^{19}N β^- decay 2006Su12

Type	Author	History Citation	Literature Cutoff Date
Update	J. Kelley	ENSDF	10-July-2013

Parent: ^{19}N: E=0; $J^\pi=1/2^-$; $T_{1/2}$=336 ms *3*; Q(β^-)=12532 *16*; %β^- decay=100.0

^{19}N-$T_{1/2}$: from 2006Su12, Q(g.s.)$from2012Wa38.

1986Du07: ^{19}N ions from the fragmentation of a 60 MeV/u ^{40}Ar beam on a Be target at GANIL were filtered by the LISE spectrometer and implanted in a Ge detector. Beta gamma coincidences of ^{19}N were measured along with their relative intensities. $T_{1/2}$=320 ms *100* was also deduced.

1988Sa04: ^{19}N ions from the fragmentation of a 35 MeV/u ^{22}Ne beam on a Ta target at MSU were filtered by the RPMS and were implanted in a Si telescope. Multiple neutron-rich isotopes were separated and identified by the RPMS, and each of their half lives was measured. All counts above a threshold of 0.3 MeV were recorded. $T_{1/2}$=235 ms *32* was deduced for ^{19}N.

1988Mu08: ^{19}N ions from the fragmentation of a 45 MeV/u ^{48}Ca beam on a ^{181}Ta target at GANIL were filtered by the LISE spectrometer and implanted in a Si telescope. The telescope was surrounded by a thin scintillator to detect β-rays and a segmented NE102A 4π neutron array with an energy threshold of 350 keV. Following implantation of ^{19}N in the telescope the cyclotron frequecy was scrambled and the decay event was measured. A delayed neutron emission probability of P_n=33 *+34−11*% was deduced. $T_{1/2}$=210 ms *+200−100* was also measured.

1991Re02: Spallation products from 800 MeV proton bombardment of a ^{232}Th target were captured by a transport line with a mass-to-charge filter and transferred to the TOFI spectrometer at LAMPF. The β-delayed neutron probability P_n=62.4 2.6% was deduced and $T_{1/2}$ = 329 ms *19* was measured. A reanalysis of the (1991Re02) data, with additional data was published in the International conference on nuclear data for science and technology: nuclear data for the twenty-first century, Gatlinburg, TN (United States), 9-13 May 1994. The reanalysis indicates P_n=(48.7 *21*)% and $T_{1/2}$ = 255 ms *10*.

2006Su12: ^{19}N ions from fragmentation of an 80 MeV/u ^{22}Ne beam on a Be target were selected by the NSCL A1200 fragment separator and implanted in a plastic scintillator. An array of curved plastic scintillator bars surrounded the implantation target. The time-of-flight between the implantation detector (beta counter) and the neutron detector array determined the neutron energies. Two HPGE detectors measured γ rays. The neutron emission probability Pn=(41.8 *9*)% was deduced from the neutron data. The analysis revealed eight neutron groups to ^{18}O states. γ transitions among excited states in ^{19}O and ^{18}O were also observed. A detailed decay scheme is suggested by comparison of the γ transition intensities amongst the ^{19}O levels, β-γ-n coincidences, and a reasonable placement of neutron group intensties that could give an intensity balance. Neutron emission groups with intensities less than 1% are left unplaced in the decay scheme. $T_{1/2}$=336 ms *3* was also measured.

Comments: The measurements of 2006Su12 provide the most complete measure of ^{19}O and ^{18}O spectroscopy for levels and transitions involved in the decay. 1986Du07 measured an additional γ ray energy of 709.2 keV not detected by 2006Su12. This nonobservation can be explained by a contaminant of ^{22}O in the beam. 2006Su12 also expresses two possible sources of gamma decay for the 2475.2 keV transition. This energy is consistent with both the 1^- to 2^+ transition in ^{18}O as well as the $3/2^-$ to $1/2^+$ in ^{19}O. It was assigned to ^{19}O; the intensity ratio in ^{18}O should have an absolute intensity ratio of 13:5 and the observed intensity ratio was 1:13.

^{19}O Levels

E(level)	J^π	$T_{1/2}$	Comments
0	$5/2^+$	26.88 s *5*	
96.4 *3*	$3/2^+$		
1472.2 *6*	$1/2^+$		
3235.7 *11*	$(1/2^-,3/2^-)$		
3947.6 *6*	$3/2^-$		
4432.4? *4*	$(1/2^-,3/2^-)$		Energy deduced from a tentative delayed neutron branch to ^{18}O*(0)with En=452 keV.
6403.1? *12*	$(1/2^-,3/2^-)$		Energy deduced from a tentative delayed neutron branch to ^{18}O*(0)with En=2319 keV.
7050.8? *5*	$(1/2^-,3/2^-)$		Energy deduced from a tentative delayed neutron branch to ^{18}O*(1983)with En=1054 keV.
8740.8? *14*	$(1/2^-,3/2^-)$		Energy deduced from a tentative delayed neutron branch to ^{18}O*(1983)with En=2655 keV.
10572? *11*	$(1/2^-,3/2^-)$		Energy deduced from a tentative delayed neutron branch to ^{18}O*(4456)with En=2047 keV.

^{19}N β^- decay 2006Su12 (continued)

β^- radiations

E(decay)	E(level)	Iβ^- †	Log *ft*	Comments
(1960 *20*)	10572?	1.2 *1*	3.40 *5*	av Eβ=821.6 *91*
(3791 *16*)	8740.8?	6.7 *2*	3.907 *16*	av Eβ=1698.7 *79*
(5481 *16*)	7050.8?	17.3 *4*	4.226 *13*	av Eβ=2526.9 *87*
(6129 *16*)	6403.1?	4.1 *1*	5.076 *13*	av Eβ=2845.9 *80*
(8100 *16*)	4432.4?	10.4 *8*	5.24 *4*	av Eβ=3818.8 *80*
(8584 *16*)	3947.6	41.0 *10*	4.763 *12*	av Eβ=4058.8 *80*
(9296 *16*)	3235.7	8.1 *3*	5.631 *17*	av Eβ=4411.4 *80*
(11060 *16*)	1472.2	1.6 *7*	6.70 *19*	av Eβ=5285.7 *80*
(12532 *16*)	0	<7.5	>6.3	av Eβ=6015.6 *80*

† Absolute intensity per 100 decays.

$\gamma(^{19}O)$

E_γ	I_γ †	E_i(level)	J_i^π	E_f	J_f^π
96.4 *3*	47.4 *13*	96.4	$3/2^+$	0	$5/2^+$
1375.7 *5*	17.2 *5*	1472.2	$1/2^+$	96.4	$3/2^+$
2475.2 *7*	15.6 *5*	3947.6	$3/2^-$	1472.2	$1/2^+$
3139 *1*	8.1 *3*	3235.7	$(1/2^-,3/2^-)$	96.4	$3/2^+$
3851 *1*	22.0 *8*	3947.6	$3/2^-$	96.4	$3/2^+$
3947 *1*	3.4 *2*	3947.6	$3/2^-$	0	$5/2^+$

† Absolute intensity per 100 decays.

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Decay Scheme

Intensities: Relative $I_{(\gamma+ce)}$