

<sup>233</sup>Ac β<sup>-</sup> decay (143 s) 1986Gi08

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	B. Singh, J. K. Tuli, E. Browne		NDS 170, 499 (2020)	8-Oct-2020

Parent: <sup>233</sup>Ac: E=0.0; J<sup>π</sup>=(1/2<sup>+</sup>); T<sub>1/2</sub>=143 s 10; Q(β<sup>-</sup>)=2576 13; %β<sup>-</sup> decay=100.0

<sup>233</sup>Ac-E,J<sup>π</sup>,T<sub>1/2</sub>: From <sup>233</sup>Ac Adopted Levels.

<sup>233</sup>Ac-Q(β<sup>-</sup>): from 2017Wa10.

1986Gi08: <sup>233</sup>Ac produced by bombardment of 11.4 MeV/nucleon <sup>238</sup>U ions from the UNILAC accelerator at GSI on W.

Measured E<sub>γ</sub>, I<sub>γ</sub>, I<sub>β</sub> using Ge(Li) and scintillation detectors.

The decay scheme given is proposed by 1986Gi08.

No β branch to the 3/2<sup>-</sup>, 1/2[501] state at 586 keV in <sup>233</sup>Th was observed and an upper limit of 0.5% was set by 1986Gi08.

<sup>233</sup>Th Levels

E(level)	J <sup>π</sup> †
0.0	1/2 <sup>+</sup>
16.86 2	3/2 <sup>+</sup>
539.61 2	(1/2) <sup>-</sup>

† From the Adopted Levels.

β<sup>-</sup> radiations

E(decay)	E(level)	Iβ <sup>-</sup> ‡	Log ft	Comments
(2036 13)	539.61	<95	>6.1	av Eβ≈905
(2559# 13)	16.86	†		
(2576# 13)	0.0	5† 5	≥7.5	av Eβ≈1130

† Feeding of 5% 5 is considered as combined for the g.s. and the 16.9 level.

‡ Absolute intensity per 100 decays.

# Existence of this branch is questionable.

γ(<sup>233</sup>Th)

I<sub>γ</sub> normalization: Possible β transition to the <sup>233</sup>Th ground state and possibly the 16.9 level was determined to be 0±10% by 4π β counting and by comparing β singles events with γ-β coincidence events. Absolute normalization factor of 0.94 5 is obtained by the evaluator by requiring I(γ+ce)(522.8γ)+I(γ+ce)(539.6γ)=95% 5. But the decay scheme is considered incomplete by the evaluators.

E <sub>γ</sub> †	I <sub>γ</sub> †‡	E <sub>i</sub> (level)	J <sub>i</sub> <sup>π</sup>	E <sub>f</sub>	J <sub>f</sub> <sup>π</sup>	Mult.†	α#	Comments
(16.86 2)		16.86	3/2 <sup>+</sup>	0.0	1/2 <sup>+</sup>			E <sub>γ</sub> : from level scheme; not observed in <sup>233</sup> Ac β <sup>-</sup> decay.
522.757 6	61 7	539.61	(1/2) <sup>-</sup>	16.86	3/2 <sup>+</sup>	E1	0.0116	α(K)=0.00938 14; α(L)=0.001644 23; α(M)=0.000391 6; α(N)=0.000103 6; α(O)=2.43×10 <sup>-5</sup> 4 E <sub>γ</sub> =522.8, I <sub>γ</sub> =60 in 1986Gi08.
539.599 9	39 4	539.61	(1/2) <sup>-</sup>	0.0	1/2 <sup>+</sup>	E1	0.0109	α(K)=0.00882 13; α(L)=0.001539 22; α(M)=0.000366 6; α(N)=9.70×10 <sup>-5</sup> 14; α(O)=2.27×10 <sup>-5</sup> 4 E <sub>γ</sub> =539.6, I <sub>γ</sub> =40 in 1986Gi08.

Continued on next page (footnotes at end of table)

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${}^{233}\text{Ac}$   $\beta^-$  decay (143 s) [1986Gi08](#) (continued)

$\gamma({}^{233}\text{Th})$  (continued)

† From the Adopted Gammas.

‡ For absolute intensity per 100 decays, multiply by  $\approx 0.94$ .

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

