

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Jun-2017

Q(β^-)=11470 SY; S(n)=4060 SY; S(p)=13540 SY; Q(α)=-9780 SY [2017Wa10](#)

Estimated uncertainties ([2017Wa10](#)): 200 for Q(β^-) and S(n), 360 for S(p) and Q(α).

S(2n)=10070 200, S(2p)=29600 450, Q(β^-n)=4520 200 (syst,[2017Wa10](#)).

[2006Mo07](#): ¹²⁰Rh produced and identified in ⁹Be(¹³⁶Xe,X).

reaction at E¹³⁶Xe=121.8 MeV/nucleon. The A1900 fragment separator at NSCL facility at MSU was used to separate nuclei of interest. The secondary beam was implanted into β -decay arrangement consisting of Si(PIN) detectors and Si strip detectors (DSSD) and single-sided Si strip detectors (SSSD). Implantation and decay events were time stamped and correlated. Measured half-life from β spectrum.

[2004Wa26](#) (same lab as [2006Mo07](#)): ⁹Be(¹³⁶Xe,X), E¹³⁶Xe=120 MeV/nucleon; A1900 fragment separator at NSCL facility. Measured E γ , β , T_{1/2}, (fragment)(β) correlations.

Others (tentative evidence for the formation of ¹²⁰Rh):

[1998Do08](#): ²⁰⁸Pb(²³⁸U,X) E=750 MeV/nucleon. Fragment recoil separator (FRS) at GSI facility. Fragments separated by magnetic rigidity, mass and total kinetic energy distribution. Measured (fragment)(β and/or γ) coincidence. Tentative evidence for the formation of ¹²⁰Rh with a measured fractional yield of 0.007 3.

[1994Be24](#) (from the same lab as [1998Do08](#)): same reaction as in [1998Do08](#), measured $\sigma=5 \mu\text{b}$ with 13 counts assigned to ¹²⁰Rh.

[2007To23](#) (also [2006ToZW](#) thesis): in a short report authors report observation of isomers in several nuclei including ¹²⁰Rh from fragmentation of ¹³⁶Xe beam at 120 MeV/nucleon carried out at β counting setup of NSCL, MSU facility. A γ ray of 211 keV was shown in a spectrum from the isomer decay with neither its half-life nor its placement in a level scheme.

[2015Lo04](#): ¹²⁰Rh nuclide produced at RIBF-RIKEN facility in ⁹Be(²³⁸U,F) reaction at E=345 MeV/nucleon with an average intensity of 6×10^{10} ions/s. Identification of ¹²⁰Rh was made by determining atomic Z and mass-to-charge ratio A/Q, where Q=charge state of the ions. The selectivity of ions was based on magnetic rigidity, time-of-flight and energy loss. The separated nuclei were implanted at a rate of 50 ions/s in a stack of eight double-sided silicon-strip detector (WAS3ABi), surrounded by EURICA array of 84 HPGe detectors. Correlations were recorded between the implanted ions and β rays. The half-life of ¹²⁰Rh isotope was measured from the correlated ion- β decay curves and maximum likelihood analysis technique as described in [2014Xu07](#). Comparison of measured half-lives with FRDM+QRPA, KTUY+GT2 and DF3+CQRPA theoretical calculations.

[Additional information 1](#).

¹²⁰Rh Levels

Cross Reference (XREF) Flags

A ¹²⁰Rh IT decay (0.294 μs)

E(level)	T _{1/2}	XREF	Comments
0	132 ms 5	A	$\% \beta^- = 100$; $\% \beta^- n < 5.4$ (2006Mo07); $\% \beta^- 2n = ?$ Theoretical T _{1/2} =82.7 ms, $\% \beta^- n = 4.0$, $\% \beta^- 2n = 0.0$ (2003Mo09). Theoretical T _{1/2} =180 ms, $\% \beta^- n = 1.3$, $\% \beta^- 2n = 0.2$ (2016Ma12). T _{1/2} : from weighted average of 131 ms 5 (2015Lo04 , implanted ions- β correlated curves and maximum likelihood method), and 136 MS +14-13 (2006Mo07 , timing of β spectrum; earlier value from the same group was 120 ms 10 reported in 2004Wa26). E(level): assumed as the g.s. J^π : 1 ⁻ to 4 ⁻ based on $\Omega_p = 3/2^+$ and $\Omega_n = 5/2^-$ from theoretical considerations (1997Mo25).
98.1? 5		A	E(level): reverse ordering of the 59.1-98.1 γ cascade is also possible.
157.2 7	0.294 μs +16-15	A	$\% \text{IT} = 100$ Number of implanted fragments= 1.7×10^5 . T _{1/2} : from $\gamma(t)$ method (2012Ka36).

Adopted Levels, Gammas (continued) $\gamma(^{120}\text{Rh})$

<u>$E_i(\text{level})$</u>	<u>E_γ</u>	<u>I_γ</u>	<u>E_f</u>	<u>Mult.</u>	<u>Comments</u>
98.1?	98.1 [†]	5	100	0	
157.2	59.1 [†]	5	100	98.1?	(D,E2) Mult.: from IT decay, based on intensity balance argument.

[†] Reverse ordering of the 59.1-98.1 γ cascade is also possible.

Adopted Levels, GammasLevel Scheme

Intensities: Relative photon branching from each level

