

Adopted Levels

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 147, 382 (2018)	1-Dec-2017

$Q(\beta^-) = -5910$ SY; $S(n) = 8800$ 60; $S(p) = 519$ 20; $Q(\alpha) = 8489$ 4 [2017Wa10](#)
 Estimated uncertainty = 70 for $Q(\beta^-)$ ([2017Wa10](#)).
 $S(2n) = 16940$ 70, $S(2p) = 3540$ 20, $Q(\epsilon p) = 1635$ 19 ([2017Wa10](#)).

²¹⁷Pa evaluated by B. Singh.

Production and identification:

- [1968Va18](#): ²⁰³Tl(²⁰Ne,6n), ²⁰⁶Pb(²⁰Ne,p8n).
 - [1979Sc09](#): ¹⁸¹Ta(⁴⁰Ar,4n), excitation function, parent of ²¹³Ac.
 - [1997An02](#): ¹⁷⁰Er(⁵¹V,4n), ¹⁹⁷Au(²⁴Mg,4n), excitation function.
 - [1998Ik01](#): ¹⁹⁴Pt(²⁸Si,p4n), Recoil Mass Separator.
 - [2002He29](#): ¹⁸¹Ta(⁴⁰Ar,4n) parent of ²¹³Ac; delayed $\alpha\alpha$ coin.
- [Additional information 1.](#)

²¹⁷Pa Levels

E(level)	J ^{π}	T _{1/2}	Comments
0	(9/2 ⁻)	3.8 ms 2	<p>$\% \alpha = 100$</p> <p>Only the α decay was observed. Gross β decay theory calculations of 1973Ta30 and theoretical calculations of 1997Mo25 give $T_{1/2}(\epsilon) \approx 300$ sec and 97 sec, respectively which correspond to ϵ decay branch of $\approx 0.0012\%$ and 0.0036%, respectively.</p> <p>E(level): the observed 3.8-ms activity is assumed to correspond to the ground state of ²¹⁷Pa.</p> <p>J^{π}: favored α decay chain ²¹⁷Pa \rightarrow ²¹³Ac \rightarrow ²⁰⁹Fr; the g.s. J^{π} = 9/2⁻ for ²⁰⁹Fr.</p> <p>T_{1/2}: from α-decay curve (2002He29). Measured half-lives are: 4.9 ms +6-8 (1979Sc09), 3.4 ms 2 (1996An21), 2.3 ms +5-3 (1998Ik01), 3.4 ms 1 (2000He17), 3.8 ms 2 (2002He29). Note that 2002He29, 2000He17 and 1996An21 are from the same group at GSI using SHIP. Values from 1979Sc09 and 1998Ik01 seem discrepant.</p> <p>Additional information 2.</p>
1854 7	(23/2 ⁻)	1.08 ms 3	<p>$\% \alpha = 73$ 4 (2002He29); $\% IT = 27$ 4 (2002He29)</p> <p>J^{π}: 2002He29 and other experimental papers proposed 29/2⁺, but analysis in 2013As01 based on systematics of semi-closed shell nuclei suggested (23/2⁻) with a fully aligned configuration = $\pi h_{9/2}^2 \otimes \nu f_{7/2}^1$. 2014Ri07 also supported 23/2⁻ from theoretical calculations of $T_{1/2} = 1.1$ ms for 23/2⁻ and 60 ms for 29/2⁺ using different models.</p> <p>T_{1/2}: from α-decay curves for several α groups (2002He29). Measurements are: 1.6 ms +10-5 (1979Sc09); 1.5 ms +9-4 (1998Ik01); 1.5 ms 1 for 10155α, 1.3 ms +4-2 for 9912α, 1.4 ms 2 for 9763α (2000He17); 1.08 ms 3 (2002He29, weighted average of 1.08 ms 2 for 10157α, 0.95 ms 5 for 9697α, 0.94 ms 9 for 9552α, 1.11 ms 20 for 9533α, 1.03 ms 13 for 8306α). Note that 2002He29 and 2000He17 are from the same group at GSI using SHIP facility. Others: 0.9 ms 6 (1995AnZY) 1.5 ms 2 (1995NiZS), both from the same group.</p> <p>E(level): approximate energy deduced by the evaluator from energy difference of the 10157- and 8337-keV α particles which were emitted from the 1.2-ms and 3.6-ms states, respectively, by assuming these α particles decay to the g.s.</p> <p>$\% \alpha$: from 2002He29, deduced from ratio of 0.15 2 for number of ^{217g}Pa nuclei from the ^{217m}Pa isomer decay and the total number of ^{217g}Pa nuclei, and using the number of α decay events from each of the two activities; the ratio itself was extracted from the fitting of the measured decay curve for the implanted evaporation residues and the α decays as a function of time.</p>