$^{201}_{81}\mathrm{Tl}_{120}$

1 Decay Scheme

Tl-201 decays by electron capture to the Hg-201.
Le thallium 201 se désintègre par capture électronique vers le mercure 201.

2 Nuclear Data

$T_{1/2}(^{201}\mathrm{Tl}\ )$: 3,0421 (17) d
$Q^{+}(^{201}\mathrm{Tl}\ )$: 483 (15) keV

2.1 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,4}$	316 (15)	40,9 (9)	1st Forbidden	6,1	0,724 (7)	0,206 (7)	0,054 (2)
$\epsilon_{0,3}$	451 (15)	13,0 (5)	1st Forbidden	6,9	0,758 (3)	0,181 (3)	0,0461 (12)
$\epsilon_{0,2}$	457 (15)	0,23	Unique 1st Forbidden	8,5			
$\epsilon_{0,1}$	482 (15)	25 (22)	1st Forbidden	6,5	0,763 (3)	0,178 (3)	0,0451 (12)
$\epsilon_{0,0}$	483 (15)	21 (21)	1st Forbidden	6,5	0,763 (3)	0,178 (3)	0,0451 (12)

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Hg)	1,565 (6)	38 (22)	M1+E2				4,7 (7) 10^4
$\gamma_{3,2}$(Hg)	5,869 (26)	0,52 (14)	[M1+E2]				
$\gamma_{2,0}$(Hg)	26,269 (7)	0,64 (7)	M1(+E2)		58,8 (18)	13,74 (41)	76,9 (23)
$\gamma_{3,1}$(Hg)	30,573 (17)	12,77 (25)	M1+E2		36,9 (4)	8,79 (26)	48,5 (2)
$\gamma_{3,0}$(Hg)	32,138 (16)	11,28 (22)	M1+E2		32,0 (4)	7,62 (23)	41,9 (2)
$\gamma_{4,3}$(Hg)	135,312 (34)	11,59 (28)	M1+E2	2,83 (3)	0,48 (5)	0,1138 (34)	3,45 (10)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{4,2}$(Hg)	141,18 (4)	< 0,02	[E2]	0,372 (11)	0,774 (23)	0,202 (6)	1,41 (4)
$\gamma_{4,1}$(Hg)	165,885 (31)	0,420 (13)	M1(+E2)	1,57 (3)	0,270 (5)	0,0634 (19)	1,86 (8)
$\gamma_{4,0}$(Hg)	167,45 (3)	28,9 (9)	M1+E2	1,55 (3)	0,262 (5)	0,0620 (19)	1,89 (8)

3 Atomic Data

3.1 Hg

ω_K : 0,962 (4)
$\bar{\omega}_L$: 0,355 (14)
n_{KL} : 0,813 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	68,895		58,99
	$K\alpha_1$	70,82		100
	$K\beta_3$	79,823	}	
	$K\beta_1$	80,254	}	
	$K\beta_5''$	80,762	}	33,94
	$K\beta_2$	82,435	}	
	$K\beta_4$	82,776	}	10
	$KO_{2,3}$	83,028	}	
X_L				
	$L\ell$	8,72		
	$L\alpha$	9,898 – 9,989		
	$L\eta$	10,651		
	$L\beta$	11,563 – 12,56		
	$L\gamma$	13,41 – 14,85		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	53,178 – 58,277	100
KLX	64,594 – 68,430	55,2
KXY	75,98 – 83,09	7,62
Auger L	5,1 – 14,8	34

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Hg)	5,1 - 14,8	57,7 (7)
e_{AK}	(Hg)		3,7 (4)
	KLL	53,178 - 58,277 }	
	KLX	64,594 - 68,430 }	
	KXY	75,98 - 83,09 }	
$ec_{2,0\ L}$	(Hg)	11,429 - 13,985	0,48 (5)
$ec_{3,1\ L}$	(Hg)	15,734 - 18,289	9,70 (34)
$ec_{3,0\ L}$	(Hg)	17,299 - 19,854	8,57 (31)
$ec_{2,0\ M}$	(Hg)	22,707 - 23,974	0,113 (13)
$ec_{3,1\ M}$	(Hg)	27,011 - 28,278	2,27 (8)
$ec_{3,0\ M}$	(Hg)	28,576 - 29,843	2,00 (7)
$ec_{3,1\ N}$	(Hg)	29,770 - 30,473	0,583 (21)
$ec_{3,0\ N}$	(Hg)	31,334 - 32,038	0,515 (19)
$ec_{4,3\ K}$	(Hg)	52,210 (34)	7,45 (24)
$ec_{4,1\ K}$	(Hg)	82,783 (31)	0,237 (8)
$ec_{4,0\ K}$	(Hg)	84,348 (30)	15,6 (5)
$ec_{4,3\ L}$	(Hg)	120,473 - 123,028	1,268 (41)
$ec_{4,3\ M}$	(Hg)	131,750 - 133,017	0,296 (9)
$ec_{4,3\ N}$	(Hg)	134,509 - 135,212	0,0760 (24)
$ec_{4,0\ L}$	(Hg)	152,611 - 155,166	2,65 (8)
$ec_{4,0\ M}$	(Hg)	163,888 - 165,155	0,62 (2)
$ec_{4,0\ N}$	(Hg)	166,647 - 167,350	0,159 (5)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Hg)	8,72 — 14,85		42,7 (18)	
XKα_2	(Hg)	68,895		27,3 (5)	} Kα
XKα_1	(Hg)	70,82		46,4 (7)	}
XKβ_3	(Hg)	79,823	}		
XKβ_1	(Hg)	80,254	}	15,7 (4)	K$'\beta_1$
XKβ''_5	(Hg)	80,762	}		
XKβ_2	(Hg)	82,435	}		
XKβ_4	(Hg)	82,776	}	4,61 (13)	K$'\beta_2$
XKO$_{2,3}$	(Hg)	83,028	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Hg)	1,565 (6)	0,00081 (47)
$\gamma_{3,2}$(Hg)	5,869 (26)	0,5
$\gamma_{2,0}$(Hg)	26,269 (7)	0,0082 (9)
$\gamma_{3,1}$(Hg)	30,573 (17)	0,258 (5)
$\gamma_{3,0}$(Hg)	32,138 (16)	0,263 (5)
$\gamma_{4,3}$(Hg)	135,312 (34)	2,604 (22)
$\gamma_{4,2}$(Hg)	141,18 (4)	< 0,008
$\gamma_{4,1}$(Hg)	165,885 (31)	0,147 (2)
$\gamma_{4,0}$(Hg)	167,45 (3)	10,0 (1)

6 Main Production Modes

$\left\{ \begin{array}{l} \mathrm{Pb-201(EC)Tl-201} \\ \mathrm{T1/2 = 9{,}33h} \end{array} \right.$

$\left\{ \begin{array}{l} \mathrm{Tl-203(p,3n)Pb-201} \\ \mathrm{Possible\ impurities:\ Pb-200,Pb-202m,Pb-203,Pb-204m,Tl-200} \end{array} \right.$

$\left\{ \begin{array}{l} \mathrm{Tl-205(p,5n)Pb-201} \\ \mathrm{Possible\ impurities:\ Pb-200,Pb-202m,Pb-204m,Tl-200,Tl-202} \end{array} \right.$

$\left\{ \begin{array}{l} \mathrm{Tl-203(d,4n)Pb-201} \\ \text{Possible impurities : } \mathrm{Pb-200,Pb-202m,Pb-203,Pb-204m,Tl-200,Tl-202} \end{array} \right.$

7 References

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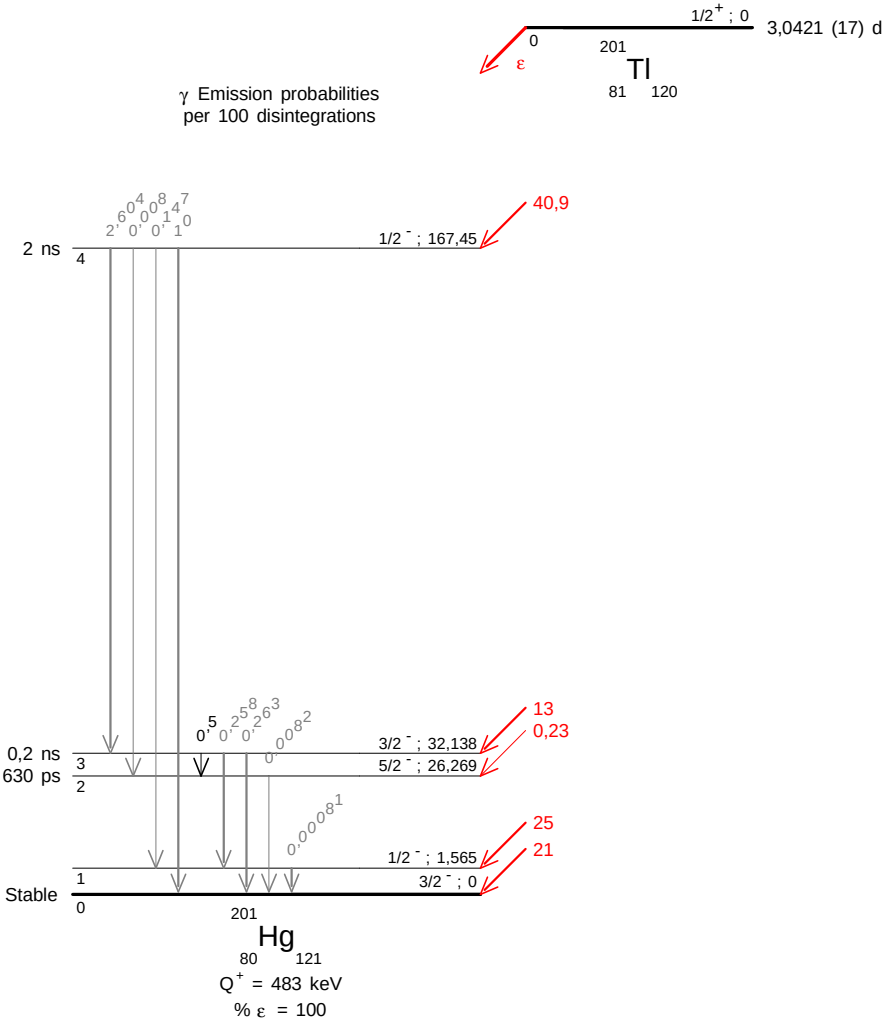
1/2+ ; 0
3,0421 (17) d
0
ε
201
Tl
81
120
γ Emission probabilities
per 100 disintegrations
40,9
2 ns
4
1/2 - ; 167,45
13
0,23
0,2 ns
630 ps
3
2
3/2 - ; 32,138
5/2 - ; 26,269
25
21
1/2 - ; 1,565
1
Stable
0
3/2 - ; 0
201
Hg
80
121
Q+ = 483 keV
% ε = 100