Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 110, 1 (2009)	20-Nov-2008

S(n)=13540 (syst) *424*; S(p)=−1241.0 *18*; Q(α)=3441 (syst) *300* 2017Wa10
Q(ε)=11434 (syst) *425*; S(2p)=804 *18*; Q(εp)=9093 (syst) *358* 2017Wa10
Additional information 1.
1982Ho04: ^{96}Ru(^{58}Ni,X) E=240-302 MeV. ^{151}Lu is produced by p2n channel or from ^{151}Hf ε decay. ^{151}Hf would be produced by 3n channel. Isotopic identification was done on the basis of the Q(proton) systematics, excitation functions, and kinematic properties of recoil products. On the basis of the absence of coincidences with annihilation radiation and K x-rays, the authors conclude that the protons are not from β-delayed proton decay mode but from direct proton decay.
1993Se04: ^{96}Ru(^{58}Ni,X) E=300, 311 MeV. ^{151}Lu separated by recoil- mass separator. Measured proton spectra and $T_{1/2}$. ^{151}Lu is either directly produced by p2n channel or from ^{151}Hf (produced in 3n channel) ε decay.
1999Bi14: ^{96}Ru(^{58}Ni,X) E=266 MeV. ^{151}Lu separated by recoil- mass separator. Measured proton spectra, $T_{1/2}$, (proton)(implant) correlations 1999Bi14: observation of proton radioactivity from both g.s. and isomer.
Review of experimental data: 2002Ry05, 2002So02, 1995Ho26.
Theoretical calculations ($T_{1/2}$, %p, deformation parameters, spin-parity assignments, etc.): 2008Ba32, 2007Ka60, 2007Me28, 2006De07, 2002Ma62, 2001Se04, 2000Fe02.
Additional information 2.

^{151}Lu Levels

A high-spin isomer e.g. $(27/2^-)$, $\pi h^3_{11/2}$ isomer in ^{147}Ho is expected in ^{151}Lu also. From recoil-decay tagging method, 1998Yu05 establish an upper limit of 7 ms for such an isomer from observation of delayed γ-ray spectrum preceding proton emission from ^{151}Lu. It is possible that the 2454.6-keV level proposed in 2007LiZR may correspond to such an isomer.

Cross Reference (XREF) Flags

A ^{96}Ru(^{58}Ni,p2nγ)

E(level)	J^{π}‡	$T_{1/2}$	XREF	Comments
0†@	$11/2^-$#	80.6 ms *20*	A	%p=63.4 *9*; %ε+%β$^+$=36.6 *9* %p,%ε+%β$^+$: from measured half-life and using calculated $T_{1/2}$(ε+β$^+$)=220 ms (1997Mo25). Configuration=$\pi h_{11/2}$. $T_{1/2}$: weighted average of 80 ms *2* (1999Bi14), 90 ms *10* (1993Se04) and 85 ms *10* (1982Ho04). E(p)=1233 *3* (1995Ho26,1982Ho04). σ(maximum)=70 μb at 50 MeV of excitation energy (1982Ho04).
78† *10*	$3/2^+$#	16 μs *1*		%p=100 (1999Bi14) Configuration is mainly $\pi d_{3/2}$ but calculated width (2002Ry05, 2001Se04) is about a factor of two larger than the experimental value which suggests admixtures with $\pi s_{1/2}$ and $\pi d_{3/2}$ coupled to 2^+ state of ^{150}Yb, expected at ≈600 keV. $T_{1/2}$: from timing of proton decay (1999Bi14). E(level): from energy difference in Q(p) values (1999Bi14). E(p)=1310 *10* (1999Bi14).
612.3@ *7*	$(15/2^-)$		A	
1474.9@ *10*	$(19/2^-)$		A	
2426.9@ *13*	$(23/2^-)$		A	
2454.6 *16*	$(25/2,27/2^-)$		A	E(level),J^{π}: possibly an isomer with $\pi h^3_{11/2}$ configuration based on systematics of neighboring nuclides (2007LiZR).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{151}Lu Levels (continued)

E(level)	J$^{\pi}$‡	XREF
2856.6@ *14*	(27/2$^-$)	A
3070.0 *14*	(27/2$^-$)	A
3392.9 *15*	(31/2$^-$)	A
3696.1@ *15*	(31/2$^-$)	A
3998.4@ *16*	(35/2$^-$)	A

† The 612.3-862.6 cascade is built either on 11/2$^-$ ($\pi h_{11/2}$) g.s. or on 3/2$^+$ (mainly $\pi d_{3/2}$) isomer at 77 keV. The former possibility is preferred by 1998Yu05 based on systematics of N=80 isotones.
‡ From systematics of N=80 isotones unless otherwise stated.
# From calculations of 2006De07 and 2000Fe02.
@ Band(A): γ cascade based on $h_{11/2}$ g.s.

$\gamma(^{151}Lu)$

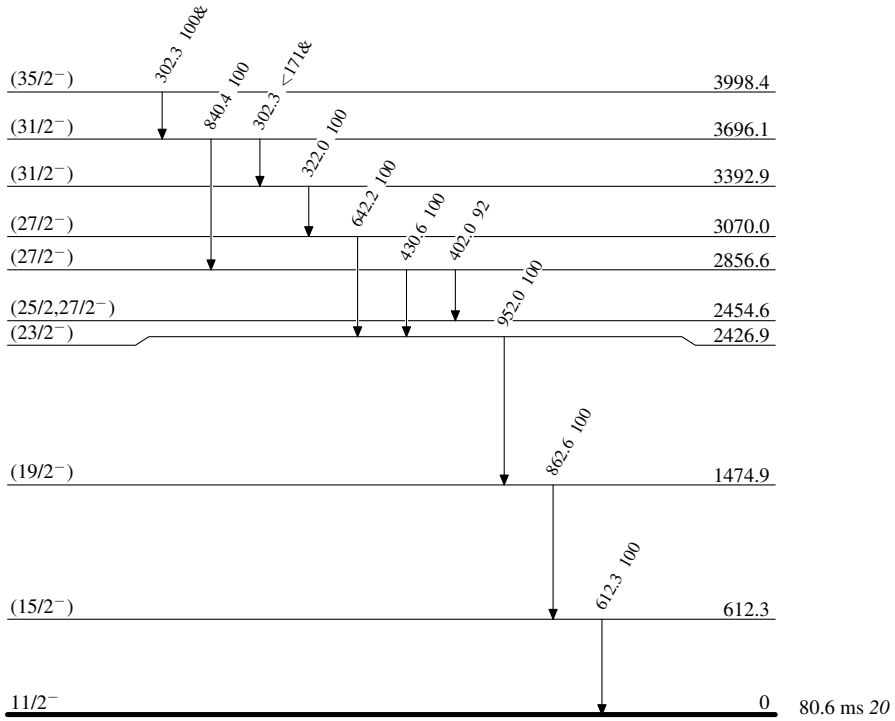
E$_i$(level)	J$_i^{\pi}$	E$_{\gamma}$	I$_{\gamma}$	E$_f$	J$_f^{\pi}$
612.3	(15/2$^-$)	612.3 *7*	100	0	11/2$^-$
1474.9	(19/2$^-$)	862.6 *7*	100	612.3	(15/2$^-$)
2426.9	(23/2$^-$)	952.0 *7*	100	1474.9	(19/2$^-$)
2856.6	(27/2$^-$)	402.0 *7*	92 *15*	2454.6	(25/2,27/2$^-$)
		430.6 *7*	100 *15*	2426.9	(23/2$^-$)
3070.0	(27/2$^-$)	642.2 *7*	100	2426.9	(23/2$^-$)
3392.9	(31/2$^-$)	322.0 *7*	100	3070.0	(27/2$^-$)
3696.1	(31/2$^-$)	302.3† *7*	<171†	3392.9	(31/2$^-$)
		840.4 *7*	100 *19*	2856.6	(27/2$^-$)
3998.4	(35/2$^-$)	302.3† *7*	100†	3696.1	(31/2$^-$)

† Multiply placed with undivided intensity.

Adopted Levels, Gammas

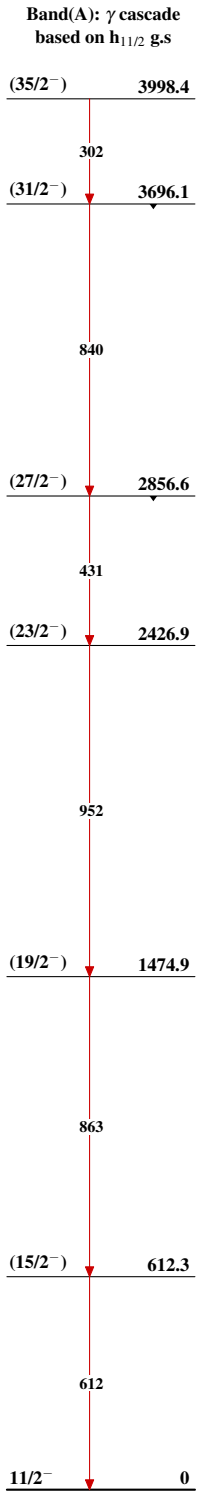
Level Scheme

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{151}_{71}Lu_{80}$

Adopted Levels, Gammas



$^{151}_{71}Lu_{80}$