Adopted Levels

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 174, 1 (2021)	15-Apr-2021

Q(β^-)=9.14×10^3 *79*; S(n)=3.88×10^3 *79*; S(p)=15840 *SY*; Q(α)=−10780 *SY* 2021Wa16
ΔS(p)=850, ΔQ(α)=850 (syst,2021Wa16).
S(2n)=10390 *790*, S(2p)=30390 *890* (syst), Q(β^-n)=2610 *790* (2021Wa16).

1994Be24, 1998Do08: ^{123}Pd produced and identified in Pb(^{238}U,F), E=750 MeV/nucleon reaction followed by mass separation with FRS separator, and identification by time-of-flight. A total of 12 events assigned by 1994Be24 to ^{123}Pd with σ=4 μb.

2006Mo07: ^{123}Pd produced in ^{9}Be(^{136}Xe,X),E=121.8 MeV/nucleon reaction using A1900 fragment separator at NSCL-MSU facility to separate nuclei of interest. The secondary beam was implanted into β-decay detection apparatus consisting of Si(PIN) detectors and Si strip detectors (DSSD) and single-sided Si strip detectors (SSSD). Implantation and decay events were time stamped and correlated. Authors claim that new nuclide was identified, but it was already reported in 1994Be24 and 1998Do08. First measurement of half-life of ^{123}Pd decay reported by 2006Mo07 from ion-β correlated spectrum from 293 implants of ^{123}Pd nuclei.

Additional information 1.

2014SmZZ: neutron-rich nuclei were produced by fission reactions of E≈900 MeV/nucleon ^{238}U beam from the UNILAC linear accelerator and the SIS-18 synchrotron accelerated in two states impinging a 2.5 g/cm^2 lead target at GSI. Fragments were separated by the FRagment Separator (FRS) and implanted into the Silicon IMplantation Beta Absorber (SIMBA) with β-delayed neutrons detected by the surrounding Beta-delayed neutron (BELEN) detector. Measured implant-β correlations, β-neutron correlations. Deduced $T_{1/2}$, β-delayed neutron emission probabilities. Comparisons with available data and theoretical calculations. Discussed relevance to astrophysical r-process.

2015Lo04: ^{123}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 ^{123}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 ^{123}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.

2016Kn03: neutron-rich exotic nuclei were produced by abrasion-fission reactions of E=410-415 MeV/nucleon ^{238}U beams from the synchrotron SIS-18 at GSI focused on a 1 g/cm^2 Be target. Fission fragments were separated using the FRagment Separator (FRS) and injected into the isochronous Experimental Storage Ring (ESR). Measured masses with the Isochronous Mass Spectrometry (IMS) method. Deduced mass excesses. Comparisons with theoretical models.

2021Ha19: ^{123}Pd ions were produced by in-flight fission of E=345 MeV primary beam of ^{238}U on a ^{9}Be target. Fission products were analyzed and identified by the BigRIPS seperator and the ZeroDegree spectrometer, and implanted into the Advanced Implantation detector Array (AIDA) consisting of six 128x128 strips, 1-mm thick DSSDs. Neutrons were detected with the BRIKEN neutron counter array consisting of 140 ^{3}He proportional counters. Measured β-delayed neutrons, βn(t). Deduced $T_{1/2}$, β-delayed neutron emission probabilities.

Structure calculations: 2019Mo01, 2018Ut01, 2017Ko24, 2016Ma12, 2015Sa14, 2013Fa08, 2003Bo06, 2003Mo09, 1997Bo24.

^{123}Pd Levels

E(level)	$T_{1/2}$	Comments
0	109 ms *2*	%β^-=100; %β^-n=1.4 *3* %β^-n: from β-delayed neutron counting (2021Ha19). Other: 10 *6* measured by 2014SmZZ. E(level): measured half-life is assumed to correspond to the ground state of ^{123}Pd. J$^\pi$: 3/2$^+$ from systematics (2021Ko07: NUBASE2020), 3/2$^-$ from theoretical considerations (2019Mo01). $T_{1/2}$: weighted average of 114 ms *2* (2021Ha19, β-delayed neutron counting), 108 ms *1* (2015Lo04, implanted ion-β correlation), 174 ms *+38−34* (2006Mo07, ion-β correlation), and 170 ms *+45−38*(stat)*18*(syst) (2014SmZZ, implant ion-β correlation). Measured mass-excess: −60430 *316*, with systematic uncertainty=315, statistical uncertainty=29 from 10 counts events (2016Kn03). Theoretical $T_{1/2}$=392.8 ms, %β^-n=1 (2019Mo01); $T_{1/2}$=172 ms, %β^-n=0.5 (2016Ma12).

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Adopted Levels (continued)

^{123}Pd Levels (continued)

E(level)	Comments
0+x?	$\%\beta^-=100$ E(level),J^π: a level with $J^\pi=(11/2^-)$ is shown in the decay scheme in Fig.4 of 2019Ch24, with no further explanation and discussion. This level is proposed by 2019Ch24 probably as the parent level to feed the high-spin levels in ^{123}Ag from ^{123}Pd β^- decay. No observation of this level has been made in any studies.