Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	20-Jul-2015

Q(β^-)=9060 *40*; S(n)=5628 *7*; S(p)=12640 *SY*; Q(α)=−862×10[1] *53* 2012Wa38
Estimated uncertainty=200 for S(p) (2012Wa38).
Q(β^-)n=4746 *10*, S(2n)=9932 *11*, S(2p)=28510 *300* (syst) (2012Wa38).

1992Ay02: ^{113}Tc produced and identified in ^{238}U(p,F),E=20 MeV reaction followed by on-line isotopic separator at IGISOL facility in JYFL, measured half-life.

1999Wa09: measured $T_{1/2}$ and %β^-n, source from ^{238}U(p,F) at the IGISOL facility in JYFL. Earlier $T_{1/2}$ measurement by 1998Ku17.

2009Pe06: ^{113}Tc formed by fragmentation of ^{136}Xe beam at 120 MeV/nucleon at NSCL-MSU facility using Coupled Cyclotrons and A1900 fragment separator. The time-of-flight and transversal positions of each particle was measured using two plastic scintillators. The ΔE energy loss in a Si PIN detector was measured which, when combined with time-of-flight (tof) and transversal position measurements, allowed for an event-by-event identification of the transmitted nuclei. Transmitted nuclei and their β decays were measured using the β counting system consisting of four Si PIN detectors and a double-sided Si strip detector. β-delayed neutrons were measured in coincidence with β-decay precursor using neutron emission ratio observer (NERO) detector consisting of 60 proportional gas counter tubes embedded in polyethylene moderator matrix. The γ rays were measured with SeGA Ge detectors. Measured isotopic half-lives and delayed neutron emission probabilities Isotopic half-life was measured by 2009Pe06 from maximum likelihood method of time differences of implantations and correlated β decay events.

2015Lo04: ^{113}Tc nuclide produced at RIBF-RIKEN facility in ^{9}Be(^{238}U,F) reaction at E=345 MeV/nucleon with an average intensity of 6×10[10] ions/s. Identification of ^{113}Tc was made by determining atomic Z and mass-to-charge ratio A/Q, where Q=charge state of the ions. The selectivity of ions was based on magnetic rigidity, time-of-flight and energy loss. The separated nuclei were implanted at a rate of 50 ions/s in a stack of eight double-sided silicon-strip detector (WAS3ABi), surrounded by EURICA array of 84 HPGe detectors. Correlations were recorded between the implanted ions and β rays. The half-life of ^{113}Tc isotope was measured from the correlated ion-β decay curves and maximum likelihood analysis technique as described in 2014Xu07. Comparison of measured half-lives with FRDM+QRPA, KTUY+GT2 and DF3+CQRPA theoretical calculations.

Mass measurement: 2011Ha48.

2013Fa05: theoretical calculation of $T_{1/2}$ and %β^-n.

^{113}Tc Levels

Cross Reference (XREF) Flags

A ^{113}Tc IT decay (0.526 μs)

E(level)	J^π	$T_{1/2}$	XREF	Comments
0.0	(5/2$^+$)	152 ms *8*	A	%β^-=100; %β^-n=2.1 *3* (1999Wa09) J^π: configuration=π5/2[422], oblate minimum from PES calculations (2010Br15). J^π=5/2$^+$ or >5/2 is also proposed by 2007Ku23 from β feeding pattern and log *ft* values from ^{113}Tc decay to levels in the daughter nucleus ^{113}Ru. $T_{1/2}$: measured by 2015Lo04 from (implanted ions)β correlated curves in time and position using maximum likelihood method. Others: 160 ms *+50−40* (2009Pe06, MLH analysis of ion-β correlated decay curve, systematic uncertainty=5 ms, statistical uncertainty= $^{50-40\ ms}$); 170 ms 20 (1999Wa09, earlier measured values of 110 ms *30* by 1998Ku17 and 130 ms *50* by 1992Ay02). See 2015Lo04 for comparison of their experimental value with theoretical values.
114.4 *5*	(5/2$^-$)	0.526 μs *+16−15*	A	J^π: proposed by 2010Br15 from PES calculations, which show a deep triaxial minimum at β_2=0.29, β_4=−0.02, γ=29.8° with J^π=5/2$^-$. Also E1 hindrance factors are consistent with systematics (2010Br05). $T_{1/2}$: from γ(t) (2012Ka36). Other: 0.50 μs *10* (2010Br15).

Adopted Levels, Gammas (continued)

$\gamma(^{113}Tc)$

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	$\alpha^\dagger$	Comments
114.4	$(5/2^-)$	114.4 *5*	100	0.0	$(5/2^+)$	[E1]	0.091	B(E1)(W.u.)=3.37×10^{-7} *+11−12*

† Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level