$^{170}_{69}\mathrm{Tm}_{101}$

1 Decay Scheme

Tm-170 disintegrates by both beta minus decay and electron capture, respectively, to the first excited level of 84.25 keV (18.3 %) and the ground state (81 %) in Yb-170, and to the first excited level of 78.6 keV (0.03 %) and the ground state (0.12 %) in Er-170.
Le thulium 170 se désintègre par émission bêta moins et par capture électronique vers le premier niveau à 84,25 keV (18,3%), le niveau fondamental (81,6 %) de l'ytterbium 170, et le premier niveau à 78,6 keV (0,03 %) et le niveau fondamental (0,12 %) de l'erbium 170.

2 Nuclear Data

$T_{1/2}(^{170}\mathrm{Tm})$	:	127,8	(6)	d
$Q^-(^{170}\mathrm{Tm})$	:	968,0	(8)	keV
$Q^+(^{170}\mathrm{Tm})$	:	314,4	(18)	keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,1}$	883,7 (8)	18,3 (7)	1st forbidden	8,924
$\beta^-_{0,0}$	968,0 (8)	81,6 (7)	1st forbidden	9,432

2.2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,1}$	235,8 (18)	0,029 (3)	1st forbidden	10,21	0,7595 (22)	0,1822 (15)	0,0451 (9)
$\epsilon_{0,0}$	314,4 (18)	0,118 (7)	1st forbidden	9,906	0,7838 (19)	0,1645 (13)	0,0401 (8)

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce} \times 100$	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{(-1,0)}$(Er)							
$\gamma_{1,0}$(Er)	78,59 (2)	0,029 (3)	E2	1,72 (11)	4,51 (30)	1,10 (7)	7,62 (50)
$\gamma_{1,0}$(Yb)	84,25474 (8)	18,3 (7)	E2	1,39 (2)	3,81 (6)	0,94 (1)	6,39 (10)

3 Atomic Data

3.1 Er

ω_K : 0,942 (4)
$\bar{\omega}_L$: 0,216 (9)
n_{KL} : 0,838 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	48,2212		56,34
	$K\alpha_1$	49,1276		100
	$K\beta_3$	55,4797	}	
	$K\beta_1$	55,6737	}	
	$K\beta_5''$	56,0322	}	32,5
	$K\beta_5'$	56,0762	}	
	$K\beta_2$	57,142	}	
	$K\beta_4$	57,313	}	8,45
	$KO_{2,3}$	57,456	}	
X_L				
	$L\ell$	6,15		
	$L\gamma$	– 9,43		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	37,79 – 40,56	100
KLX	45,47 – 49,10	52,4
KXY	53,02 – 57,43	6,9

3.2 Yb

ω_K : 0,947 (4)
$\bar{\omega}_L$: 0,238 (10)
n_{KL} : 0,833 (4)

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	51,3541		56,73
	$K\alpha_1$	52,3887		100
	$K\beta_3$	59,1593	}	
	$K\beta_1$	59,3825	}	
	$K\beta''_5$	59,756	}	32,83
	$K\beta'_5$	59,8045	}	
	$K\beta_2$	60,962	}	
	$K\beta_4$	61,141	}	8,57
	$KO_{2,3}$	61,309	}	
X_L				
	$L\ell$	6,548		
	$L\alpha$	7,369 – 7,416		
	$L\eta$	7,583		
	$L\beta$	8,026 – 8,756		
	$L\gamma$	9,736 – 10,142		

3.2.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	40,16 – 43,23	100
KLX	48,36 – 52,36	52,8
KXY	56,48 – 61,29	7

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AK}	(Er)			0,0072 (6)
	KLL	37,79	- 40,56 }	
	KLX	45,47	- 49,10 }	
	KXY	53,02	- 57,43 }	
e_{AK}	(Yb)			0,182 (14)
	KLL	40,16	- 43,23 }	
	KLX	48,36	- 52,36 }	
	KXY	56,48	- 61,29 }	
$ec_{1,0\ K}$	(Er)	21,10	(2)	0,0058 (5)
$ec_{1,0\ K}$	(Yb)	22,9224	(1)	3,45 (13)
$ec_{1,0\ L}$	(Er)	68,84	- 70,23	0,015 (1)
$ec_{1,0\ L}$	(Yb)	73,77	- 75,31	9,4 (4)
$ec_{1,0\ M}$	(Er)	76,38	- 77,18	0,0037 (3)
$ec_{1,0\ M}$	(Yb)	81,86	- 82,73	2,3 (1)
$\beta^-_{0,1}$	max:	883,7	(8)	18,3 (7)
$\beta^-_{0,1}$	avg:	290,5	(3)	
$\beta^-_{0,0}$	max:	968,0	(8)	81,6 (7)
$\beta^-_{0,0}$	avg:	323,1	(3)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Er)	6,15 — 9,43		0,0306 (19)	
$XK\alpha_2$	(Er)	48,2212		0,332 (16)	} $K\alpha$
$XK\alpha_1$	(Er)	49,1276		0,0590 (24)	}
$XK\beta_3$	(Er)	55,4797	}		
$XK\beta_1$	(Er)	55,6737	}	0,0191 (10)	$K'\beta_1$
$XK\beta''_5$	(Er)	56,0322	}		
$XK\beta'_5$	(Er)	56,0762	}		
$XK\beta_2$	(Er)	57,142	}		
$XK\beta_4$	(Er)	57,313	}	0,0050 (3)	$K'\beta_2$
$XKO_{2,3}$	(Er)	57,456	}		

		Energy keV		Photons per 100 disint.	
XL	(Yb)	6,548 — 10,142		3,22 (13)	
XKα_2	(Yb)	51,3541		0,95 (4)	} Kα
XKα_1	(Yb)	52,3887		1,67 (7)	}
XKβ_3	(Yb)	59,1593	}		
XKβ_1	(Yb)	59,3825	}	0,55 (3)	K$'\beta_1$
XKβ_5''	(Yb)	59,756	}		
XKβ_5'	(Yb)	59,8045	}		
XKβ_2	(Yb)	60,962	}		
XKβ_4	(Yb)	61,141	}	0,144 (7)	K$'\beta_2$
XKO$_{2,3}$	(Yb)	61,309	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Er)	78,59 (2)	0,0034 (3)
$\gamma_{1,0}$(Yb)	84,25474 (8)	2,48 (9)

6 Main Production Modes

$\mathrm{Tm-169(n,\gamma)Tm-170}$

$\left\{ \begin{array}{l} \mathrm{Er-170(p,n)Tm-170} \\ \text{Possible impurities : } \mathrm{Tm-168} \end{array} \right.$

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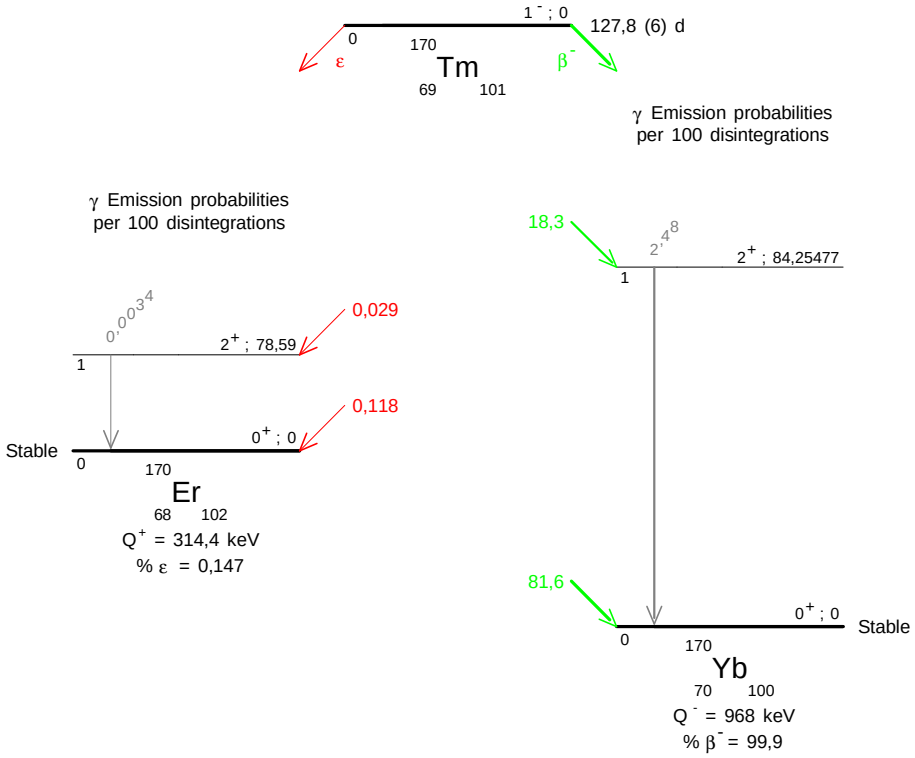
1⁻ ; 0
127,8 (6) d
0
170
ε
Tm
69
101
β⁻
γ Emission probabilities
per 100 disintegrations
γ Emission probabilities
per 100 disintegrations
18,3
2,4,8
2⁺ ; 84,25477
1
0,029
0,0,0,3,4
2⁺ ; 78,59
1
0,118
Stable
0⁺ ; 0
0
170
Er
68
102
Q⁺ = 314,4 keV
% ε = 0,147
81,6
0⁺ ; 0
Stable
0
170
Yb
70
100
Q⁻ = 968 keV
% β⁻ = 99,9