

Adopted Levels

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	31-Aug-2022

S(n)=8990 CA; S(p)=1160 CA; Q(α)=8210 CA [2019Mo01](#)

S(2n)=19690, S(2p)=1120 ([2019Mo01](#), theory).

[2022Ya15](#): ^{207}Th nuclide produced and identified in $^{176}\text{Hf}(^{36}\text{Ar},5n)^{207}\text{Th}$, $E(^{36}\text{Ar})=197\text{-}199$ MeV reaction at the sector focusing cyclotron of HIRFL, Lanzhou facility, followed by mass separation of fragments of interest using gas-filled recoil separator SHANS. Separated fragments were implanted in three position-sensitive silicon strip detectors (PSSDs) surrounded by eight non-position sensitive Si detectors. Measured evaporation residues (ERs), $E\alpha$, and one ER- α_1 - α_2 - α_3 - α_4 correlated α -decay chain $^{207}\text{Th} \rightarrow ^{203}\text{Ra} \rightarrow ^{199}\text{Rn} \rightarrow ^{195}\text{Po}$. Discussed odd-even staggering of Q(α) for nuclei with Z=84-92 and N=102-126.

Theoretical calculations: five primary references for decay characteristics, and one for atomic masses are in the NSR database (www.nndc.bnl.gov/nsr/) are listed in document records, which can be accessed via web retrievals of the ENSDF database (www.nndc.bnl.gov/ensdf/).

[Additional information 1.](#)

Event #1: Evaporation residue: ^{207}Th , energy=6448 keV ([2022Ya15](#)).

$E_{\alpha 1}=8167$ keV, $\Delta t_{\alpha 1}=14.03$ ms, assigned to ^{207}Th α decay.

$E_{\alpha 2}=7593$ keV, $\Delta t_{\alpha 2}=0.322$ ms, assigned to ^{203}Ra α decay.

$E_{\alpha 3}=5461+1570$ keV, $\Delta t_{\alpha 3}=0.316$ s, assigned to ^{199}Rn α decay.

$E_{\alpha 4}=6614$ keV, $\Delta t_{\alpha 4}=8.044$ s, assigned to ^{195}Po α decay to ^{191}Pb , which decays 99.9% by $\varepsilon+\beta^+$ decay.

 ^{207}Th Levels

E(level)	$T_{1/2}$	Comments
0	10 ms $+46-5$	<p>$\% \alpha \approx 100$</p> <p>Only the α-decay mode has been observed. From theoretical half-lives of 1.24 s for β decay and 15 ms for α decay (2019Mo01), $\% \varepsilon+\beta^+$ is estimated as $\leq 1.5\%$. Probability of misidentification of the decay chain (or that of random event) is estimated by 2022Ya15 as $< 1.0 \times 10^{-12}$.</p> <p>Production σ of ^{207}Th in $^{176}\text{Hf}(^{36}\text{Ar},5n)$, $E(^{36}\text{Ar})=197\text{-}199$ MeV is estimated as 4 pb $+9-3$ (2022Ya15).</p> <p>J^π: $\Omega_n=1/2^+$ in 2019Mo01 (theory).</p> <p>$T_{1/2}$: 9.7 ms $+466-44$ (measured by 2022Ya15 from one correlated event).</p> <p>Measured $E\alpha=8167$ keV $2I$ (2022Ya15) from the decay of ^{207}Th; assumed to be a g.s. to g.s. transition.</p>