we measured a precision half-life of ^{173}Hf in a separate experiment. In this work, we could measure the excitation functions of the $\text{natLu}(p,xn)^{173,175}\text{Hf}$ and $\text{natLu}(d,x)^{173,175}\text{Hf}$, $^{173,174}\text{m}$, ^{174}g , ^{176}m , ^{177}m , ^{177}gLu reactions. Thick-target yields of ^{175}Hf were also deduced from the measured excitation functions. The yields are 0.47 MBq/ $\mu\text{A}\cdot\text{h}$ at 17.2-MeV proton and 2.0 MBq/ $\mu\text{A}\cdot\text{h}$ at 24.0 MeV deuteron. We determined the half-life of ^{173}Hf to be 24.176 ± 0.012 h which is 0.58 ± 0.10 h longer than that in the database.

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