^{161}Lu IT decay (7.3 ms) 1973An10

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 112,2497 (2011)	1-Jun-2011

Parent: ^{161}Lu: E=166.5+x; J^π=(9/2$^-$); $T_{1/2}$=7.3 ms *4*; %IT decay=100.0 *SY*

^{161}Lu-%IT decay: evaluator assumes that the ε decay of the isomer is negligible.

Additional information 1.

^{161}Lu isomer produced in the ^{148}Sm(^{19}F,6n) reaction, E(^{19}F)=110-150 MeV, on an enriched metallic target and in the Eu(^{16}O,xn) reaction. γ's measured in a multiscaled manner between beam pulses (2-ms wide, 2% duty cycle), using a Ge(Li) detector of volume 8 cm^3. The mass assignment was deduced from excitation functions and the elemental assignment was made through observation of the decay of Lu K x-rays with the appropriate half-life. Measured $T_{1/2}$. Noted only one γ between 10 and 550 keV with the 7.3 ms half-life.

The problems In interpretation of the IT decay, noted In the previous evaluation (2000Re14), appear to have been resolved by recent heavy-ion studies (2006Br12). For a discussion of these problems, see (2000Re14).

^{161}Lu Levels

E(level)	J^π[†]	$T_{1/2}$	Comments
0	1/2$^+$		Level not reported in the IT decay, but expected from the decay of the first excited state. J^π: bandhead of 1/2[411].
0+x	(3/2$^+$)		E(level): x ≈ 15 keV based on systematics. See comment In the Adopted Levels.
135.8+x *2*	(5/2$^+$)		
166.5+x	(9/2$^-$)	7.3 ms *4*	E(level): from 'Adopted Levels' based on data from ^{139}La(^{28}Si,6nγ). J^π: bandhead of 9/2[514], the most likely candidate for the isomeric level.

[†] From the Adopted Levels.

γ(^{161}Lu)

Iγ normalization: value assumes a transition intensity of 100% for 135.8γ.

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[‡]	Comments
(30.7)		166.5+x	(9/2$^-$)	135.8+x	(5/2$^+$)	[M2]		1767	α(L)=1333 *19*; α(M)=341 *5*; α(N+..)=93.3 *13* α(N)=81.4 *12*; α(O)=11.34 *16*; α(P)=0.533 *8* E_γ: the evaluator assumes that the isomer decays to 135.8+x, (5/2$^+$) through an M2 transition. This energy is consistent with a low-energy transition, below the K-shell binding energy of 63 keV as postulated by 1973An10. Transitions to 0+x or g.s. would be higher than the K-shell binding energy.
135.8 *2*	100	135.8+x	(5/2$^+$)	0+x	(3/2$^+$)	M1(+E2)	0.6 *6*	1.41 *16*	α(K)=1.1 *3*; α(L)=0.26 *9*; α(M)=0.062 *22*; α(N+..)=0.017 *6* α(N)=0.014 *5*; α(O)=0.0020 *6*; α(P)=7.7×10^{-5} *23* Placement from 'Adopted Gammas', which is based on the work of 2006Br12 in ^{139}La(^{28}Si,6nγ). Mult.: 1973An10 report multipolarity

Continued on next page (footnotes at end of table)

^{161}Lu IT decay (7.3 ms) 1973An10 (continued)

$\gamma(^{161}Lu)$ (continued)

E_γ	E_i(level)	Comments
		from α(K)exp=1.1 *3*, after rejecting the possibility of an E3 transition with a half-life of 7 ms. δ: evaluator's analysis of α(K)exp=1.1 *3* (1973An10); 1973An10 give ≈10% E2 (δ≈0.3).

† For absolute intensity per 100 decays, multiply by syst 0.41.

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