^{19}B β^- decay 1998Yo06,2003Yo02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, G. C. Sheu	ENSDF	23-March-2017

Parent: ^{19}B: E=0; J^π=(3/2$^-$); $T_{1/2}$=2.92 ms *13*; Q(β^-)=26.37×10^3 *41*; %β^- decay=100.0

^{19}B-$T_{1/2}$: from 2003Yo02.

^{19}B-Q(β^-): from 2012Wa38.

1998Yo06: A beam of ^{19}B was produced by fragmentation of a 95 MeV/A ^{40}Ar beam on a ^{181}Ta target. ^{19}B was selected using the RIKEN Projectile-fragment Separator (RIPS) and was implanted into a 12 mm thick plastic scintillator stopper. The β-decays were observed during the 100 ms beam-off period. The active stopper detected β-rays and a neutron detector array, consisting of 14 liquid scintillation counters covering about 80% of 4π detected delayed neutrons. The efficiency of the neutron array was 30% by comparison of a measurement of β-delayed neutrons of ^{15}B, which has a known delayed neutron emission probability of 100%.

A preliminary value of $T_{1/2}$=3.3 ms *2* was deduced from the least-squares fits to the data, and P_n=125% *32* was determined from the ratio of the number of detected neutrons to that of β-rays. P_n is more than 100% which implies the existence of significant multineutron emissions in the decay, reflecting its large Q_β value (26.5 MeV) compared with the multineutron separation energies of daughter nucleus ^{19}C (S_{1n}=160 keV, S_{2n}=4.4 MeV,.....).

2003Yo02: The authors reevaluated the preliminary values $T_{1/2}$ and P_n reported in 1998Yo06. The new experiment was performed using RIPS at RIKEN Accelerator Research Facility as was in 1998Yo06. A beam of ^{19}B was produced by the projectile-fragmentation reaction of a 95 MeV/*u* ^{40}Ar beam on a 670 mg/cm^2 ^{nat}Ta target. The values of $T_{1/2}$ and P_{in} were determined by fitting a set of decay curves altogether to remove possible complication and inconsistency. The method of maximum likelihood was applied for deducing $T_{1/2}$ and P_{in}. The neutron detection efficiencies were treated carefully, the total detection efficiencies of direct and scattered neutrons are 31.5 % *3* and 4.7% *+2-6*, respectively. The new values of $T_{1/2}$=2.92 ms *13*, P_{1n}=71.8% *+83-91* and P_{2n}=16.0% *+56-48* were determined with a better precision. P_{3n} was not determined because of the limited statistics. In the text it is unclear if the 1998Yo06 "preliminary" data are included in the 2003Yo02 analysis; we assume that it is and use the 2003Yo02 result to avoid possible data correlations.

1999Re16: A low statistics determination of $T_{1/2}$=4.5 ms *15* was given.

In Summary, the decay to ^{19}C levels is not measured. Only the P_{1n}=71.8% *+83-91* to ^{18}C and P_{2n}=16.0% *+56-48* to ^{17}C were determined.

^{19}C Levels

E(level)	Comments
581+x	E(level): group of neutron-decaying levels above S(n)(^{19}C)=581 keV.
4763+y	E(level): group of 2 neutron-decaying levels above S(2n)(^{19}C)=4763 keV.

β^- radiations

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
(1.1×10^4[‡] *11*)	4763+y	16.0 *56*	5.02 *16*	av Eβ=1.052×10^4 *21* Iβ^-: total β^-2n decay branch β^-_{2n}=16.0% *+56-48*.
(1.3×10^4[‡] *13*)	581+x	71.8 *91*	4.74 *7*	av Eβ=1.258×10^4 *21* Iβ^-: total β^-n decay branch β^-_{1n}=71.8% *+83-91*.

[†] Absolute intensity per 100 decays.

[‡] Estimated for a range of levels.