^{179}Tl α decay (1.40 ms) 2017Ba46,2002Ro17,1998To14

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jin Wu	NDS 206,1 (2025)	29-Oct-2024

Parent: ^{179}Tl: E=0.0+x; J^{π}=(11/2$^-$); $T_{1/2}$=1.40 ms *3*; Q(α)=6709.1 *26*; %α decay=100

^{179}Tl-$T_{1/2}$: : from 2017Ba46. Others: 1.46 ms *4* (2010An01), 1.7 ms *2* (2002Ro17), 1.8 ms *4* from Eα=7213 and 1.6 ms *8* from Eα=7096 (1998To14), 0.7 ms *+6−4* (1996Pa01), and 1.4 ms *5* (1983Sc24).

^{179}Tl-Q(α): From 2021Wa16.

^{179}Tl-%α decay: %α=100 (2010An01).

2017Ba46: The ^{179}Tl was produced through the fusion-evaporation reaction ^{104}Pd(^{78}Kr,p2n)^{179}Tl, using a ^{78}Kr^{15+} beam of 358 MeV impinging on a self-supporting rotating ^{104}Pd target with a thickness and enrichment of 745 μg/cm^2 and 92.25%, respectively. The evaporation residues of interest were separated from beam and unwanted reaction products using the gas-filled separator RITU and transported to the focal plane, where the HPGe GREAT spectrometer is located to detect the emitted γ rays. The isotopes of interest were implanted into a 300−μm-thick double-sided silicon strip detectors (DSSDs) placed in the center of the GRETA spectrometer, in which the decay products of α particles were detected. Measured Eγ, Eα, $T_{1/2}$.

2013An10,2010An01: The ^{179}Tl was produced in two reactions. First reaction E(p)=1.4 GeV at ISOLDE-CERN, using a target of 50 g/cm^2 ^{238}U. The ^{179}Tl was ionized to 1$^+$ charge by the Resonance Ionization Laser Ion Source (RILIS) and mass separated by the High Resolution (HRS) and General Purpose (GPS) Separators. Second reaction E(^{40}Ca)=232 MeV provided by the UNILAC of GSI, using a target of ≈350 μg/cm^2 ^{144}Sm, separated by the velocity filter SHIP at GSI. Measured Eγ, Iγ, Eα, Iα, $T_{1/2}$, yield using a single Miniball Ge cluster and a DSSD. Deduced J, π, α branching ratio.

2002Ro17: The parent ^{179}Tl was produced using a projectile of ^{78}Kr at E=355 MeV (340 MeV at midtarget) bombarding a target of 90.4% enriched ^{202}Pb. The recoil residues were transported to a gas-filled separator and parallel-plate avalanche counters, finally implanted into a Si strip detector. The emitted γ rays were detected with the HPGe detector. Deduced $T_{1/2}$, corrected for random correlation rates.

1998To14: The parent ^{179}Tl was produced using a projectile of ^{92}Mo at E=420 MeV (404 MeV at midtarget) bombarding a target of ^{90}Zr. The recoil residues were transported to a gas-filled separator and parallel-plate avalanche counters, finally implanted into a double sided Si strip detector with 40 in horizontal and 40 in vertical. Measured: Eα, t, Iα.

1996Pa01: The parent ^{179}Tl was produced from heavy-ion fusion-evaporation reactions. The recoil residues were transported to a mass separator and implanted into a double-sided Si strip detector (FWHM≤20 keV). Measured Eα, parent and daughter $T_{1/2}$.

1983Sc24: The parent ^{179}Tl was produced using a projectile of ^{92}Mo at E=414-497 MeV bombarding a target of enriched (>95%) Rb-Mo isotopes. The recoil residues were implanted into an array of seven position surface Si detectors. The emitted γ rays were detected with the HPGe detector. Measured Eα, Iα.

^{175}Au Levels

E(level)	J^{π}	$T_{1/2}$	Comments
0.0+x	(11/2$^-$)	137 ms *1*	J^{π}: From Adopted Levels. E(level): It seems that 6568α is a g.s. to g.s. transition from ^{179}Tl (0.23 s) to ^{175}Au, and the observed 7069α and 7213α 's are from 0.0+x to 0.0+x state transitions between ^{179}Tl(1.4 ms) and ^{175}Au (1998To14). The 1/2$^+$ g.s. and 11/2$^-$ isomeric state, from systematics and experiment, for these isotopes also looks reasonable for these transitions with low HF values. $T_{1/2}$: from Adopted Levels. 138 ms *5* by 2010An01.

α radiations

Eα	E(level)	Iα[†][‡]	Comments
7096[#] *10*		20 *8*	Eα: Observed only in 1998To14. An expected level of 116 keV above the (11/2$^-$) state at (0.0+x) keV level, calculated from the 7209α and 7096α energy difference, has not been observed in ^{175}Au level scheme (2001Ko44).
7207 *4*	0.0+x	80 *8*	Eα: Weighted average of 7206 *4* (2017Ba46), 7207 *5* (2010An01), 7213 *10* (1998To14), 7201 *20* (1996Pa01), and 7200 *20* (1983Sc24).

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^{179}Tl α decay (1.40 ms) 2017Ba46,2002Ro17,1998To14 (continued)

α radiations (continued)

† Normalized from 1998To14 values.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.