

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 3.130 h
Pd101 8.47 h	Pd102 1.02 %	Pd103 16.991 d	Pd104 11.14 %	Pd105 22.33 %	N uclear	Pd107 4.36 s	Pd108 26.46 %	Pd109 11.700 h	Pd110 11.72 %	Pd111 33.4 m
Rh100 20.8 h	Rh101 3.3 y	Rh102 1.71 h	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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Production and Applications of Radioisotopes at RIKEN RI Beam Factory - Search for New Elements through Diagnosis and Therapy of Cancer -

At RIKEN RI Beam Factory (RIBF), we have been developing production technologies of radioisotopes (RIs) and conducting RI application studies in the fields of physics, chemistry, biology, engineering, medicine, pharmaceutical and environmental sciences [1]. With light- to heavy-ion beams from the AVF cyclotron, we produce more than 100 RIs from ${}^7\text{Be}$ (atomic number $Z = 4$) to ${}^{262}\text{Db}$ ($Z = 105$). Recently, we often produce ${}^{211}\text{At}$ in the ${}^{209}\text{Bi}(\alpha, 2n){}^{211}\text{At}$ reaction for nuclear medicine [2]. RIs of a large number of elements (multitracer) are simultaneously produced from metallic targets such as natAg , ${}^{197}\text{Au}$, and ${}^{232}\text{Th}$ irradiated with a ${}^{135}\text{MeV}$ $\text{nucl.}-1$ ${}^{14}\text{N}$ beam from RIKEN Ring Cyclotron [3]. The multitracer is useful to trace the behavior of many elements simultaneously under an identical experimental condition. We installed a gas-jet transport system to the Gas-filled Recoil Ion Separator (GARIS) as a novel technique for superheavy element chemistry [4]. Long-lived isotopes of ${}^{261}\text{Rf}$, ${}^{262}\text{Db}$, ${}^{265}\text{Sg}$, ${}^{266}\text{Bh}$ ($Z = 106$), and ${}^{266}\text{Bh}$ ($Z = 107$) useful for chemistry studies were produced in the heavy-ion induced reactions on a ${}^{248}\text{Cm}$ target and their decay properties were investigated in detail using a rotating wheel apparatus for α and spontaneous fission spectrometry [5–8]. Thanks to the pre-separation of Sg atoms with GARIS, chemical synthesis and gas-chromatographic analysis of the first organometallic compound of SHEs, $\text{Sg}(\text{CO})_6$ were conducted under a large international collaboration lead by the Univ. Mainz and GSI groups [9].

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[5] H. Haba et al., Phys. Rev. C 83 (2011) 034602.

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[7] H. Haba et al., Phys. Rev. C 89 (2014) 024618.

[8] H. Haba et al., Phys. Rev. C 102 (2020) 024625.

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