^{204}Tl – Comments on evaluation
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The electron capture transition to the Hg-204 ground state is first forbidden unique, so the P_K/P_L ratio strongly depends on the decay energy. In this evaluation the Q^+ value from Audi and Wapstra has been adopted. However, if this value changes, P_K and P_L, as well as the decay branching ratios, must be reevaluated.

Nuclear Data

Spin and parity assignments are from Schmorak (1994Sc24).

Experimental Q^+ values

The following experimental values have been noted from publications :

Reference	Value in keV	Uc	
Biavati(1962Bi04)	310	10	393 quoted in Klein
Leutz (1962Le05)	410	+30 – 23	As quoted by Christmas
Christmas (1964Ch17)	313	+17 – 14	
Klein (1966Kl02)	324	+21 – 16	
Lancman (1973La17)	385	20	
Zide (1979Zi02)	357	15	
Audi (1995Au04)	347,5	15	
Audi (2002)	**345,0**	**13**	**Adopted**

In the 1995Au04 publication, Audi recommended 347,5(15) keV for the Q^+ energy, but a new mass determination of Hg-204 (2002Be) leads to the value of 345,0(13) keV (Audi on the AMDC web site) from the atomic mass differences. As these mass measurements were performed with Penning trap facility, the resulting Q value is considered to be more reliable than the other values quoted in the above table.

Adopted Q values

Q^- value is from Audi and Wapstra (1995Au04)
Q^- = 763,72 (18) keV
Q^+ = 345,0 (13) keV

Half-life

Reference	Value (years)	Uc	Comments
Anspach (1965An07)	3,754	0,004	
Horroks (1968Ho07)	3,825	0,003	
Bortels (1969Bo24)	3,774	0,008	Uc for 1 σ
Jordan (1969Jo02)	3,7730	0,0028	Uc for 1 $\sigma \times 1{,}5$
Harbottle (1970Ha32)	3,793	0,005	
Adopted	**3,788**	**0,015**	

The uncertainty for one standard deviation given by Jordan has been multiply by 1,5. The set of five values quoted above is quite discrepant with a reduced-χ^2 of 64,3. The Lweight program has calculated a weighted average of *3,788 years* with an external uncertainty of 0,013, which was increased to *0,015* to include the most precise value.

Electron capture sub shell probabilities

The adopted values have been calculated with the LOGFT program for a unique 1st forbidden transition and Q = 345,0 (13) keV.
P_K = 0,5843(14) ; P_L = 0,3024(10) ; P_{M+} = 0,1133(5)

Several measurements of the P_L /P_K ratio were carried out :

Reference	P_L/P_K	P_K/P_{b-}	Branching ratio %
Christmas (1964Ch17)	0,600 (55)	0,01590 (36)	2,54 (12)
Joshi (1961JO12)	0,42 (5)	0,0155 (10)	
Leutz (1962Le05)	0,41 (3)		
Klein (1966Kl02)	0,55 (5)	0,0153 (5)	2,15 (6)
Weighted mean	0,47 (3)		
Adopted values	0,518 (2)		2,92 (13)

Branching ratios

From the Xk emissions intensities measured by Schötzig (1990Sc08), I_{XK} = 1,64(7), and using P_K = 0,5843(14) and ω_K = 0,962(4), the electron capture branching ratio $P\varepsilon$ becomes:
$P\varepsilon = I_{XK} / (P_K \times \omega_K) = 2{,}92(13)$ %

And then $P\beta^-$ = 97,08(13) %

Atomic data

All the atomic data : ω_K = 0,962(4) etc. and ratio K_β/K_α etc. are from Schönfeld (1996Sc06).

Photons emissions

X-ray emissions

The X_K emission intensities are those measured by Schötzig.

Reference		I(%)	Uc
Schotzig (1990Sc08)	Hg- $K_{\alpha 2}$	0,474	0,020
	Hg- $K_{\alpha 1}$	0,812	0,034
	Hg- K_{β} 1	0,273	0,010
	Hg- K_{β} 2	0,081	0,003
	Pb- $K_{\alpha 2}$	$4{,}4\ 10^{-3}$	0,3
	Pb- $K_{\alpha 1}$	$6{,}1\ 10^{-3}$	0,3
	Pb-K_{β} 1	$2{,}7\ 10^{-3}$	0,2
	Pb- K_{β} 2	$7{,}3\ 10^{-4}$	0,2

The X_L emission intensities have been calculated by using the Emission program after addition of the PL1, etc. values.

The ratio K–Auger / β- = 6,7(8) 10^{-4} , deduced from the evaluated data, can be compared with the measured value, K–Auger /β– = 4,9(28) 10^{-4} given by Park and Christmas (1967Pa08).

Internal bremsstrahlung

Internal bremsstrahlung accompanying capture of orbital electrons is about (3×10^{-5}) photons per K capture.

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