$^{236}_{93}\mathrm{Np}_{143}$

1 Decay Scheme

Np-236 decays 87,8 (6) % by electron capture to U-236, 12,0 (6) % by beta minus emission to Pu-236, a possible alpha emission of 0,16 (6)% to Pa-232 has not been observed.
Le neptunium 236 se désintègre majoritairement (87,8 %) par capture électronique vers l'uranium 236 et par transition bêta moins (12 %) vers le plutonium 236. Une faible branche par transition alpha vers le protactinium 232 est possible mais n'a pas été observée.

2 Nuclear Data

$T_{1/2}(^{236}\mathrm{Np})$	:	1,55	(8)	10^5 a
$T_{1/2}(^{236}\mathrm{U})$	:	23,43	(6)	10^6 a
$T_{1/2}(^{236}\mathrm{Pu})$	:	2,87	(1)	a
$T_{1/2}(^{232}\mathrm{Pa})$	:	1,31	(2)	d
$Q^-(^{236}\mathrm{Np})$	:	480	(50)	keV
$Q^+(^{236}\mathrm{Np})$	:	930	(50)	keV
$Q^\alpha(^{236}\mathrm{Np})$	:	5010	(50)	keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,3}$	174 (50)	11,8 (12)	1st forbidden	14,5
$\beta^-_{0,2}$	333 (50)	< 1,6	1st forbidden unique	> 16

2.2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,6}$	82 (50)	∼ 0,096	allowed	14,6		0,6	0,4
$\epsilon_{0,3}$	620 (50)	87,8 (43)	1st forbidden	14,1	0,726 (8)	0,201 (5)	0,073 (2)
$\epsilon_{0,2}$	781 (50)	< 4,4	1st forbidden unique	> 15,9	0,74	0,19	0,07

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Pu)	44,63 (10)	11,9 (7)	E2		538 (11)	150 (3)	741 (15)
$\gamma_{1,0}$(U)	45,244 (2)	87,8 (6)	E2		429 (9)	118,6 (24)	589 (12)
$\gamma_{5,4}$(U)	56,6 (5)	∼ 0,08	(E2)		145 (7)	40,1 (19)	199 (10)
$\gamma_{2,1}$(Pu)	102,82 (2)	12,0 (6)	E2		10,06 (20)	2,82 (6)	13,87 (28)
$\gamma_{6,5}$(U)	104,1 (10)	∼ 0,096	E2		8,1 (4)	2,23 (11)	11,1 (6)
$\gamma_{2,1}$(U)	104,233 (5)	87,8 (6)	E2		8,00 (16)	2,22 (5)	10,99 (22)
$\gamma_{3,2}$(Pu)	158,35 (2)	11,8 (12)	E2	0,193 (4)	1,41 (3)	0,394 (8)	2,14 (4)
$\gamma_{3,2}$(U)	160,308 (3)	87,8 (43)	E2	0,208 (4)	1,13 (2)	0,313 (7)	1,76 (4)
$\gamma_{4,2}$(U)	538,1 (1)	∼ 0,0008	E3	0,0622 (13)	0,0587 (12)	0,0160 (3)	0,143 (3)
$\gamma_{5,2}$(U)	594,5 (3)	∼ 0,008					
$\gamma_{4,1}$(U)	642,34 (5)	∼ 0,068	E1+(M2+E3)	0,112 (10)	0,031 (3)	0,0080 (8)	0,15 (2)
$\gamma_{4,0}$(U)	687,59 (4)	∼ 0,021	E1+(M2+E3)	0,219 (12)	0,068 (6)	0,018 (2)	0,31 (2)

3 Atomic Data

3.1 U

ω_K : 0,970 (4)
$\bar{\omega}_L$: 0,500 (19)
n_{KL} : 0,794 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	94,666		62,47
	$K\alpha_1$	98,44		100
	$K\beta_3$	110,421	}	
	$K\beta_1$	111,298	}	
	$K\beta_5''$	111,964	}	36,08
	$K\beta_2$	114,407	}	
	$K\beta_4$	115,012	}	12,34
	$KO_{2,3}$	115,377	}	
X_L				
	$L\ell$	11,619		
	$L\alpha$	13,438 – 13,615		
	$L\eta$	15,399		
	$L\beta$	15,727 – 18,206		
	$L\gamma$	19,507 – 20,714		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	71,78 – 80,95	100
KLX	88,15 – 98,43	59,6
KXY	104,51 – 115,59	8,88
Auger L	6,07 – 21,68	

3.2 Pu

ω_K : 0,971 (4)
$\bar{\omega}_L$: 0,521 (20)
n_{KL} : 0,790 (5)

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	99,525		63,17
	$K\alpha_1$	103,734		100
	$K\beta_3$	116,244	}	
	$K\beta_1$	117,228	}	
	$K\beta_5''$	117,918	}	36,7
	$K\beta_2$	120,54	}	
	$K\beta_4$	120,969	}	12,74
	$KO_{2,3}$	121,543	}	
X_L				
	$L\ell$	12,1246		
	$L\alpha$	14,083 – 14,279		
	$L\eta$	16,334		
	$L\beta$	16,499 – 18,543		
	$L\gamma$	20,708 – 21,984		

3.2.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	75,26 – 85,36	100
KLX	92,61 – 103,73	60,6
KXY	109,93 – 121,78	9,18
Auger L	6,19 – 23,10	

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(U)	6,07 - 21,68	128,8 (19)
e_{AK}	(U)		2,1 (3)
	KLL	71,78 - 80,95	}
	KLX	88,15 - 98,43	}
	KXY	104,51 - 115,59	}
e_{AL}	(Pu)	6,19 - 23,10	10,7 (3)
e_{AK}	(Pu)		0,021 (4)
	KLL	75,26 - 85,36	}
	KLX	92,61 - 103,73	}
	KXY	109,93 - 121,78	}
$ec_{1,0\ L}$	(Pu)	21,53 - 26,57	8,7 (5)
$ec_{1,0\ L}$	(U)	23,486 - 28,076	63,9 (19)
$ec_{3,2\ K}$	(Pu)	36,56 (2)	0,73 (8)
$ec_{1,0\ M}$	(Pu)	38,70 - 40,86	2,42 (14)
$ec_{1,0\ M}$	(U)	39,696 - 41,690	17,7 (5)
$ec_{3,2\ K}$	(U)	44,706 (3)	6,6 (3)
$ec_{2,1\ L}$	(Pu)	79,72 - 84,76	8,1 (6)
$ec_{2,1\ L}$	(U)	82,475 - 87,065	58,6 (16)
$ec_{2,1\ M}$	(Pu)	96,89 - 99,04	2,28 (18)
$ec_{2,1\ M}$	(U)	98,685 - 100,680	16,25 (47)
$ec_{3,2\ L}$	(Pu)	135,25 - 140,29	5,4 (6)
$ec_{3,2\ L}$	(U)	138,55 - 143,14	36,0 (18)
$ec_{3,2\ M}$	(Pu)	152,42 - 154,57	1,50 (16)
$ec_{3,2\ M}$	(U)	154,76 - 156,76	10,0 (5)
$\beta^-_{0,3}$	max:	174 (50)	11,8 (12)
$\beta^-_{0,3}$	avg:	46 (15)	
$\beta^-_{0,2}$	max:	333 (50)	< 1,6
$\beta^-_{0,2}$	avg:	92 (16)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(U)	11,619 — 20,714	117,5 (30)	
XKα_2	(U)	94,666	20,2 (3)	} Kα
XKα_1	(U)	98,44	32,4 (5)	}
XKβ_3	(U)	110,421	}	
XKβ_1	(U)	111,298	} 11,69 (25)	K$'\beta_1$
XKβ''_5	(U)	111,964	}	
XKβ_2	(U)	114,407	}	
XKβ_4	(U)	115,012	} 4,00 (11)	K$'\beta_2$
XKO$_{2,3}$	(U)	115,377	}	
XL	(Pu)	12,1246 — 21,984	12,1 (4)	
XKα_2	(Pu)	99,525	0,212 (23)	} Kα
XKα_1	(Pu)	103,734	0,33 (4)	}
XKβ_3	(Pu)	116,244	}	
XKβ_1	(Pu)	117,228	} 0,123 (14)	K$'\beta_1$
XKβ''_5	(Pu)	117,918	}	
XKβ_2	(Pu)	120,54	}	
XKβ_4	(Pu)	120,969	} 0,043 (5)	K$'\beta_2$
XKO$_{2,3}$	(Pu)	121,543	}	

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Pu)	44,63 (10)	0,0161 (9)
$\gamma_{1,0}$(U)	45,244 (2)	0,149 (3)
$\gamma_{5,4}$(U)	56,6 (5)	$\sim$ 0,0004
$\gamma_{2,1}$(Pu)	102,82 (2)	0,81 (6)
$\gamma_{6,5}$(U)	104,1 (10)	$\sim$ 0,008
$\gamma_{2,1}$(U)	104,234 (6)	7,32 (13)
$\gamma_{3,2}$(Pu)	158,35 (3)	3,8 (4)
$\gamma_{3,2}$(U)	160,307 (3)	31,8 (15)
$\gamma_{4,2}$(U)	538,1 (1)	$\sim$ 0,0007
$\gamma_{5,2}$(U)	594,5 (3)	$\sim$ 0,008
$\gamma_{4,1}$(U)	642,34 (5)	$\sim$ 0,059
$\gamma_{4,0}$(U)	687,60 (5)	$\sim$ 0,016

6 Main Production Modes

U − 235(d,n)Np − 236
U − 235(α,p2n)Np − 236

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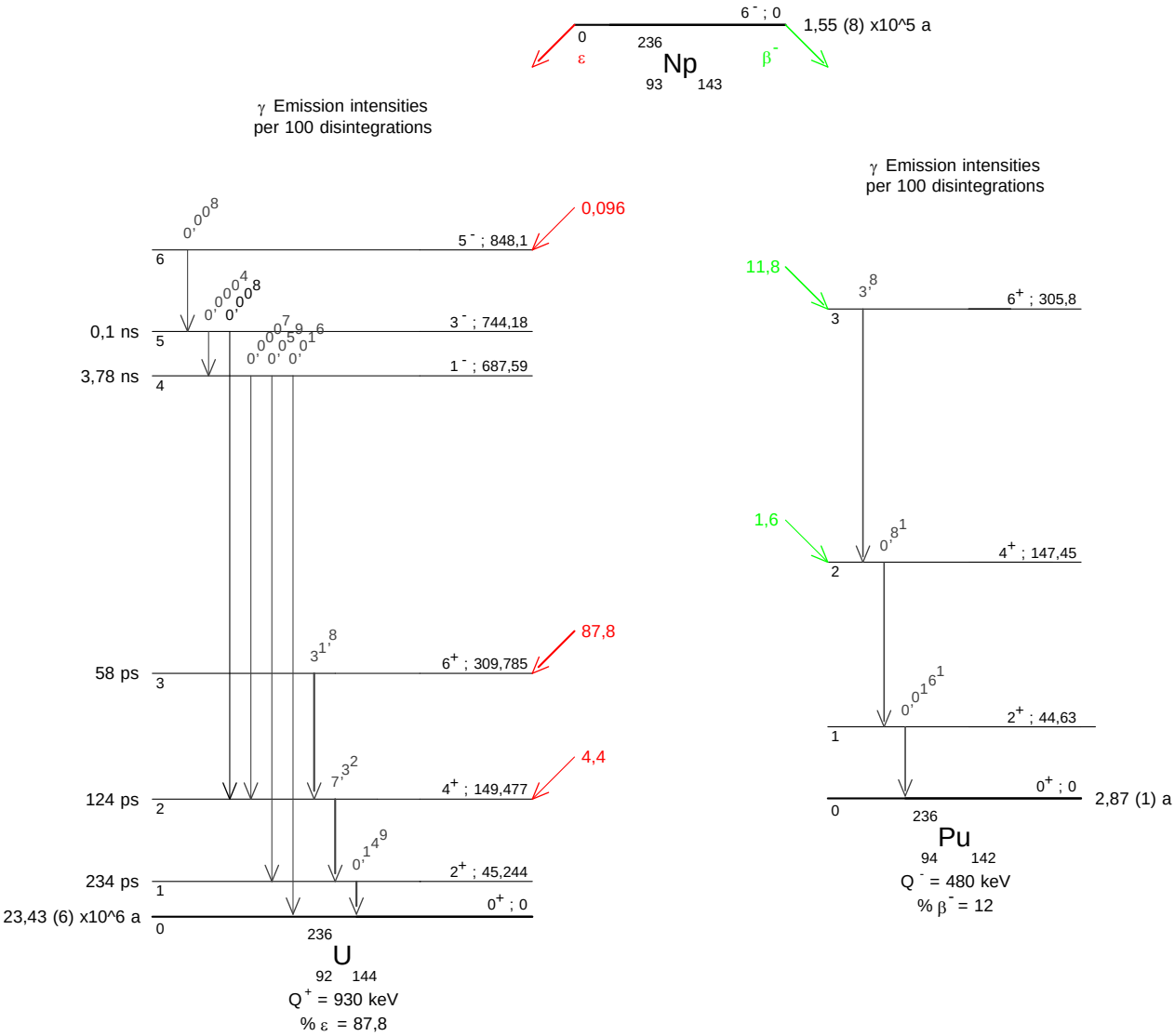
6⁻ ; 0
1,55 (8) x10^5 a
0
236
ε
Np
β⁻
93
143
γ Emission intensities
per 100 disintegrations
0,096
5⁻ ; 848,1
6
0,1 ns
3⁻ ; 744,18
5
3,78 ns
1⁻ ; 687,59
4
87,8
58 ps
6⁺ ; 309,785
3
4,4
124 ps
4⁺ ; 149,477
2
234 ps
2⁺ ; 45,244
1
23,43 (6) x10^6 a
0⁺ ; 0
0
236
U
92
144
Q⁺ = 930 keV
% ε = 87,8
γ Emission intensities
per 100 disintegrations
11,8
6⁺ ; 305,8
3
1,6
4⁺ ; 147,45
2
2⁺ ; 44,63
1
0⁺ ; 0
2,87 (1) a
0
236
Pu
94
142
Q⁻ = 480 keV
% β⁻ = 12