Adopted Levels

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	14-Jan-2022

Q(β^-)=13710 *SY*; S(n)=3220 *SY*; S(p)=14890 *SY*; Q(α)=−10760 *SY* 2021Wa16

Estimated uncertainties (2021Wa16): 450 for Q(β^-), 570 for S(n), 640 for S(p) and Q(α).

S(2n)=8220 *500*, S(2p)=32640 *500*, Q(β^-n)=8130 *590* (syst, 2021Wa16).

Q(β^-2n)=4637 *400*, deduced by evaluator from mass excesses in 2021Wa16.

1995CzZZ (short conference paper): possible identification of ^{118}Tc in ^{9}Be(^{238}U,f) at 750 MeV/nucleon at GSI facility. But in subsequent published works (1997Be70,1998Do08) by the same group, there was no mention of the formation or identification of the ^{118}Tc isotope; the heaviest Tc isotope identified was ^{117}Tc in 1997Be70 and ^{115}Tc in 1998Do08 (where a Pb target was used instead of Be). In 1995CzZZ, there was no detailed discussion about the formation of new isotopes, ^{118}Tc was simply shown in the chart of nuclides figure 2 in their paper. In the absence of sufficient confirmatory evidence from the same experimental group (1994Be24,1995CzZZ,1997Be70,1998Do08), the identification of ^{118}Tc remained uncertain until the work by 2010Oh02.

2010Oh02: ^{118}Tc nuclide identified in Be(^{238}U,F) and Pb(^{238}U,F) reactions with a $^{238}U^{86+}$ beam energy of 345 MeV/nucleon produced by the cascade operation of the RBIF accelerator complex of the linear accelerator RILAC and four cyclotrons RRC, fRC, IRC and SRC. Identification of ^{118}Tc nuclei was made on the basis of magnetic rigidity, time-of-flight and energy loss of the fragments using BigRIPS fragment separator. Experiments performed at RIKEN facility. Based on A/Q spectrum and Z versus A/Q figure 2 in 2010Oh02, about 400 counts were assigned to ^{118}Tc isotope. (Q and Q(β^-)1 charge states).

2013So17: ^{118}Tc isotope produced in ^{9}Be(^{238}U,X) reaction at 345 MeV/nucleon at RIBF-RIKEN facility. Fragments identified by Zero-degree spectrometer which analyzed events based on Bρ-tof-ΔE. Measured Eγ, Iγ, Eβ, (fragment)γ-coin, $\beta\gamma$-coin, $\gamma\gamma$-coin.

2015Lo04: ^{118}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 ^{118}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 ^{118}Tc isotope was measured from the correlated ion-β decay curves and maximum likelihood analysis technique. Comparison of measured half-lives with FRDM+QRPA, KTUY+GT2 and DF3+CQRPA theoretical calculations.

Production cross sections and yields of ^{118}Tc:

2021Su01: measured production cross section in ^{9}Be(^{238}U,F), E=345 MeV/nucleon at RIBF-RIKEN facility.

2020Su23: measured production cross section in ^{9}Be(^{132}Sn,X), E=278 MeV/nucleon at RIBF-RIKEN facility.

2019Pe09: measured production σ in ^{208}Pb(^{238}U,F), E=950 MeV/nucleon at GSI facility.

Theoretical calculations: two primary reference for half-lives and decay mode from the NSR database available at www.nndc.bnl.gov/nsr/ are listed in the 'document' records in this dataset.

Additional information 1.

^{118}Tc Levels

E(level)	$T_{1/2}$	Comments
0	30 ms *4*	%β^-=100; %β^-n=?; %β^-2n=? Only β^- decay mode is expected, followed by delayed-neutron decays, thus 100% β^- decay is assigned by inference. Theoretical $T_{1/2}$=30.4 ms; %β^-n=29; %β^-2n=0 (2019Mo01). Theoretical $T_{1/2}$=51.6 ms; %β^-n=64.0, 31.4; %β^-2n=1.12, 0.89 (2021Mi17, %β^-n and %β^-2n for four different fission barriers). E(level): measured half-life is assumed to correspond to the ground state of ^{118}Tc, although, from systematics, two long-lived activities are expected, a low-spin and a high-spin (2013So17). J$^\pi$: there may be two long-lived states according to 2013So17; a high-spin and low-spin with possible configuration= π5/2[422]⊗ν3/2[541] giving rise to J^π=1$^-$ or 4$^-$,5$^-$,6$^-$. 2021Ko07 propose 2$^+$ for the g.s. from a systematic trend. $T_{1/2}$: measured by 2015Lo04 from (implanted ions)β correlated curves in time and position using maximum likelihood method. Authors compared experimental value with theoretical predictions from several models. Observed activity could be a mixture of two activities as suggested by 2013So17.