Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 181, 475 (2022)	1-Jan-2022

Q(β^-)=4987 *28*; S(n)=4740 *SY*; S(p)=8530 *SY*; Q(α)=1590 *SY* 2021Wa16
ΔS(n)=200 (syst), ΔS(p)=300 (syst), ΔQ(α)=400 (syst) (2021Wa16).
S(p) and Q(α) from 2019Mo01.
Q(β^-n)=1261 *27*, S(2n)=8280 *50* (2021Wa16), S(2p)=18760 (2019Mo01, calculated).
2010Ch19, 2012Ch19: ^{213}Tl isotope was produced in the fragmentation of ^{238}U beam at 670 MeV/nucleon with a 4 g/cm^2 ^{9}Be target followed by separation by Fragment Recoil Separator facility at GSI. The fragments were then injected into the cooler electron storage ring ESR. Measured mass and half-life by time-resolved Schottky Mass spectrometry technique.
2010Al24: ^{213}Tl nuclide identified in ^{9}Be(^{238}U,X) reaction with a beam energy of 1 GeV/nucleon produced by the SIS synchrotron at GSI facility. Target=2500 mg/cm^2. The fragment residues were analyzed with the high resolving power magnetic spectrometer Fragment separator (FRS). The identification of nuclei was made on the basis of magnetic rigidity, velocity, time-of-flight, energy loss and atomic number of the fragments using two plastic scintillators and two multisampling ionization chambers. The FRS magnet was tuned to center on ^{210}Au, ^{216}Pb, ^{219}Pb, ^{227}At and ^{229}At nuclei along the central trajectory of FRS.
Unambiguous identification of nuclides required the separation of different charge states of the nuclei passing through the FRS. Through the measurement of difference in magnetic rigidity in the two sections of the FRS and the difference in energy loss in the two ionization chambers, the charge state of the transmitted nuclei was determined, especially, that of the singly charged (hydrogen-like) nuclei which preserved their charge in the current experimental setup. Measured production cross sections with 10% statistical and 20% systematic uncertainties.
Criterion established in 2010Al24 for acceptance of identification of a new nuclide: 1. number of events should be compatible with the corresponding mass and atomic number located in the expected range of positions at both image planes of the FRS spectrometer; 2. number of events should be compatible with >95% probability that at least one of the counts does not correspond to a charge-state contaminant. Comparisons of measured σ with model predictions using the computer codes COFRA and EPAX.
2012Be28: Method of production at GSI facility same as in 2010Al24. In this work half-life of the isotope is measured from an implant of 1526 events using FRS-RISING setup at GSI.

^{213}Tl Levels

Measured mass excess=1763 keV *61* (2010Ch19, 2012Ch19).

Cross Reference (XREF) Flags

A ^{9}Be(^{238}U,Xγ)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	(1/2$^+$)	23.8 s *44*	A	%β^-=100; %β^-n=7.6 *34* (2017Ca12,2016Ca25) J$^\pi$: from shell-model calculations (2019Go10 – (^{238}U,Xγ)). 1/2$^+$ from systematics (2021Ko07). Configuration: π ($s^{-1}_{1/2}$). T$_{1/2}$: From 2017Ca12: (ion)β correlated decay curve and analyzed by maximum-likelihood method, also 24 s *4* in 2016Ca25 – same research group. Others: 46 s *+55–26* (2012Be28 – (implant)$\beta\gamma$ correlations of 2768 implants) also in 2014Mo15, 101 s *+484–46* (2010Ch19). %β^-n: beta-delayed neutron branching ratio deduced from implant-β and implant-β-neutron correlations detected in forward and backward directions (2017Ca12,2016Ca25). Production cross section measured in 2010Al24, values are given in figure 2, plot of σ versus mass number for Tl isotopes. Statistical uncertainty=10%, systematic uncertainty=20%. Production σ=9.74 nb (from e-mail reply of H. Alvarez-Pol to B. Singh (Dated: Oct 29, 2010), which also stated that further analysis was in progress.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{213}Tl Levels (continued)

E(level)	$T_{1/2}$	XREF	Comments
			From A/Z plot (figure 1 in 2010Al24), a large number of events is assigned to ^{213}Tl.
0+x?		A	
0+y?		A	
380+x?	4.1 μs *5*	A	$T_{1/2}$: from 380γ(t) (2019Go10). Uncertainty includes statistical and systematic.
698+y?	0.6 μs *3*	A	$T_{1/2}$: from 698γ(t) (2019Go10). Uncertainty includes statistical and systematic.

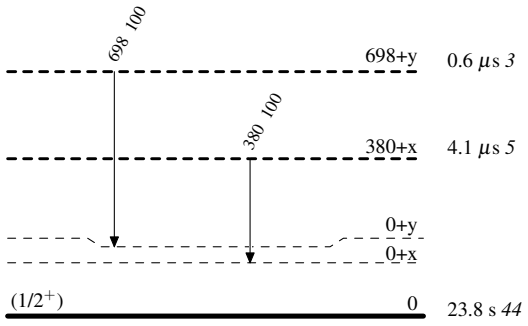
$\gamma(^{213}Tl)$

E_i(level)	E_γ	I_γ	E_f
380+x?	380 *1*	100	0+x?
698+y?	698 *1*	100	0+y?

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{213}_{81}Tl_{132}$