$^{19}C\,\beta^-$n decay　　1995Oz02

		History	
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Kelley	ENSDF	13-Aug-2012

Parent: ^{19}C: E=0; $T_{1/2}$=45.5 ms *40*; Q(β^-n)=11.23×10^3 *10*; %β^-n decay=47 *3*

^{19}C-$T_{1/2}$: From (1995Oz02).

^{19}C-Q(β^-n): From (2021Wa16).

1988Du09: A beam of ^{19}C ions, produced in the GANIL/LISE spectrometer was implanted into a 7 mm thick plastic scintillator that was surrounded by a 500 liter gadolinium doped 4π liquid scintillator neutron detector array. The lower-level threshold was essentially zero because of the Gd(n,γ) sensitivity. Analysis of the data indicated P_{0n}=(46 *3*)%, P_{1n}=(47 *3*)% and P_{2n}=(7 *3*)%. See also (1988DuZT,1988DuZZ).

1995Oz02: A beam of ^{19}C ions was produced by fragmenting a ^{22}Ne beam on a ^{9}Be target at RIKEN. The beam was magnetically separated, degraded to lower energies, and finally stopped in a plastic scintillator that was sandwiched between four other scintillator detectors. A valid β-decay event required a coincidence between three ajacent detectors. Three neutron walls surrounded the implantation target and covered about 1.4 sr. The decay neutron energy was deduced by the time of flight between the implantation detector and the neutron wall detectors. The ToF was calibrated by studying the decay of ^{17}N which has three visible known neutron groups. A set of two NaI detectors also faced the target for use measuring γ-ray singles events and n-γ coincidence events.

The measured neutron spectrum shows several decay groups. A significant ^{17}B component was present in the beam, and its decay radiations presented a background that was analyzed and subtracted. The final analysis of the neutron energy spectrum revealed five neutron groups that are attributed to β delayed neutron decay of ^{19}C to ^{18}N* states, or of its its daughter ^{19}N to ^{18}O states.

Throughout the experiment, ions were implanted for a 100 ms period followed by a 200 ms counting period; analysis of the time dependence for the neutron groups permitted assignment of four groups to decay of ^{19}C ($T_{1/2}\approx$50 ms) and one group to decay of ^{19}N ($T_{1/2}\approx$320 ms).

Four neutron groups at E_n=0.46, 1.01, 1.50 and 2.08 are observed; poor statistics prohibited full analysis of the E_n=2.08 MeV group. Since n-γ correlations were used to characterize the decay paths, the results are presented by normalizing to %β^-1n=(47 *3*)% from (1988Du09).

See also (1994OzZY,1995OzZY).

^{18}N Levels

E(level)[†]	J^{π}[†]	$T_{1/2}$[†]
0.0	1^-	619 ms *2*
114.71 *10*	(2^-)	0.40 ns *11*
587.39 *20*	(2^-)	

[†] From Adopted Levels.

$\gamma(^{18}$N)

E_{γ}	I_{γ}[†]	E_i(level)	J_i^{π}	E_f	J_f^{π}
114.7	47.	114.71	(2^-)	0.0	1^-
472.7	14.3	587.39	(2^-)	114.71	(2^-)

[†] Absolute intensity per 100 decays.

^{19}C β^-n decay　　1995Oz02 (continued)

Delayed Neutrons (^{18}N)

E(n)	E(^{18}N)	I(n)[†‡]	E(^{19}N)	Comments
460 *10*	587.39	14.3 *20*	6400	E_n=460 keV *10* implies E_x(^{19}N)=6400 keV *27*.
1010 *10*	114.71	20.0 *16*	6508	E_n=1010 keV *10* implies E_x(^{19}N)=6508 keV *27*.
1500 *20*	114.71	12.7 *15*	7025	E_n=1500 keV *20* implies E_x(^{19}N)=7025 keV *33*.

[†] Normalized to (47 *3*)%; see (1988Du09).
[‡] Absolute intensity per 100 decays.

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Decay Scheme

γ Intensities: I_γ per 100 parent decays
I(n) Intensities: I(n) per 100 parent decays

E(n)	I(n)	E($^{19}_{7}$N)	E($^{18}_{7}$N)
1010	20.0	6508	114.71
1500	12.7	7025	114.71
460	14.3	6400	587.39