## $^{204}$Tl IT decay (61.7 μs) 1975Uy01,1972Ma59,1958Du80

History

| Type | Author | Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | C. J. Chiara and F. G. Kondev | NDS 111,141 (2010) | 1-Oct-2009 |

Parent: $^{204}$Tl: E=1103.9 *3*; $J^\pi=(7)^+$; $T_{1/2}$=61.7 μs *10*; %IT decay=100.0

1975Uy01: isomer populated by $^{205}$Tl(γ,nγ′); 0.84-g/cm$^2$ natural Tl oxide between 0.1-mm Ni foils; $24^-$ to 32-MeV bremsstrahlung photons;Ge(Li) detector with 2.7-keV resolution at 662 keV; data collected in 16 15−μs intervals for γ(t) measurement.

1972Ma59: isomer populated by $^{204}$Hg(d,2nγ); thick liquid $^{204}$Hg target; E(d)=15 MeV; 2−μs beam pulses at 250−μs intervals, data collected during $17^-$ to 180−μs interval after beam pulse;Ge(Li) detector. Time-differential perturbed angular distribution method.

1966MoZZ: isomer populated by pulsed irradiation of natural Tl target with 14.3-MeV N′s; 4.5-cm diameter cylindrical Tl target.

1958Du80: isomer populated by $^{205}$Tl(γ,nγ′); 2.06-g/cm$^2$ natural Tl target; x-ray beam from 22-MeV betatron, 1−μs pulses at 180 Hz; NaI(Tl) detectors for γ(t) and γγ-coin measurements.

### $^{204}$Tl Levels

| E(level)[†] | $J^\pi$[‡#] | $T_{1/2}$ | Comments |
|---|---|---|---|
| 0 | $2^-$ | | |
| 414.10 *20* | $(4^-)$ | <6 ns | $T_{1/2}$: From 1958Du80. |
| 1103.9 *3* | $(7)^+$ | 61.7 μs *10* | E(level): From Adopted Levels.<br>$T_{1/2}$: Weighted average of 60.7 *12* μs (2008Fo03), 65 *3* μs (1975Uy01), 63 *2* μs (1966MoZZ), and 62 *5* μs (1958Du80).<br>μ = +1.187 *6* by 1972Ma59, but not corrected for Knight shift or diamagnetic shielding; these corrections are expected to mostly cancel, but yield a larger uncertainty than was quoted (1972Ma59).<br>Additional information 1.<br>Proposed dominant configuration: $\pi[(s_{1/2})^{-1}]\nu[(i_{13/2})^{-1}](\nu^{-2})_{0+}$. |

† From a least-squares fit to Eγ, unless otherwise specified.
‡ From Adopted Levels.
# Additional information 2.

### γ($^{204}$Tl)

| $E_\gamma$[‡] | $I_\gamma$[#a] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[@] | α[†] | Comments |
|---|---|---|---|---|---|---|---|---|
| 414.1 *2* | 95.7 | 414.10 | $(4^-)$ | 0 | $2^-$ | [E2][&] | 0.0451 | α(K)=0.0304 *5*; α(L)=0.01111 *16*; α(M)=0.00278 *4*; α(N+..)=0.000833 *12*<br>α(N)=0.000698 *10*; α(O)=0.0001267 *18*; α(P)=7.82×10$^{-6}$ *11* |
| 689.9 *2* | 96.5 | 1103.9 | $(7)^+$ | 414.10 | $(4^-)$ | [E3][&] | 0.0365 | α(K)=0.0242 *4*; α(L)=0.00932 *13*; α(M)=0.00235 *4*; α(N+..)=0.000709 *10*<br>α(N)=0.000593 *9*; α(O)=0.0001089 *16*; α(P)=7.48×10$^{-6}$ *11* |

† Additional information 3.
‡ From 1975Uy01; others: 1958Du80, 1962Eu01. 1958Du80 confirm the coin between 414.1γ and 689.9γ, but the ordering was not determined.
# Additional information 4.
@ From analogy with $^{198}$Tl, $^{202}$Tl. Consistent with $A_2$>0 (values not specified) for 414.1γ and 689.9γ in γ(θ) by 1972Ma59.
& 1958Du80 placed an upper limit of 0.2 on the ratio of total number of conversion electrons from the 414.1- and 689.9-keV

Continued on next page (footnotes at end of table)

## $^{204}$Tl IT decay (61.7 $\mu$s) 1975Uy01,1972Ma59,1958Du80 (continued)

### $\gamma(^{204}Tl)$ (continued)

transitions, as determined by x-ray yield, to the 414.1$\gamma$ intensity, i.e. $[N_e(689.9)+N_e(414.1)]/N_\gamma(414.1)\leq 0.2$. This limit is consistent with the $\alpha'$s for the assigned multipolarities.

[a] Absolute intensity per 100 decays.

## $^{204}$Tl IT decay (61.7 $\mu$s) 1975Uy01,1972Ma59,1958Du80