

Adopted Levels, Gammas

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Balraj Singh	ENSDF	31-Jul-2015

$Q(\beta^-)=938\times 10^1$ 59; $S(n)=352\times 10^1$ 59; $S(p)=15350$ SY; $Q(\alpha)=-91800$ SY [2012Wa38](#)

Estimated uncertainties ([2012Wa38](#)): 660 for $S(p)$ and $Q(\alpha)$.

$S(2n)=9360$ 590, $S(2p)=29350$ 710 (syst), $Q(\beta^-n)=3150$ 590 ([2012Wa38](#)).

[1994Be24](#), [1997Be70](#), [1998Do08](#): ^{117}Ru produced and in $^9\text{Be,Pb}(^{238}\text{U},\text{F})$ reaction at 750 MeV/nucleon, and identified event-by-event by measurements of energy loss, Time-of-flight (ToF), trajectory and magnetic rigidity. A total of 30 events were assigned to ^{117}Ru in [1994Be24](#) with a cross-section of 11 μb for Pb target. A report from the same group: [1995CzZZ](#).

Additional information 1.

[2006Mo07](#): ^{117}Ru produced in $\text{E}^{136}\text{Xe}=121.8$ MeV/nucleon reaction. The A1900 fragment separator at NSCL-MSU facility 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 β decay events were time stamped and correlated, from which half-life of ^{117}Ru was measured.

[2015Lo04](#): ^{117}Ru nuclide produced at RIBF-RIKEN facility in $^9\text{Be}(^{238}\text{U},\text{F})$ reaction at $\text{E}=345$ MeV/nucleon with an average intensity of 6×10^{10} ions/s. Identification of ^{117}Ru 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 ^{117}Ru 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.

 ^{117}Ru LevelsCross Reference (XREF) Flags

A ^{117}Ru IT decay (2.487 μs)

E(level)	$T_{1/2}$	XREF	Comments
0.0	151 ms 3	A	$\% \beta^- = 100$; $\% \beta^- n = ?$ J^π : $1/2^+$ with configuration= $\nu 1/2[400]$ proposed in 2012LaZT . $3/2^+$ from systematic trends (2012Au07); $1/2^+$ also in theoretical calculations (1997Mo25). Theoretical $T_{1/2}=163.5$ ms, $\% \beta^- n=0.42$ (2003Mo09). E(level): measured half-life is assumed to correspond to the ground state of ^{117}Ru . $T_{1/2}$: measured by 2015Lo04 from (implanted ions) β correlated curves in time and position using maximum likelihood method. Other: 142 ms +18-17 (2006Mo07 , from ion- β correlated curves). See 2015Lo04 for comparison of their experimental value with theoretical values.
57.7 4		A	
102.7? 4		A	E(level): reverse ordering of the 82.5-102.9 γ cascade is also possible, which will give a level at 82.5 keV instead of that at 102.7 keV.
185.0 4	2.487 μs +58-55	A	$\% \text{IT}=100$ J^π : $1/2^-$ with configuration= $\nu 1/2[541]$ proposed in 2012LaZT . $T_{1/2}$: from $\gamma(t)$ method (2012Ka36). Other: 2.0 μs 3 (2012LaZT). Isomer was also reported in 2007To23 but without any half-life information.

Adopted Levels, Gammas (continued)

$\gamma(^{117}\text{Ru})$						
$E_i(\text{level})$	E_γ	I_γ	E_f	Mult.	$\alpha^\#$	Comments
57.7	57.8 5	100	0.0	(E1)	0.67	Mult.: assignment by the evaluator from intensity balance arguments.
102.7?	102.9 ‡ 5	100	0.0	(D) †	0.21 8	α : overlaps E1 and M1.
185.0	82.5 ‡ 5	28 1	102.7?	(E1) †	0.242 5	
	127.4 5	5.1 5	57.7	[D,E2]	0.31 24	Mult.: assumed by the evaluator. α : overlaps E1, M1 and E2.
	184.6 5	100 2	0.0	(D,E2) †	0.084 60	Mult.: from 2012Ka36 based on Weisskopf estimates. Other: E1 assigned by 2012LaZT based on systematics of hindrance factors, which seem to rule out M2. α : overlaps E1, M1 and E2.

† From 2012Ka36, based on consideration of Weisskopf estimates and intensity balances. See also 2012LaZT for possible E1 assignment for 184-keV transition; 2006ToZW propose E2.

‡ Reverse ordering of the 90.8-136.3 γ cascade is also possible.

$^\#$ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

Adopted Levels, GammasLevel Scheme

Intensities: Relative photon branching from each level

