Adopted Levels

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	07-June-2023

Q(β^-)=6830 *30*; S(n)=3960 *30*; S(p)=12860 *syst*; Q(α)=−4370 *syst* 2017Wa10

Estimated uncertainties (2021Wa16): 300 for S(p) and Q(α).

Q(β^-n)=1311 *30*, S(2n)=9373 *30*, S(2p)=24370 *400* (syst) (2021Wa16).

2012Ku26: ^{159}Nd produced and identified in ^{9}Be(^{238}U,F), E=1 GeV/nucleon reaction using SIS-18 synchrotron facility at GSI. Target=1.6 g/cm^2 ^{9}Be placed at the entrance of projectile Fragment Separator (FRS). Particle identification was achieved by event-by-event in-flight analysis of time-of-flight, energy loss measurement, and magnetic rigidity (tof-$\Delta E'$-Bρ). Time-of-flight measured using two plastic scintillation detectors, energy loss or deposit by ionization chambers (MUSIC), and magnetic rigidity by four time-projection chambers (TPC), which also provided energy deposit information. Isomer tagging method for known μs isomers was used to verify event-by-event identification and in-flight separation of new isotopes. Gamma rays from the known isomers were recorded in coincidence with the incoming ions using either the RISING array of Ge detectors at GSI or only two Ge detectors, a stopper foil and a scintillator for veto signal. Measured production cross section. Comparison of measured σ with predictions from ABRABLA model and EPAX-3 model.

2017Wu04: ^{159}Pr produced at the RIBF-RIKEN facility in ^{9}Be(^{238}U,F),E(^{238}U)=345 MeV/nucleon, optimized for the transmission of ^{158}Nd and ^{170}Dy, followed by the identification of the nuclide of interest using the BigRIPS separator by determining A/Q ratio using the tof-Bρ-ΔE method using the ZeroDegree Spectrometer, and finally implanted into the beta-counting system WAS3ABi, surrounded by the EURICA array of 84 HPGe detectors. Measured (implanted ions)β^-(t), (implanted ions)$\beta^-\gamma$(t) and (implanted ions)γ(t) correlations, and $T_{1/2}$ of the g.s. of ^{159}Nd.

2018Or02: measured mass of the g.s. from cyclotron frequency ratios using the Canadian Penning Trap mass spectrometer at the CARIBU-ANL facility.

Theoretical nuclear structure calculations:

2022An05: calculated charge radii and odd-even staggering (OES) effects using the relativistic mean field (RMF-BCS) and the modified RMF(BCS) approaches.

2022Pa25: calculated binding energy, S(n), S(2n), rotational energies, potential energy curves, neutron, proton and matter radii, rms charge radii, β_2 quadrupole deformations, neutron and proton Fermi energies using point-coupling deformed relativistic Hartree-Bogoliubov theory in continuum (DRHBc) theory with the density functional PC-PK1.

2020Li53: calculated energy levels, J^π, ground-state band, moments of inertia, bandhead energy of isomeric state using modified Nilsson parameters to generate deformed bases for the projected shell model.

2018Ou01: calculated binding energy, S(n), S(2n), nuclear radii, quadrupole-deformation parameters, potential energy curves, Q-values, β^--decay $T_{1/2}$ using Hartree-Fock-Bogoliubov mean-field theory.

2015El05: calculated ground state energy, S(2n) using HFB method with SLy5 Skyrme and Gogny forces.

Additional information 1.

^{159}Nd Levels

E(level)	$T_{1/2}$	Comments
0	485 ms *+39−20*	%β^-=100; %β^-n=? %β^-: Only β^- decay mode is expected. Theoretical $T_{1/2}$=758 ms, %β^-n=0 (2019Mo01). Theoretical $T_{1/2}$=676.9 ms, %β^-n=0.38, 0.60 (2021Mi17, two values of %β^-n for different fission barriers). E(level): it is assumed that the observed events correspond to ground-state activity of ^{159}Nd. J^π: tentative (7/2$^+$), based on ν7/2[633] orbital from systematics of known quasiparticle states in neighboring nuclei, as proposed in the 2017 evaluation, and in 2021Ko07. 2019Mo01 suggest Ω_n=1/2$^-$ from theoretical considerations. $T_{1/2}$: from 2017Wu04, using a fit to the (implanted ions)β^-(t) spectrum using the least-squares and maximum-likelihood methods. The data analysis included contributions from the parent, daughter and grand-daughter decays, as well as a constant background. Production σ(at 1 GeV/nucleon)=39 nb *4* (2012Ku26).