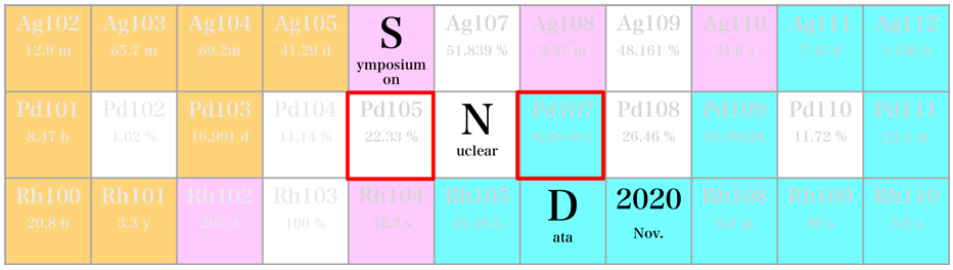


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# Production cross sections of 175Hf in the natLu(p,xn) and natLu(d,xn) reactions/natLu(p,xn) および natLu(d,xn) 反応による 175Hf の生成断面積の測定

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

A long-lived isotope of Hf, 175Hf (T1/2 = 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 natLu(p,xn)175Hf and natLu(d,xn)175Hf 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 173Hf is slightly longer than that adopted in the current nuclear database. Therefore, we measured a precision half-life of 173Hf in a separate experiment. In this work, we could measure the excitation functions of the natLu(p,xn)173,175Hf and natLu(d,x)173,175Hf, 173,174m,174g,176m,177m,177gLu reactions. Thick-target yields of 175Hf were also deduced from the measured excitation functions. The yields are 0.47 MBq/μA·h at 17.2-MeV proton and 2.0 MBq/μA·h at 24.0 MeV deuteron. We determined the half-life of 173Hf to be 24.176 ± 0.012 h which is 0.58 ± 0.10 h longer than that in the database.

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