Adopted Levels

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	10-Jun-2021

Q(β^-)=−3245 *23*; S(n)=6476 *22*; S(p)=845 *21*; Q(α)=9791 *12* 2021Wa16
Q(ε)=6283 *21*, S(2n)=15320 *30*, S(2p)=4078 *20*, Q(εp)=2658 *21* (2021Wa16).
Additional information 1.
1979Sc09: ^{218}Pa produced and identified in ^{181}Ta(^{40}Ar,xn) reaction, measured excitation function.
2000He17 (also 1996An21): ^{170}Er(^{50}Ti,X),E=150-211 MeV; measured $T_{1/2}$.
1999Bo52: measured yield in ^{197}Au(^{26}Mg,X),E<164 MeV.
2001Ni06: measured yield in Ce(^{82}Se,X).
2005Li17: measured yield in ^{9}Be(^{238}U,X).
2020Zh01: ^{218}Pa produced and identified in ^{182}W(^{40}Ar,p3n), E(^{40}Ar)=190 MeV using the Sector-Focusing cyclotron facility at HIRFL-Lanzhou. The evaporation residues (ERs) were separated from the incident beam particles using gas-filled recoil separator for heavy ions (SHANS). Measured Eα, (residues)$\alpha_1\alpha_2$ correlations, where α_1 is from parent nucleus and α_2 from daughter nucleus, and half-life. The residues and α particles were detected using multiwire proportional gas counter (MWPC) and position-sensitive silicon strip detectors (PSSDs). The α particles escaping the PSSD in the backward direction were collected by a system of eight silicon detectors. Energy resolution (FWHM) for α particles was 35 keV for Eα=6-9 MeV. The γ rays were detected in coincidence mode with α particles and recoils using a Ge Clover-detector and two HPGe detectors. According to Fig. 1b showing (recoil)α-coin spectrum, a large number of recoil-α correlated chains were observed, which were assigned to the decay of ^{218}Pa g.s. In addition, an isomeric state in ^{218}Pa was also discovered, consistent with systematics of α decays for odd-proton N=127 isotones, and with shell-model calculations.
Theory references: consult NSR database (www.nndc.bnl.gov/nsr/) for ten primary references for calculations of half-lives of radioactive decays, and two for nuclear structure.

^{218}Pa Levels

E(level)	J^{π}[†]	$T_{1/2}$	Comments
0	(8$^-$)	109 μs *5*	%α=100 Only the α decay has been observed, with Eα=9610 *14* and 9524 *16* (2020Zh01); 9616 *15* and 9544 *15* (2000He17); and 9614 *20* and 9535 *15* (1979Sc09). Theoretical partial $T_{1/2}$=57.4 s for ^{218}Pa $\varepsilon+\beta^+$ decay (2019Mo01) gives %ε+%β^+=2×10^{-4}. The α decay feeds the (5$^+$) g.s. and a (4$^+$) excited state at 92 keV in ^{214}Ac, as proposed in 1979Sc09. $T_{1/2}$: weighted average of 107 μs *5* (2020Zh01), 113 μs *10* (2000He17) and 0.12 ms *+4−2* (1979Sc09).
82 *21*	(1$^-$)	135 μs *+62−32*	%α=100 Only the α decay has been observed, with Eα=9691 *15* and tentative 9596 *21* (2020Zh01). The α decay feeds the (5$^+$) g.s. and a (4$^+$) excited state at 92 keV in ^{214}Ac, proposed by 2020Zh01. E(level): deduced by evaluator from differences Eα values of 9610 *14* from the g.s. to g.s. of ^{214}Ac and 9691 *15* from the isomer to g.s. of ^{214}Ac, as given in 2020Zh01, and each corrected for recoil. 2020Zh01 give E(level)=83 *6*. $T_{1/2}$: from 2020Zh01, deduced from nine (implants)-α1−α2 correlated decay chains).

[†] Assigned by 2020Zh01, based on the systematics of α decays of odd-proton, N=127 isotones of ^{212}At, ^{214}Fr and ^{216}Ac, with further support from shell-model calculations.