Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	H. Iimura, J. Katakura, S. Ohya	NDS 180, 1 (2022)	1-Oct-2021

$Q(\beta^-)$=8930 SY; S(n)=5900 SY; S(p)=17250 SY; $Q(\alpha)$=−12440 SY 2021Wa16
$\Delta Q(\beta^-)$=450, ΔS(n)=570, ΔS(p)=640, $\Delta Q(\alpha)$=640 (2021WA16).

2021Ha19: ^{126}Pd produced in ^{9}Be(^{238}U,F) reaction with ^{238}U beam of 345 MeV/nucleon from the cascade operation of the RIBF complex of accelerators at RIKEN. Identification of ^{126}Pd made on the basis of magnetic rigidity, time-of-flight and energy loss using the BigRIPS separator and ZeroDegree spectrometer. The separated nuclei were sent to the Advanced Implantation Detector Array (AIDA) for the detection of implanted ions and subsequent β^- and β^--delayed neutrons using six double-sided silicon-strip detector (DSSDs) for particles, and BRIKEN neutron counter array of 140 ^{3}He proportional counters embedded in a high-density polyethylene (HDPE) matrix. Measured and analyzed (implanted ions)-β and (implanted ions)-β-n correlated events to deduce half-life of decay and delayed-neutron emission probability (%β^-n or (P$_{1n}$). Comparison of measured half-lives and P$_n$ values with FRDM+QRPA, FRDM+QRPA+HF, RHB+pn:RQRPA and EDM calculations.

2008Oh06: ^{126}Pd nuclide identified in ^{9}Be(^{238}U,X) reaction with a ^{238}U^{86+} beam energy of 345 MeV/nucleon produced by the cascade operation of the RIBF accelerator complex of the linear accelerator RILAC and four cyclotrons RRC, fRC, IRC and SRC. Identification of ^{126}Pd nuclei was made on the basis of magnetic rigidity, time-of-flight and energy loss of the fragments using BigRIPS fragment separator. Experiments performed at RIKEN facility. Based on A/Q spectrum and Z versus A/Q plot, three counts were assigned to the ^{126}Pd isotope. (Q=charge state).

Additional information 1.

2015Lo04: ^{126}Pd nuclide produced at RIBF-RIKEN facility in ^{9}Be(^{238}U,F) reaction at E=345 MeV/nucleon with an average intensity of 6×10^{10} ions/s. Identification of ^{126}Pd was made by determining atomic Z and mass-to-charge ratio A/Q, where Q=charge state of the ions. The selectivity of ions was based on magnetic rigidity, time-of-flight and energy loss. The separated nuclei were implanted at a rate of 50 ions/s in a stack of eight double-sided silicon-strip detector (WAS3ABi), surrounded by EURICA array of 84 HPGe detectors. Correlations were recorded between the implanted ions and β rays. The half-life of ^{126}Pd isotope was measured from the correlated ion-β decay curves and maximum likelihood analysis technique as described in 2014Xu07. Comparison of measured half-lives with FRDM+QRPA, KTUY+GT2 and DF3+CQRPA theoretical calculations.

Structure calculations:
2014Wa21: calculated levels, J, π, B(E2).
2010No01: IBM model, calculated potential energy surface (PES)contours, low-spin positive-parity levels, B(E2) ratios.
1996Kl08: IBM-II model, calculated low-spin positive-parity levels up to 2.5 MeV, B(E2) from first 2$^+$ level.
1985Sc07: IBM model, calculated mixed symmetry, odd spin states, F-spin factor and matrix elements for 1$^+$ to 0$^+$ and 3$^+$ to 0$^+$ transitions.
The β-decay properties (theory):
2013Fa08: calculated Q value, T$_{1/2}$, %β^-n.

^{126}Pd Levels

Cross Reference (XREF) Flags

A	^{126}Pd IT decay (23.0 ms)
B	^{9}Be(^{133}Sn,Xγ)
C	^{9}Be(^{238}U,Fγ)
D	^{126}Rh β^- decay

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$	XREF	Comments
0	0$^+$	48.5 ms 7	ABCD	%β^-=100; %β^-n=4.9 9 (2012Ha19)
				%β^--n: other measurement: 22 9 (2014SmZZ).
				Measured σ=0.7 nb (2008Oh06).
				T$_{1/2}$: weighted average of 51 ms 3 (2021Ha19), 48.6 ms 8 (2015Lo04) and the values obtained by 2014Wa26 from decay curves of several γ rays in ^{126}Ag: 54 ms 3 for 254.3γ, 56 ms 4 for 263.2γ, 48 ms 2 for 287.0γ, 48 ms 3 for 365.0γ, 46 ms 5 for

Adopted Levels, Gammas (continued)

^{126}Pd Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$	XREF	Comments
				583.5γ, 46 ms *3* for 661.9γ, 48 ms *2* for 842.6γ, 46 ms *4* for 914.7γ, 52 ms *4* for
				1133.2γ, and 41 ms *3* for 1502.0γ. Other: 56 ms *+11−9* (2014SmZZ).
693.3 *5*	(2$^+$)		ABCD	
1481.0 *7*	(4$^+$)		A CD	
2023.5 *7*	(5$^-$)	0.33 μs *4*	A CD	%IT=100
				T$_{1/2}$: from ^{9}Be(^{238}U,Fγ).
2109.7 *9*	(7$^-$)	0.44 μs *3*	A C	%IT=100
				T$_{1/2}$: from ^{9}Be(^{238}U,Fγ).
2406.4 *10*	(10$^+$)	23.0 ms *10*	A	%IT=28 *8* (2014Wa26); %β^-=72 *8*
				T$_{1/2}$: weighted average of the values obtained by 2014Wa26 from decay curves of γ
				rays in ^{126}Pd (20 ms *3* for 296.7γ, 20 ms *3* for 542.4γ, 21 ms *2* for 693.3γ, 18
				ms *4* for 787.7γ, 23 ms *5* for 1330.2γ) and γ rays in ^{126}Ag (25 ms *2* for 193.7γ,
				27 ms *2* for 203.7γ, 27 ms *10* for 227.9γ, 17 ms *4* for 359.5γ, 26 ms *3* for
				598.1γ, and 23 ms *2* for 741.8γ).

[†] From least-squares fit to Eγ data, assuming 0.5 keV uncertainty for each γ ray.
[‡] As proposed by 2013Wa24, based on systematics of even-even and neighboring nuclides.

$\gamma(^{126}$Pd)

E$_i$(level)	J$^{\pi}_i$	E$_{\gamma}$	I$_{\gamma}$	E$_f$	J$^{\pi}_f$	Mult.	α[†]	Comments
693.3	(2$^+$)	693.3	100	0	0$^+$			
1481.0	(4$^+$)	787.7	100	693.3	(2$^+$)			
2023.5	(5$^-$)	542.4	100 *6*	1481.0	(4$^+$)	[E1]		B(E1)(W.u.)=2.9×10^{-9} *5*
		1330.2	77 *6*	693.3	(2$^+$)	[E3]		B(E3)(W.u.)=0.23 *4*
2109.7	(7$^-$)	86.2	100	2023.5	(5$^-$)	[E2]	2.37 *6*	B(E2)(W.u.)=2.14 *17*
2406.4	(10$^+$)	296.7	100	2109.7	(7$^-$)	[E3]	0.1197	

[†] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation
based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

$^{126}_{46}$Pd$_{80}$