Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Apr-2022

Q(β^-)=10990 *70*; S(n)=4480 *60*; S(p)=12970 *80*; Q(α)=−10750 *60* 2021Wa16
Q(β^-n)=6830 *60*, S(2n)=8220 *60*, S(2p)=33120 *130* (2021Wa16).

1990Tu01: mass excess of ^{55}Sc measured in Th(p,F),E=800 MeV, followed by separation of fragments by A/Q using the Time-of-Flight Isochronous (TOFI) spectrometer at the Los Alamos Meson Physics Facility. Deduced mass excess=−28.5 MeV *10* for ^{55}Sc (1990Tu01) is within ≈2σ of evaluated mass excess of −30840 keV *60* (2021Wa16). However, in a later work 1994Se12 by the same group as 1990Tu01, and using the same experimental methods, mass excess of ^{55}Sc was not reported, which may cast some doubt on the results reported in 1990Tu01.

1998So03: ^{55}Sc produced and identified in ^{9}Be(^{65}Cu,X), E=64.5 MeV/nucleon reaction using LISE3 separator at GANIL. Measured half-life of ^{55}Sc decay from (implants)(β decay) correlated events. A total of 42 events were assigned to ^{55}Sc nuclide.

2004Li75 (also 2002Sh43): ^{55}Sc produced in ^{9}Be(^{86}Kr,X), E=140 MeV/nucleon reaction using A1900 fragment separator at NSCL-MSU. Measured half-life of ^{55}Sc decay from (implants)(β decay) correlated events, and identified a 592-keV γ ray from the decay of ^{55}Sc.

2008Ma01: ^{55}Sc produced in ^{9}Be(^{76}Ge,X), E=140 MeV/nucleon reaction using A1900 fragment separator at NSCL-MSU. Measured half-life of ^{55}Sc decay from (implants)(β decay) correlated events, and identified a 592-keV γ ray from the decay of ^{55}Sc.

2010Cr02: ^{55}Sc produced in ^{9}Be(^{86}Kr^{34+},X) fragmentation reaction at E=140 MeV/nucleon, A1900 fragment separator. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\beta\gamma$-coin, half-life of ^{55}Sc decay using a double-sided Si microstrip detector (DSSD) and the SeGA array of HPGe detectors, arranged around the β counting system (BCS) and comprised six HPGe detectors.

Mass measurements: 2021Le02, 2020Me06, 2020Mi13, 2015Me08, 2011Es06, 1990Tu01 (from reaction Q value).

Theoretical calculations: six primary references (five for structure and one for ^{55}Sc decay) retrieved from the NSR database at www.nndc.bnl.gov/nsr/. These are listed in this dataset under 'document' records.

Additional information 1.

^{55}Sc Levels

Cross Reference (XREF) Flags

A ^{9}Be(^{56}Ti,^{55}Scγ),(^{55}Sc,^{55}Sc$'\gamma$)

E(level)†	J$^\pi$‡	T$_{1/2}$	XREF	Comments
0	(7/2$^-$)	96 ms *2*	A	%β^-=100; %β^-n≈17 *7* (2010Cr02) %β^-n in 2010Cr02 is not directly measured, but estimated from missing β-feeding intensity in ^{55}Sc decay, where absolute γ intensities (per 100 decays) were measured. Theoretical T$_{1/2}$=27.4 ms, %β^-n=15 (2019Mo01). Theoretical T$_{1/2}$=88.7 ms, %β^-n=2.8, 2.2 (2021Mi17). T$_{1/2}$: from 2010Cr02 (summed γ-decay curve fitted with a single exponential and constant background; earlier measurements from the same lab and by some of the same authors using implants-β correlated decay curves: 115 ms *15* in 2004Li75, 103 ms *7* in 2002Sh43, and 83 ms *3* in 2008Ma01). Other: 120 ms *40* (1998So03, from implants-β correlated events, statistics was weak in this first paper on the identification of ^{55}Sc nuclide, where 42 events were assigned to ^{55}Sc). Evaluator adopts T$_{1/2}$ from 2010Cr02 due to the highest statistics and better selectivity from γ-decay curves. Weighted average of all five values is 93 ms *4* with reduced χ^2=4.5, higher than critical χ^2=2.4 at 95% confidence level; NRM weighted averaging gives 95 ms 3 with acceptable reduced χ^2; while unweighted average is 103 ms *7*, same value suggested in LWM weighted average.
695 *5*	(3/2$^-$)		A	
1267 *7*	(1/2$^-$)		A	
1730 *20*	(7/2$^-$)		A	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{55}Sc Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	XREF	Comments
2786 *20*	(1/2$^+$)	A	
2806 *12*	(1/2,3/2,5/2$^-$)	A	J$^{\pi}$: γ to (1/2$^-$).
3135 *20*	(3/2$^+$)	A	

[†] From ^{9}Be(^{56}Ti,^{55}Scγ),(^{55}Sc,^{55}Sc$'\gamma$).

[‡] As suggested in ^{9}Be(^{56}Ti,^{55}Scγ),(^{55}Sc,^{55}Sc$'\gamma$) (2017St22), based on predictions of detailed calculations using shell-model and valence-space in-medium similarity renormalization group (VS-IM-SRG) method. Exception is J^{π} for the 2806 level, with no corresponding level in theoretical calculations.

γ(^{55}Sc)

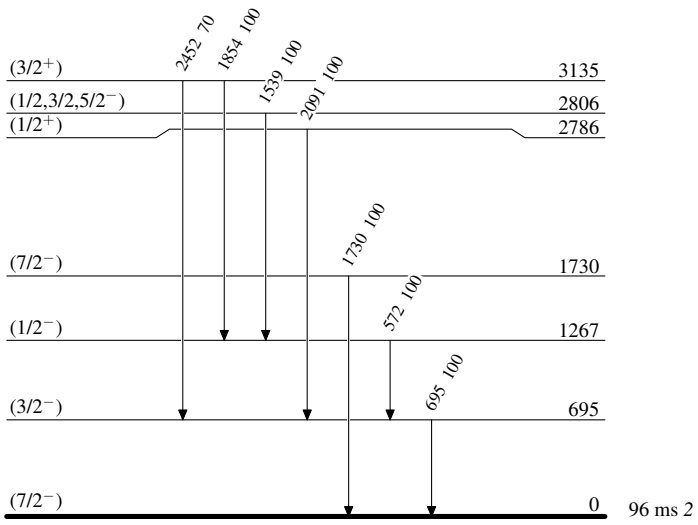
E$_i$(level)	J$_i^{\pi}$	E$_{\gamma}$[†]	I$_{\gamma}$[†]	E$_f$	J$_f^{\pi}$
695	(3/2$^-$)	695 *5*	100	0	(7/2$^-$)
1267	(1/2$^-$)	572 *4*	100	695	(3/2$^-$)
1730	(7/2$^-$)	1730 *20*	100	0	(7/2$^-$)
2786	(1/2$^+$)	2091 *19*	100	695	(3/2$^-$)
2806	(1/2,3/2,5/2$^-$)	1539 *10*	100	1267	(1/2$^-$)
3135	(3/2$^+$)	1854 *27*	100 *15*	1267	(1/2$^-$)
		2452 *26*	70 *10*	695	(3/2$^-$)

[†] From ^{9}Be(^{56}Ti,^{55}Scγ),(^{55}Sc,^{55}Sc$'\gamma$).

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{55}_{21}Sc_{34}$