$^{159}_{64}$Gd $_{95}$

1 Decay Scheme

Gd-159 decays by beta minus emission to levels in Tb-159.
Le gadolinium 159 se désintègre par émission bêta moins vers des niveaux excités du terbium 159.

2 Nuclear Data

$T_{1/2}(^{159}\text{Gd})$	:	18,479	(7)	h
$Q^-(^{159}\text{Gd})$	:	970,5	(7)	keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,9}$	79,3 (7)	0,0009 (4)	Allowed	8,08
$\beta^-_{0,8}$	115,5 (7)	0,0162 (5)	Allowed	7,31
$\beta^-_{0,7}$	296,3 (7)	0,00388 (10)	1st Forbbiden	9,22
$\beta^-_{0,6}$	352,9 (7)	0,0300 (9)	1st Forbbiden	8,58
$\beta^-_{0,5}$	389,7 (7)	0,0626 (8)	1st Forbbiden	8,41
$\beta^-_{0,4}$	607,0 (7)	12,19 (6)	Allowed	6,76
$\beta^-_{0,3}$	622,2 (7)	0,315 (4)	1st Forbbiden	8,39
$\beta^-_{0,2}$	833,0 (7)	0,012 (9)	Unique 1st Forbbiden	10,6
$\beta^-_{0,1}$	912,5 (7)	29,6 (12)	1st Forbbiden	6,99
$\beta^-_{0,0}$	970,5 (7)	57,8 (12)	1st Forbbiden	6,73

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Tb)	58,0000 (22)	30,13 (7)	M1+1,4%E2	9,14 (27)	1,55 (5)	0,343 (10)	11,1 (3)
$\gamma_{2,1}$(Tb)	79,5132 (27)	0,2532 (11)	M1+1,56%E2	3,66 (11)	0,584 (18)	0,129 (4)	4,41 (13)
$\gamma_{2,0}$(Tb)	137,515 (5)	0,01188 (15)	[E2]	0,474 (14)	0,277 (8)	0,0653 (19)	0,833 (25)
$\gamma_{3,2}$(Tb)	210,783 (3)	0,0246 (14)	[M1,E2]	0,18 (3)	0,039 (7)	0,0089 (16)	0,23 (7)
$\gamma_{4,2}$(Tb)	226,0406 (18)	0,2244 (21)	E1	0,0290 (9)	0,00414 (12)	0,00089 (3)	0,0343 (10)
$\gamma_{8,6}$(Tb)	237,341 (5)	0,00792 (16)	[E1]	0,0256 (8)	0,00364 (11)	0,00079 (2)	0,0302 (9)
$\gamma_{9,6}$(Tb)	273,62 (12)	0,00071 (41)	[E1]	0,0178 (5)	0,00251 (8)	0,00055 (2)	0,0210 (6)
$\gamma_{8,5}$(Tb)	274,163 (19)	0,0058 (4)	[E1]	0,0177 (5)	0,00250 (8)	0,00054 (2)	0,0209 (6)
$\gamma_{3,1}$(Tb)	290,2865 (25)	0,0353 (5)	[M1,E2]	0,075 (23)	0,014 (1)	0,0031 (1)	0,093 (29)
$\gamma_{4,1}$(Tb)	305,5492 (20)	0,0630 (7)	E1	0,0135 (4)	0,00189 (6)	0,000411 (12)	0,0159 (5)
$\gamma_{3,0}$(Tb)	348,2807 (18)	0,2553 (25)	M1+16%E2	0,056 (2)	0,0084 (3)	0,00180 (5)	0,067 (2)
$\gamma_{4,0}$(Tb)	363,5430 (18)	11,90 (5)	E1	0,00882 (26)	0,00123 (4)	0,000266 (8)	0,0104 (3)
$\gamma_{7,2}$(Tb)	536,730 (17)	0,00164 (5)	M1+E2	0,0200 (6)	0,00280 (8)	0,00061 (2)	0,0236 (7)
$\gamma_{6,1}$(Tb)	559,624 (6)	0,0225 (6)	M1+E2	0,0152 (5)	0,0022 (2)	0,00040 (9)	0,019 (3)
$\gamma_{5,0}$(Tb)	580,809 (6)	0,0703 (8)	[M1,E2]	0,012 (4)	0,0018 (6)		0,015 (5)
$\gamma_{7,1}$(Tb)	616,234 (18)	0,00191 (8)	(M1)	0,0142 (4)	0,00197 (6)	0,00042 (2)	0,0167 (5)
$\gamma_{6,0}$(Tb)	617,616 (8)	0,0162 (5)	(M1)	0,0141 (4)	0,00196 (6)	0,00043 (2)	0,0166 (5)
$\gamma_{7,0}$(Tb)	674,26 (5)	0,000320 (22)	(M1)	0,0113 (3)	0,00157 (5)	0,00034 (1)	0,0133 (4)
$\gamma_{9,2}$(Tb)	753,74 (6)	0,00018 (2)	[E1]	0,00177 (5)	0,000236 (7)	0,000051 (2)	0,00207 (6)
$\gamma_{8,0}$(Tb)	854,949 (20)	0,00246 (14)	[E1]	0,00138 (4)	0,000183 (5)	0,000040 (1)	0,00162 (5)

3 Atomic Data

3.1 Tb

ω_K	:	0,935	(4)
$\bar{\omega}_L$	:	0,186	(8)
n_{KL}	:	0,847	(4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	43,7447		55,77
	$K\alpha_1$	44,4821		100
	$K\beta_3$	50,23	}	
	$K\beta_1$	50,383	}	31,9
	$K\beta_2$	51,724	}	
	$K\beta_4$	51,849	}	8,3

3.1.2 Auger Electrons

		Energy keV	Relative probability
Auger K			
	KLL	34,398 – 36,773	100
	KLX	41,243 – 44,456	52,1
	KXY	48,06 – 51,95	6,7
Auger L		3,58 – 8,70	

4 Electron Emissions

		Energy keV			Electrons per 100 disint.
e_{AL}	(Tb)	3,58 - 8,70			0,195 (5)
e_{AK}	(Tb)				1,49 (11)
	KLL	34,398 - 36,773		}	
	KLX	41,243 - 44,456		}	
	KXY	48,06 - 51,95		}	
$ec_{1,0\ T}$	(Tb)	6,004 - 57,715			27,64 (80)
$ec_{1,0\ K}$	(Tb)	6,004	(1)		22,8 (9)
$ec_{2,1\ K}$	(Tb)	27,518	(1)		0,17 (7)
$ec_{1,0\ L}$	(Tb)	49,292 - 50,486			3,86 (16)
$ec_{1,0\ M}$	(Tb)	56,032 - 56,389			0,85 (4)
$ec_{1,0\ N}$	(Tb)	57,602 - 57,715			0,235 (10)
$ec_{4,0\ K}$	(Tb)	311,547	(2)		0,104 (3)
$\beta^-_{0,9}$	max:	79,3	(7)		0,0009 (4)
$\beta^-_{0,9}$	avg:	20,54	(19)		
$\beta^-_{0,8}$	max:	115,5	(7)		0,0162 (5)
$\beta^-_{0,8}$	avg:	30,43	(20)		
$\beta^-_{0,7}$	max:	296,3	(7)		0,00388 (10)
$\beta^-_{0,7}$	avg:	83,82	(22)		
$\beta^-_{0,6}$	max:	352,9	(7)		0,0300 (9)
$\beta^-_{0,6}$	avg:	101,84	(23)		
$\beta^-_{0,5}$	max:	389,7	(7)		0,0626 (8)
$\beta^-_{0,5}$	avg:	113,8	(2)		
$\beta^-_{0,4}$	max:	607,0	(7)		12,19 (6)
$\beta^-_{0,4}$	avg:	189,0	(3)		
$\beta^-_{0,3}$	max:	622,2	(7)		0,315 (4)
$\beta^-_{0,3}$	avg:	194,5	(3)		
$\beta^-_{0,2}$	max:	833,0	(7)		0,012 (9)

		Energy keV		Electrons per 100 disint.
$\beta^-_{0,2}$	avg:	283,9	(3)	
$\beta^-_{0,1}$	max:	912,5	(7)	29,6 (12)
$\beta^-_{0,1}$	avg:	304,1	(3)	
$\beta^-_{0,0}$	max:	970,5	(7)	57,8 (12)
$\beta^-_{0,0}$	avg:	326,9	(3)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XKα_2	(Tb)	43,7447		6,09 (25)	} Kα
XKα_1	(Tb)	44,4821		10,9 (5)	}
XKβ_3	(Tb)	50,23	}		
XKβ_1	(Tb)	50,383	}	3,49 (15)	K$'\beta_1$
XKβ_2	(Tb)	51,724	}		
XKβ_4	(Tb)	51,849	}	0,90 (5)	K$'\beta_2$

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Tb)	58,0000 (22)	2,49 (7)
$\gamma_{2,1}$(Tb)	79,5132 (27)	0,0468 (11)
$\gamma_{2,0}$(Tb)	137,515 (5)	0,00648 (15)
$\gamma_{3,2}$(Tb)	210,783 (3)	0,0200 (14)
$\gamma_{4,2}$(Tb)	226,0406 (18)	0,2170 (21)
$\gamma_{8,6}$(Tb)	237,341 (5)	0,00769 (16)
$\gamma_{9,6}$(Tb)	273,62 (12)	0,0007 (4)
$\gamma_{8,5}$(Tb)	274,163 (19)	0,0057 (4)
$\gamma_{3,1}$(Tb)	290,2865 (25)	0,0323 (5)
$\gamma_{4,1}$(Tb)	305,5492 (20)	0,0620 (7)
$\gamma_{3,0}$(Tb)	348,2807 (18)	0,2393 (25)
$\gamma_{4,0}$(Tb)	363,5430 (18)	11,78 (5)
$\gamma_{7,2}$(Tb)	536,730 (12)	0,00160 (5)
$\gamma_{6,1}$(Tb)	559,623 (6)	0,0221 (6)
$\gamma_{5,0}$(Tb)	580,808 (6)	0,0693 (7)
$\gamma_{7,1}$(Tb)	616,233 (18)	0,00188 (8)
$\gamma_{6,0}$(Tb)	617,615 (8)	0,0159 (5)

	Energy keV	Photons per 100 disint.
$\gamma_{7,0}$(Tb)	674,26 (5)	0,000316 (22)
$\gamma_{9,2}$(Tb)	753,74 (6)	0,00018 (2)
$\gamma_{8,0}$(Tb)	854,947 (20)	0,00246 (14)

6 Main Production Modes

Gd – 158(n,γ)Gd – 159

7 References

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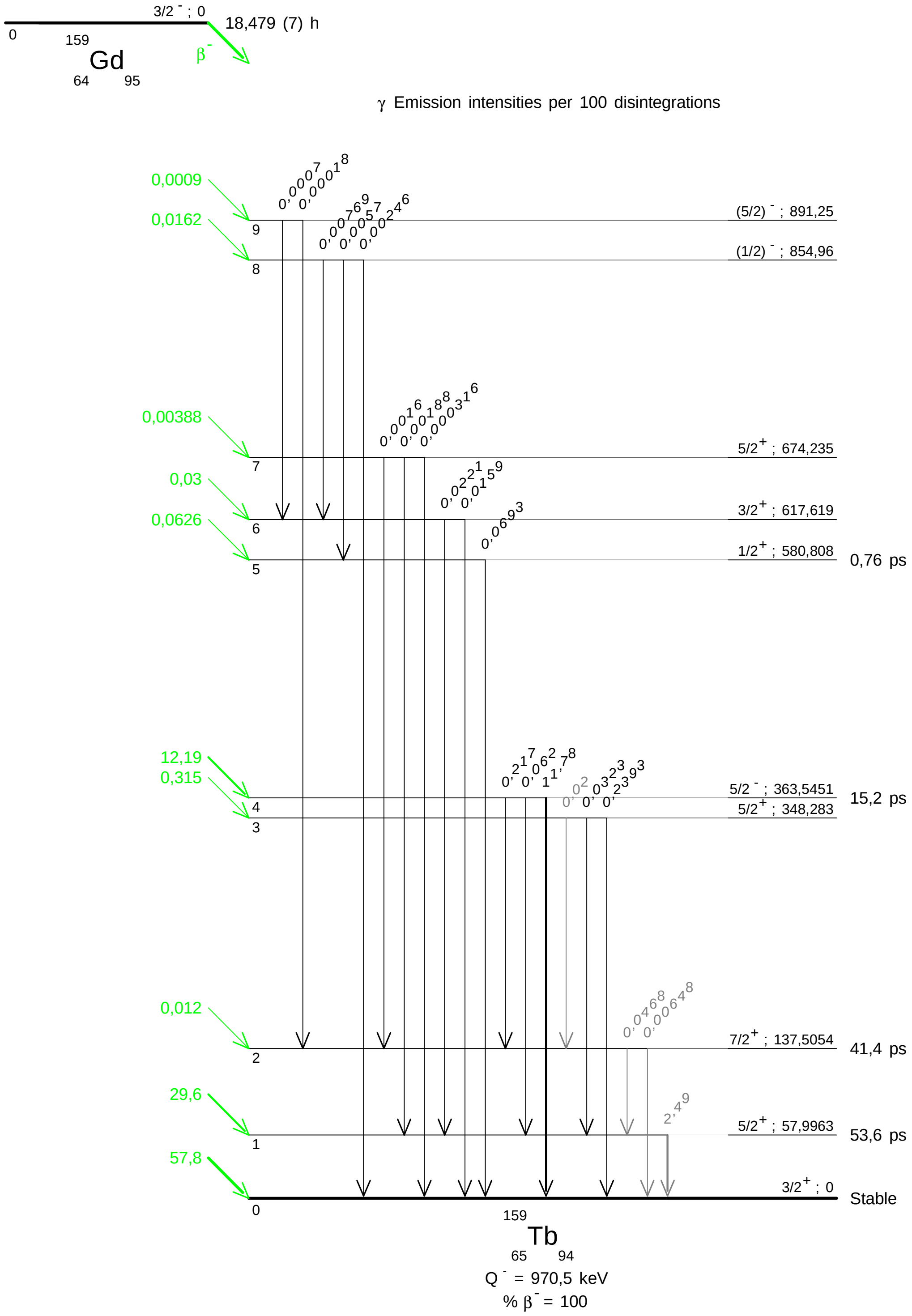
3/2 - ; 0
18,479 (7) h
0
159 Gd 64 95
β-
γ Emission intensities per 100 disintegrations
0,0009
0,0162
0,00388
0,03
0,0626
12,19
0,315
0,012
29,6
57,8
(5/2) - ; 891,25
(1/2) - ; 854,96
5/2+ ; 674,235
3/2+ ; 617,619
1/2+ ; 580,808
0,76 ps
5/2 - ; 363,5451
5/2+ ; 348,283
15,2 ps
7/2+ ; 137,5054
41,4 ps
5/2+ ; 57,9963
53,6 ps
3/2+ ; 0
Stable
159 Tb 65 94
Q - = 970,5 keV
% β- = 100