Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 181, 475 (2022)	1-Jan-2022

Q(β^-)=−7530 *60*; S(n)=8062 *14*; S(p)=2468 *14*; Q(α)=7837 *7* 2021Wa16
Assignment: ^{206}Pb(^{16}O,9n) excit (1968Va18), ^{177}Hf(^{40}Ar,4n) excit (1980Ve01).
2002Mi20: ^{154}Sm(^{64}Ni,5n), E=4-5 MeV/nucleon, measured evaporation residue cross section σ.
2002Sa22, 2003Ik01: ^{138}Ba(^{82}Se,7n), E(cm)=193-251 MeV and ^{134}Ba(^{82}Se,3n); measured evaporation residue cross section σ.
2007Ma57 and 2008La14: 2007Ma57 reported long-lived isomer (half-life ≥1 × 10^8 year) for ^{213}Th from mass measurement and abundances relative to ^{232}Th in a study of naturally-occurring thorium using inductively coupled plasma-sector field mass spectrometry. Not confirmed by accelerator mass spectrometry (AMS) measurements (2008La14). An upperlimit of 1.2 × 10^{12} was determined for the detection of ^{213}Th/^{232}Th.

^{213}Th Levels

Cross Reference (XREF) Flags

- A ^{217}U α decay
- B ^{164}Dy(^{54}Cr,5nγ)
- C ^{176}Hf(^{40}Ar,3nγ)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	5/2$^-$	146 ms *+22−19*	ABC	%α≈100 J$^\pi$: favored α decay to 5/2$^-$ g.s. of ^{209}Ra. Configuration: ν ($f^{-1}_{5/2}$). Only α decay is reported. Branching for a possible (ε+β^+) decay to ^{213}Ac is estimated by the evaluator as ≈1.4% from T$_{1/2}$(ε+β^+)≈10 second, calculated by 1973Ta30 using β gross theory. Eα=7700 keV *30* (1997Mi03). T$_{1/2}$: Weighted average of 150 ms *25* (1968Va18 − 7690α(t)) and 130 ms *+50−30* (1980Ve01 − 7689α(t)).
799 *1*	(9/2$^-$)		BC	J$^\pi$: 381γ M2 from (13/2)$^+$.
1180 *1*	(13/2$^+$)	8.3 μs *8*	BC	J$^\pi$: Proposed by 2007Kh22 in analogy of 13/2$^+$ isomeric states in ^{205}Po, ^{207}Po, ^{209}Rn, and ^{211}Ra. Configuration: ν ($i^{-1}_{13/2}$). T$_{1/2}$: From (^{40}Ar,3nγ) − 2021Zh24. Other value 1.3 μs *3* ((^{54}Cr,5nγ) − reported as 1.4 μs *4* in 2007Kh22) is discrepant. The 2021Zh24 value is chosen based on the transition strenghs B(M2)(W.u.) of the 13/2$^+$ isomers for N=123 isotones: 0.0056 *+6−5* (^{213}Th), 0.0046 *3* (^{211}Ra) (2013Si17), 0.0043 *5* (^{209}Rn) (2015Ch30), and 0.0026 *2* (^{207}Po) (2011Ko04).

γ(^{213}Th)

E$_i$(level)	J$_i^\pi$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$_f^\pi$	Mult.	α[‡]	Comments
799	(9/2$^-$)	799 *1*	100	0	5/2$^-$			
1180	(13/2$^+$)	381 *1*	100	799	(9/2$^-$)	(M2)	1.331 *22*	α(K)=0.981 *16*; α(L)=0.261 *5*; α(M)=0.0660 *11* α(N)=0.0178 *3*; α(O)=0.00420 *7*; α(P)=0.000805 *14*; α(Q)=7.14×10^{-5} *12* B(M2)(W.u.)=0.0056 *+6−5* Mult.: from α(exp)=0.77 *29*, deduced from intensity balance at 799 level (^{54}Cr,5nγ) (2007Kh22).

[†] From (^{54}Cr,5nγ).
[‡] Additional information 1.

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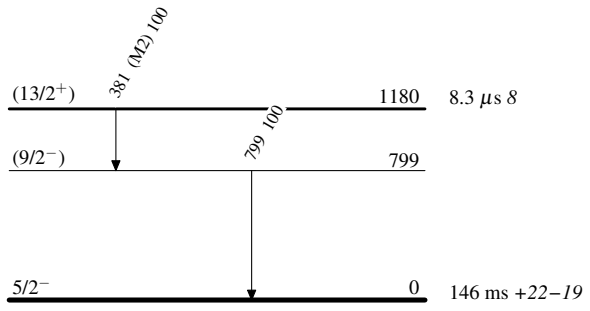
Level Scheme

Intensities: Relative photon branching from each level



$^{213}_{90}Th_{123}$