^{70}Cu β^- decay (6.6 s) 2004Va08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	G. Gürdal, E. A. Mccutchan	NDS 136, 1 (2016)	1-Jul-2016

Parent: ^{70}Cu: E=242.6 *5*; $J^\pi=1^+$; $T_{1/2}$=6.6 s *2*; Q(β^-)=6588.3 *22*; %β^- decay=93.2 *9*

^{70}Cu-%β^- decay: %IT=6.8 *9* (2004Va08).

2004Va08,2004Va07: ^{70}Cu activity produced in proton (E(p)= 1 GeV) and neutron induced fission of uranium carbide and separated with the RILIS ion source followed by mass separation. Measured Eγ, Iγ, γ(t), $\beta\gamma$ and $\gamma\gamma$ coincidences using three thin plastic ΔE detectors and two HPGe detectors. See also thesis, 2002VaZX.

1975Re09: ^{70}Cu activity from ^{70}Zn(n,p), E(n)=14 MeV. Measured Eγ, Iγ, γ(t), Eβ, Iβ, $\beta\gamma$ coincidences with a Ge(Li) detector, a NaI(Tl) detector and a β spectrometer consisting of a proportional counter backed by a plastic scintillator.

1971Ta03: ^{70}Cu activity from ^{70}Zn(n,p) with E(n)=14 MeV. Measured Eγ, Iγ, Eβ, Iβ, γ(t), $\beta\gamma$ and $\gamma\gamma$ coincidences using two Ge(Li) detectors, a NaI(Tl) detector and a plastic scintillator.

Other: 1983Ru06, 1998Fr15.

A total energy release of ≈ 6400 keV is calculated for this decay scheme by the code RADLST, in agreement with the effective Q value of 6370 keV *60*. However, the ground state β^- feeding is not determined and there is nearly a 3 MeV energy difference between the highest observed energy level and the Q value, indicating the decay scheme is incomplete.

α: Additional information 1.

^{70}Zn Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]
0.0	0^+	≥3.8×10^{18} y
884.95 *8*	2^+	3.65 ps *21*
1070.80 *9*	0^+	3.90 ns *20*
1759.33 *10*	2^+	1.32 ps *21*
1957.15 *13*	2^+	
2140.36 *22*	0^+	
3635.16 *23*	2^+	

[†] From a least-squared fit to Eγ, by evaluators.
[‡] From the Adopted Levels.

β^- radiations

1975Re09 measured a 6.09 MeV *16* β^- branch with Iβ^-=46% *10* which they associate with ground state feeding and a 5.29 MeV *11* β^- branch with Iβ^-=54% *10* which they associate with feeding to the 885-keV, 2^+ level. However, in 1998Fr15 determine a weak ground state β^- feeding based on $^{68-74}$Ni cross section measurements. If the 46% *10* value is used in their determination, the production rate for ^{70}Ni would be doubled, a result which they state would be difficult to reconcile with the measured smooth cross sections for $^{68-74}$Ni.

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(3195.7 *23*)	3635.16	<3.8	>5.4	av Eβ=1376.0 *11*
(4690.5 *23*)	2140.36	<7.9	>5.8	av Eβ=2097.3 *11*
(4873.8 *23*)	1957.15	<16.8	>5.6	av Eβ=2186.2 *11*
(5071.6 *23*)	1759.33	<10.1	>5.9	av Eβ=2282.2 *11*
(5760.1 *23*)	1070.80	<3.1	>6.6	av Eβ=2616.9 *11*
(5945.9 *23*)	884.95	<52	>5.5	av Eβ=2707.3 *11*

[†] Deduced by the evaluators from γ-ray intensity balance. Total β feeding sums to 93.2%. Given as upper limits as ground state

Continued on next page (footnotes at end of table)

^{70}Cu β^- decay (6.6 s) 2004Va08 (continued)

β^- radiations (continued)

feeding has not been determined. Note that corresponding values quoted in 2004Va08 sum to 100%.
‡ Absolute intensity per 100 decays.

$\gamma(^{70}Zn)$

Iγ normalization: From Σ(I(γ+ce) to g.s.)=93.2 *9*. Value is an upper limit, as ground state β-feeding is unknown. See general comment on β^- radiations.
Iγ(141.3γ, IT)/Iγ(884.88γ)=0.078 *4* (2004Va08).

E_γ†	I_γ†#	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	α	Comments
185.85 *3*	3.3 *2*	1070.80	0^+	884.95	2^+	[E2]		0.0634	α(K)=0.0563 *8*; α(L)=0.00613 *9*; α(M)=0.000871 *13*; α(N)=3.07×10^{-5} *5*
874.33 *8*	9.4 *4*	1759.33	2^+	884.95	2^+	M1+E2	+0.75 *15*	3.58×10^{-4} *9*	α(K)=0.000321 *9*; α(L)=3.21×10^{-5} *9*; α(M)=4.61×10^{-6} *12*; α(N)=1.85×10^{-7} *5*
884.88 *9*	100 *2*	884.95	2^+	0.0	0^+	E2		3.97×10^{-4}	α(K)=0.000356 *5*; α(L)=3.58×10^{-5} *5*; α(M)=5.12×10^{-6} *8*; α(N)=2.04×10^{-7} *3* I_γ: other: 100 (1971Ta03).
1072.2 *1*	19.2 *6*	1957.15	2^+	884.95	2^+				
1255.4 *2*	9 *1*	2140.36	0^+	884.95	2^+	[E2]		1.94×10^{-4}	α(K)=0.0001573 *22*; α(L)=1.570×10^{-5} *22*; α(M)=2.25×10^{-6} *4*; α(N)=9.05×10^{-8} *13*
1759.6 *2*	6.5 *3*	1759.33	2^+	0.0	0^+	[E2]		2.86×10^{-4}	α(K)=7.92×10^{-5} *11*; α(L)=7.86×10^{-6} *11*; α(M)=1.127×10^{-6} *16*; α(N)=4.56×10^{-8} *7*
1875.8 *2*	4.3 *2*	3635.16	2^+	1759.33	2^+				I_γ: other: 4 *1* (1971Ta03).

† From 2004Va08. Iγ are normalized to Iγ(885γ)=100.
‡ From the Adopted Levels.
# For absolute intensity per 100 decays, multiply by <0.884.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays