



1 Decay Scheme

Ce-139 disintegrates by electron capture to La-139.

If asymmetric uncertainties are used, the probability of capture to the 165 keV level is 99,9973 (+27-53) and that to the ground state is less than 0,008%.

Le cérium 139 se désintègre par capture électronique vers le lanthane 139. La probabilité de capture vers le niveau fondamental est inférieure à 0,008 %.

2 Nuclear Data

$$T_{1/2}({}^{139}\text{Ce}) : 137,641 \quad (20) \quad \text{d}$$

$$Q^+({}^{139}\text{Ce}) : 270 \quad (3) \quad \text{keV}$$

2.1 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg <i>ft</i>	P_K	P_L	P_M
$\epsilon_{0,1}$	104,1 (30)	99,9973 (27)	Allowed	5,42	0,716 (7)	0,217 (5)	0,0669 (18)
$\epsilon_{0,0}$	270 (3)	0,008	2nd Forbidden	10,6			

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}(\text{La})$	165,8576 (11)	100,00 (4)	M1	0,2146 (10)	0,0288 (6)	0,0060 (2)	0,2516 (7)

3 Atomic Data

3.1 La

ω_K	:	0,905	(4)
$\bar{\omega}_L$:	0,117	(5)
n_{KL}	:	0,882	(4)

3.1.1 X Radiations

	Energy keV	Relative probability
X _K		
K α_2	33,0344	54,44
K α_1	33,4421	100
K β_3	37,7206	}
K β_1	37,8015	}
K β_5''	38,084	}
		29,78
K β_2	38,7303	}
K β_4	38,828	}
K $O_{2,3}$	38,91	}
		7,53
X _L		
L ℓ	4,117	
L α	4,634 – 4,65	
L η	4,525	
L β	5,041 – 5,381	
L γ	5,62 – 6,072	

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	26,240 – 27,795	100
KLX	31,231 – 33,428	48,3
KXY	36,2 – 38,9	5,84
Auger L	2,7 – 6,2	

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e _{AL}	(La)	2,7 - 6,2	90,1 (6)
e _{AK}	(La)		8,4 (4)
	KLL	26,240 - 27,795	}
	KLX	31,231 - 33,428	}
	KXY	36,2 - 38,9	}
ec _{1,0 T}	(La)	126,933 - 165,843	20,10 (6)
ec _{1,0 K}	(La)	126,9330 (11)	17,15 (8)
ec _{1,0 L}	(La)	159,591 - 160,375	2,30 (5)
ec _{1,0 M}	(La)	164,496 - 165,026	0,479 (16)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.
XL	(La)	4,117 — 6,072	12,19 (18)
XK α_2	(La)	33,0344	22,80 (24) } K α
XK α_1	(La)	33,4421	41,9 (4) }
XK β_3	(La)	37,7206	}
XK β_1	(La)	37,8015	}
XK β_5''	(La)	38,084	}
XK β_2	(La)	38,7303	}
XK β_4	(La)	38,828	}
XKO _{2,3}	(La)	38,91	}
			12,47 (18) K' β_1
			3,16 (8) K' β_2

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}(\text{La})$	165,8575 (11)	79,90 (4)

6 Main Production Modes

- Ce – 138(n,γ)Ce – 139m σ : 0,015 (5) barns
- { Ce – 139m(I.T.,)Ce – 139
- { Possible impurities : T1/2 = 56 s
- { Ce – 138(n,γ)Ce – 139 σ : 1,1 (3) barns
- { Possible impurities : Ce – 141
- { La – 139(d,2n)Ce – 139
- { Possible impurities : none
- La – 139(p,n)Ce – 139m

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