

$^{228}\text{U}$   $\alpha$  decay (9.1 min) 1961Ru06

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Sukhjeet Singh	ENSDF	08-Mar-2022

Parent:  $^{228}\text{U}$ :  $E=0$ ;  $J^\pi=0^+$ ;  $T_{1/2}=9.1$  min 2;  $Q(\alpha)=6800$  9;  $\% \alpha$  decay=97.5 25

$^{228}\text{U}$ - $T_{1/2}$ : From  $^{228}\text{U}$  Adopted Levels in ENSDF database (Dec 2012 update, value taken from 1961Ru06, no new reference after this evaluation).

$^{228}\text{U}$ - $Q(\alpha)$ : From 2021Wa16.

$^{228}\text{U}$ - $\% \alpha$  decay:  $\% \alpha=97.5$  25 (from  $\% \epsilon < 5\%$  measured by 1961Ru06). Other:  $\% \alpha > 80$  (1951Me10).

1961Ru06:  $^{228}\text{U}$  produced from bombardment of  $^{232}\text{Th}$  target with He ion beam of 300 MeV from Berkeley synchrocyclotron facility, followed by chemical separation. Measured  $E\alpha$ ,  $E\gamma$ ,  $\alpha\gamma$ -coin,  $\gamma\gamma$ -coin. Other: 1951Me10, also from Lawrence Berkeley laboratory.

 $^{224}\text{Th}$  Levels

E(level)	$J^\pi$ †
0	$0^+$
98 4	$2^+$
246 3	$(1^-)$
280 6	$4^+$

† From Adopted Levels.

 $\alpha$  radiations

$E\alpha$	E(level)	$I\alpha$ @	HF#
6409†&	280	0.56† 20	8 3
6442†&	246	0.66† 11	9.9 18
6590‡ 10	98	29‡ 4	0.96 15
6680‡ 10	0	70‡ 4	1.0

† Energy based on level energy determined from  $\gamma$ -ray data, and intensity from  $\gamma$ -transition intensities.

‡ From 1961Ru06.

# HF(6680 $\alpha$ )=1.0 yields  $r_0(^{224}\text{Th})=1.5253$  fm 48. In 2020Si16, evaluation  $r_0=1.5237$  51.

@ For absolute intensity per 100 decays, multiply by 0.975 25.

& Existence of this branch is questionable.

 $\gamma(^{224}\text{Th})$ 

I $\gamma$  normalization: I $\gamma$  data of 1961Ru06 are given as photons per 100  $\alpha$  particles.

$E_\gamma$	$I_\gamma$ ‡	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.†	$\alpha$ #	$I_{(\gamma+ce)}$ ‡	Comments
(98)	2.1 3	98	$2^+$	0	$0^+$	E2	12.6	29 4	$E_\gamma$ : rounded value from Adopted Gammas. $E_\gamma=93$ (1961Ru06). $I_{(\gamma+ce)}$ : from I $\alpha$ imbalance at 93 level. I $\gamma$ : from I $(\gamma+ce)$ and $\alpha$ . $\alpha$ : $\alpha$ is for $E_\gamma=98.1$ keV, the adopted energy for this $\gamma$ .
152 3	0.20 5	246	$(1^-)$	98	$2^+$	[E1]	0.184		

Continued on next page (footnotes at end of table)

$^{228}\text{U}$   $\alpha$  decay (9.1 min)    **1961Ru06** (continued) $\gamma(^{224}\text{Th})$  (continued)

$E_\gamma$	$I_\gamma^\ddagger$	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. <sup>†</sup>	$\alpha^\#$
187 3	0.3 1	280	4 <sup>+</sup>	98	2 <sup>+</sup>	E2	0.88
246 3	0.40 10	246	(1 <sup>-</sup> )	0	0 <sup>+</sup>	[E1]	0.059

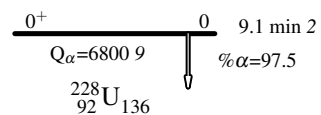
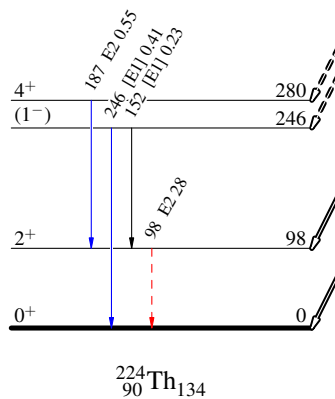
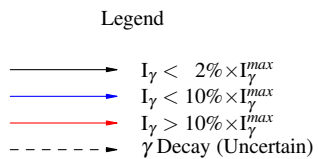
<sup>†</sup> From Adopted Gammas.

<sup>‡</sup> For absolute intensity per 100 decays, multiply by 0.975 25.

<sup>#</sup> 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.

$^{228}\text{U}$   $\alpha$  decay (9.1 min) 1961Ru06

## Decay Scheme

Intensities:  $I_{(\gamma+ce)}$  per 100 parent decays

$E_{\alpha}$	$I_{\alpha}$	HF
6409	0.55	8
6442	0.64	9.9
6590	28	0.96
6680	68	1.0