Adopted Levels

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 184, 29 (2022)	24-Jun-2022

Q(β^-)=1.894×10^4 *27*; S(n)=1.7×10^2 *13*; S(p)=25070 *SY*; Q(α)=−15910 *SY* 2021Wa16
ΔS(p)=570, ΔQ(α)=570 (syst,2021Wa16).
S(2n)=3360 *310*, Q(β^-n)=14640 *270* (2021Wa16).
Q(β^-2n)=12360 *270*, Q(β^-3n)=7960 *270*, and Q(β^-4n)=4410 *270* deduced by evaluators from masses in 2021Wa16.
Mass measurements:
2012Ga45, 2007Ju03: time-of-flight and energy loss method at GANIL. Measured mass excess=31.44 MeV *31* (2012Ga45), 30.82 MeV *162* (2007Ju03).
Other measurements:
1990Gu02: Ta(^{48}Ca,X) E=2112 MeV, measured fragment total kinetic energy, time-of-flight, no events were seen for ^{31}Ne from which particle instability was implied for ^{31}Ne. Later works of 1996Sa34 and 1997Sa14, however, discovered many events associated with ^{31}Ne, thus proving that it is a bound nucleus.
1996Sa34: ^{181}Ta(^{50}Ti,X) E=80 MeV/nucleon. Measured fragment total kinetic energy, time-of-flight, magnetic rigidity. A total of 23 events were associated with ^{31}Ne.
1997Sa14 (conference paper): ^{181}Ta(^{48}Ca,X) E=70 MeV/nucleon. Measured fragment total kinetic energy, time-of-flight, magnetic rigidity. A total of 90 events were associated with ^{31}Ne.
1998NoZW, 1998NoZZ: ^{181}Ta(^{40}Ar,X); fragmentation of ^{40}Ar beam. Measured isotopic half-life from β-decay curve.
1998NoZW, 1998NoZZ, 1997Sa14 and 1996Sa34 are from the same group at RIKEN facility. Reaction fragments analyzed by RIPS spectrometer. Detectors: parallel plate avalanche chamber (PPAC) and several surface barrier silicon detectors.
2007Ju03: Measured mass by time-of-flight and energy-loss magnetic spectrograph spectrometer at GANIL. ^{31}Ne formed by fragmentation of ^{48}Ca beam on a Ta target.
2009Na39, 2010Ta16: Pb,C(^{31}Ne,^{30}Ne), E=230-243 MeV/nucleon; measured reaction fragments; deduced Coulomb breakup cross section of 540 mb *70*, soft E1 excitations for ^{31}Ne, B(E1), deformation and halo effects. RIBF facility at RIKEN. Configuration of $2p_{3/2}$ is proposed instead of $1f_{7/2}$.
Additional information 1.
2012Ta02: ^{12}C(^{31}Ne,^{31}Ne′) E=240 MeV/nucleon; ^{31}Ne beam from fragmentation of 345 MeV/nucleon ^{48}Ca with ^{9}Be target at RIKEN facility and using BigRIPS magnetic spectrometer.
2012Su09 (also 2012Mi01): ^{12}C(^{31}Ne,^{31}Ne′) E=240 MeV/nucleon: analyzed interaction σ, $\sigma(\theta)$; deduced deformation parameter as ≈0.4 in the 'Island of Inversion'.
Theoretical analysis of structure of ^{31}Ne g.s. based on single-neutron removal and Coulomb dissociation experimental results: 2017Ho27, 2012Ur06, 2010Ha05, 2010Ho03.
^{31}Ne nuclide is relevant to the 'Island of Inversion' and halo structure.
Theoretical calculations: 35 primary references for nuclear structure and one for decay characteristics retrieved from the NSR database (www.nndc.bnl.gov/nsr/) are listed under 'document records'.

^{31}Ne Levels

Cross Reference (XREF) Flags

A C(^{31}Ne,^{30}Ne)
B ^{9}Be(^{33}Mg,X)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	(3/2$^-$)	3.4 ms *8*	A	%β^-=100; %β^-n=?; %β^-2n=?; %β^-3n=?; %β^-4n=? Only the β^- decay has been observed, and particle stability established by 1996Sa34 and 1997Sa14. Theoretical T$_{1/2}$=15.0 ms, %β^-n=59, %β^-2n=11, %β^-3n=0 (2019Mo01). Theoretical T$_{1/2}$=7.7 ms, %β^-n=81.5; %β^-2n=9.9, 10.0; %β^-3n=0.68, 0.57; %β^-4n=0.007, 0.003 (2021Mi17).

Continued on next page (footnotes at end of table)

Adopted Levels (continued)

^{31}Ne Levels (continued)

E(level)	XREF	Comments
		J^{π}: from comparisons of measured inclusive and partial one-neutron removal cross sections, inclusive parallel momentum distribution of ^{30}Ne residues with eikonal-model predictions using $C^2S(0^+_1; 2p_{3/2})=0.32$ *+21−17* obtained from shell-model calculations considering SDPF-M interactions (2014Na10). From consistency of the measured data with the shell-model calculations, ^{31}Ne is identified as deformed and having a significant p-wave halo component.
		Configuration=ν1/2[330] with β_2=0.2 is favored over the ν3/2[321] with β_2=0.55 in the theoretical calculations (2011Ur01, 2012Ur06) and comparison with measured cross sections for the Coulomb dissociation of ^{31}Ne. However, 2011Ur01 point out that $1/2^+$ configurations such as 1/2[200] with $\beta_2\approx$0.95 or with oblate $\beta_2\approx-0.35$ cannot be excluded only from the Coulomb dissociation data. 2012Su09 analyze $\sigma(\theta)$ data in ^{12}C(^{31}Ne,^{31}Ne′) E=240 MeV/nucleon obtained by 2012Ta02 and deduce $\beta_2\approx$0.4.
		$T_{1/2}$: tentative half-life from β-decay curve (1998NoZW,1998NoZZ). Further experimental measurements are needed for the half-life measurement.
0.30×10^3? *17*	B	
1092?	B	
1.50×10^3? *33*	B	
2292?	B	
2535?	B	
3735?	B	