$^{241}_{94}$Pu $_{147}$

1 Decay Scheme

Pu-241 decays approximately 100 % by beta minus emission to the ground state of Am-241 and 0,00244 % by alpha emission to levels of U-237. The spontaneous fission decay branching is less than E-14 %.
Le plutonium 241 se désintègre principalement par émission beta moins vers le niveau fondamental d'américium 241. L'intensité des émissions alpha conduisant aux niveaux excités et au niveau fondamental d'uranium 237 est de 0,00244 %. La probabilité de fission sontanée est inférieure à E-14 %.
Le plutonium 241 et l'uranium 237 sont à l'équilibre environ 68 jours après la formation de plutonium 241.

2 Nuclear Data

$T_{1/2}$(^{241}Pu)	:	14,33	(4)	a
$T_{1/2}$(^{241}Am)	:	432,6	(6)	a
$T_{1/2}$(^{237}U)	:	6,749	(16)	d
Q^-(^{241}Pu)	:	20,8	(2)	keV
Q^α(^{241}Pu)	:	5140,0	(5)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,10}$	4773 (3)	≈ 0,0000007	132
$\alpha_{0,9}$	4813 (3)	≈ 0,0000007	254
$\alpha_{0,8}$	4824 (5)	≈ 0,0000017	131
$\alpha_{0,7}$	4866,0 (11)	0,0000005 (2)	90
$\alpha_{0,6}$	4879,1 (5)	0,000029 (3)	18,6
$\alpha_{0,5}$	4935,8 (5)	0,000295 (8)	4,5
$\alpha_{0,4}$	4980,0 (5)	0,00203 (4)	1,3
$\alpha_{0,3}$	5057,0 (5)	0,000032 (3)	276
$\alpha_{0,2}$	5083,7 (5)	0,0000100 (12)	1300
$\alpha_{0,1}$	5128,6 (5)	0,000025 (2)	1000
$\alpha_{0,0}$	5140,0 (5)	0,0000086 (10)	3600

2.2 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,0}$	20,8 (2)	99,99756 (2)	first-forbidden	5,8

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(U)	11,39 (2)	0,00182 (3)					
$\gamma_{3,2}$(U)	26,67 (18)	0,000077 (15)	[M1+E2]				
$\gamma_{5,4}$(U)	44,18 (14)	0,000258 (17)	M1+1,7(5)%E2		45,3 (25)	11,2 (7)	60,4 (29)
$\gamma_{2,1}$(U)	44,86 (12)	0,000111 (25)	[M1+15(4)%E2]		96 (18)	25 (4)	131 (25)
$\gamma_{2,0}$(U)	56,30 (12)	0,00051 (4)	(E2)		149 (3)	41,1 (8)	204 (4)
$\gamma_{6,5}$(U)	56,76 (22)	0,0000280 (41)	M1+1,1(13)E2		21 (3)	5,0 (9)	27 (3)
$\gamma_{3,1}$(U)	71,64 (13)	0,000189 (14)	(E2)		46,8 (10)	13,0 (3)	64,3 (13)
$\gamma_{4,3}$(U)	77,01 (13)	0,000225 (6)	(M1)		7,44 (15)	1,8 (4)	9,86 (20)
$\gamma_{6,4}$(U)	100,94 (17)	0,00000099	(E2)		9,3 (2)	2,58 (5)	12,8 (3)
$\gamma_{4,2}$(U)	103,68 (12)	0,000536 (14)	[M1+0,47(1)%E2]		3,16 (7)	0,767 (15)	4,20 (9)
$\gamma_{7,4}$(U)	114 (1)	0,0000067 (13)	E1		0,0665 (13)	0,0163 (3)	0,0883 (17)
$\gamma_{5,3}$(U)	121,22 (19)	0,0000097 (10)	(M1)	10,1 (2)	2,00 (4)	0,484 (10)	12,8 (3)
$\gamma_{4,1}$(U)	148,567 (28)	0,00150 (3)	[M1+2,8(1)%E2]	5,55 (11)	1,13 (3)	0,275 (6)	7,05 (14)
$\gamma_{4,0}$(U)	159,96 (2)	0,0000179 (4)	(E2)	0,208 (4)	1,14 (3)	0,316 (7)	1,78 (3)

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

		Energy keV		Relative probability
	$K\beta_2$	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	71,776 – 80,954	100
KLX	88,153 – 98,429	59,6
KXY	104,51 – 115,59	8,88
Auger L	5,9 – 21,6	

4 α Emissions

	Energy keV	Alpha per 100 disint.
$\alpha_{0,10}$	4694 (3)	≈ 0,0000007
$\alpha_{0,9}$	4733 (3)	≈ 0,0000007
$\alpha_{0,8}$	4744 (5)	≈ 0,0000017
$\alpha_{0,7}$	4785,1 (11)	0,0000005 (2)
$\alpha_{0,6}$	4798,0 (5)	0,000029 (3)
$\alpha_{0,5}$	4853,8 (5)	0,000295 (8)
$\alpha_{0,4}$	4897,3 (5)	0,00203 (4)
$\alpha_{0,3}$	4973,1 (5)	0,000032 (3)
$\alpha_{0,2}$	4999,2 (5)	0,0000100 (12)
$\alpha_{0,1}$	5043,4 (5)	0,000025 (2)
$\alpha_{0,0}$	5054,6 (5)	0,0000086 (10)

5 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(U)	5,9 - 21,6	0,00117 (6)
e_{AK}	(U)		0,000031 (5)
	KLL	71,776 - 80,954	}
	KLX	88,153 - 98,429	}
	KXY	104,51 - 115,59	}
$ec_{5,4\ L}$	(U)	22,42 - 27,01	0,000190 (14)
$ec_{4,1\ K}$	(U)	32,965 (10)	0,001034 (21)
$ec_{2,0\ L}$	(U)	34,54 - 39,13	0,00037 (3)
$ec_{3,1\ L}$	(U)	49,88 - 54,47	0,000136 (10)
$ec_{2,0\ M}$	(U)	50,75 - 52,75	0,000103 (8)
$ec_{4,3\ L}$	(U)	55,25 - 59,84	0,000154 (4)
$ec_{4,2\ L}$	(U)	81,922 - 86,512	0,000325 (10)
$ec_{4,1\ L}$	(U)	126,809 - 131,399	0,000211 (6)
$\beta^-_{0,0}$	max:	20,8 (2)	99,99756 (2)
$\beta^-_{0,0}$	avg:	5,8 (1)	

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11,619 — 20,714		0,001166 (40)	
$XK\alpha_2$	(U)	94,666		0,000300 (7)	} $K\alpha$
$XK\alpha_1$	(U)	98,44		0,000479 (10)	}
$XK\beta_3$	(U)	110,421	}		
$XK\beta_1$	(U)	111,298	}	0,000179 (5)	$K'\beta_1$
$XK\beta_5''$	(U)	111,964	}		
$XK\beta_2$	(U)	114,407	}		
$XK\beta_4$	(U)	115,012	}	0,000059 (2)	$K'\beta_2$
$XKO_{2,3}$	(U)	115,377	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{5,4}$(U)	44,18 (3)	0,0000042 (2)
$\gamma_{2,1}$(U)	44,86 (10)	0,00000084 (10)
$\gamma_{2,0}$(U)	56,30 (12)	0,0000025 (2)
$\gamma_{6,5}$(U)	56,76 (10)	0,0000010 (1)
$\gamma_{3,1}$(U)	71,64 (9)	0,0000029 (2)
$\gamma_{4,3}$(U)	77,01 (4)	0,0000207 (4)
$\gamma_{6,4}$(U)	100,94 (11)	0,000000072
$\gamma_{4,2}$(U)	103,680 (5)	0,000103 (2)
$\gamma_{7,4}$(U)	114 (1)	0,0000062 (12)
$\gamma_{5,3}$(U)	121,22 (5)	0,00000070 (7)
$\gamma_{4,1}$(U)	148,567 (10)	0,0001863 (8)
$\gamma_{4,0}$(U)	159,96 (2)	0,00000645 (9)

7 Main Production Modes

U – 238(n,γ)U – 239

{ U – 239(β^-,)Np – 239
Possible impurities : $T_{1/2}$ = 23,5 min

{ Np – 239(β^-,)Pu – 239
Possible impurities : $T_{1/2}$ = 2,36 d

Pu – 239(n,γ)Pu – 240

$$\left\{\begin{array}{l}\mathrm{Pu-240(n,\gamma)Pu-241}\\ \text{Possible impurities : } \mathrm{Pu-238,\ Pu-239,\ Pu-240}\end{array}\right.$$

$$\left\{\begin{array}{l}\mathrm{U-238(\alpha,n)Pu-241}\\ \text{Possible impurities : } \mathrm{Pu-238,\ Pu-239,\ Pu-240}\end{array}\right.$$

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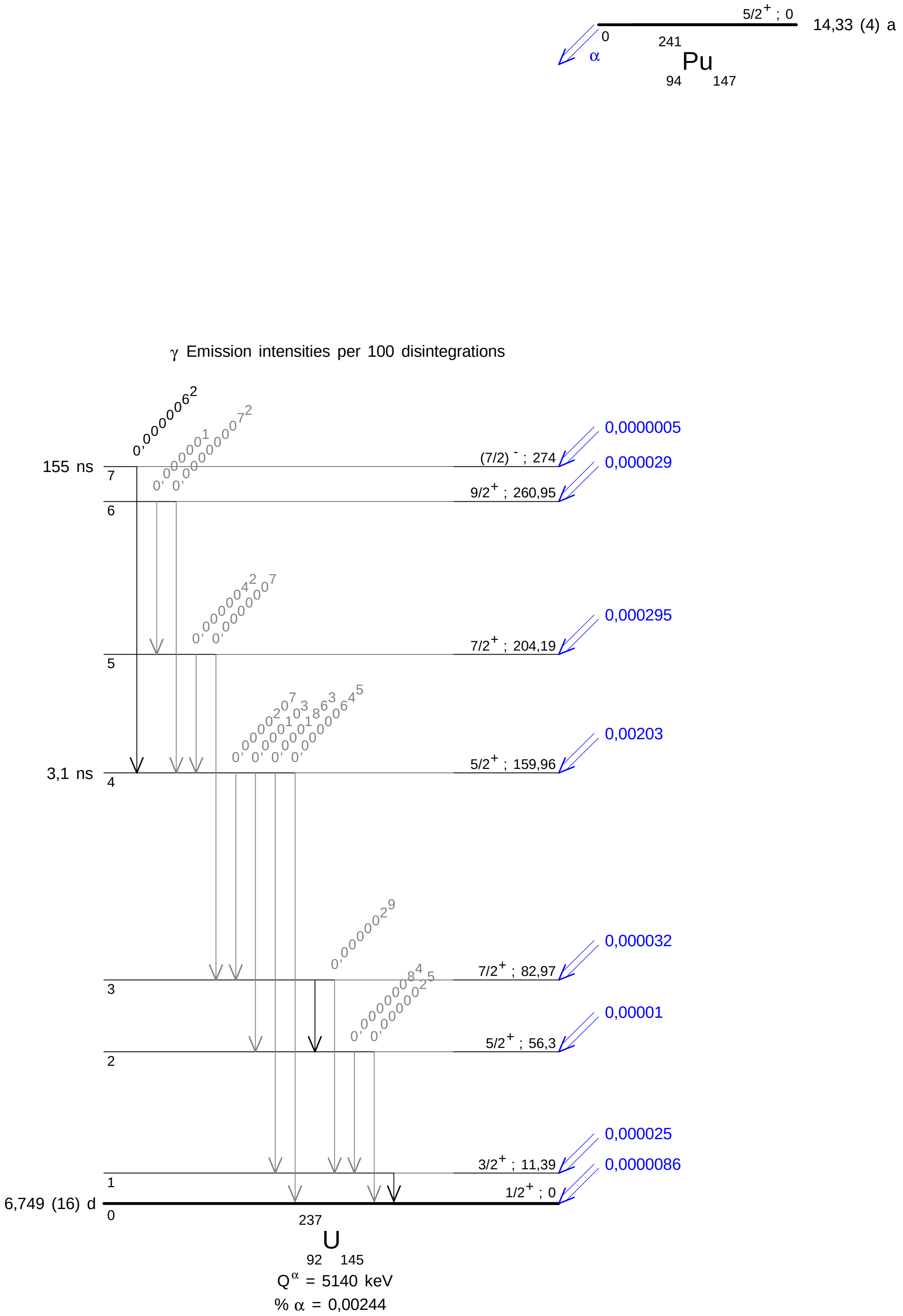
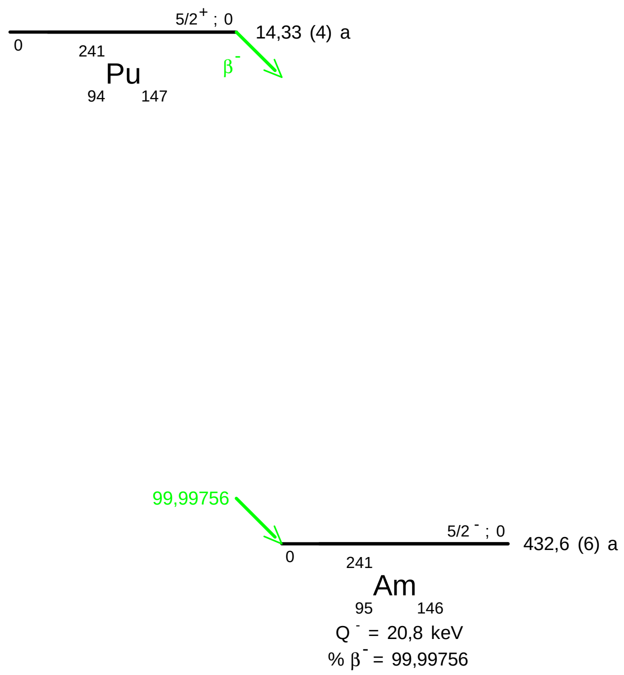

5/2+ ; 0
14,33 (4) a
α
241 Pu 94 147
γ Emission intensities per 100 disintegrations
155 ns
3,1 ns
6,749 (16) d
(7/2)- ; 274
9/2+ ; 260,95
7/2+ ; 204,19
5/2+ ; 159,96
7/2+ ; 82,97
5/2+ ; 56,3
3/2+ ; 11,39
1/2+ ; 0
0,0000005
0,000029
0,000295
0,00203
0,000032
0,00001
0,000025
0,0000086
237 U 92 145
Qα = 5140 keV
% α = 0,00244


5/2+ ; 0
14,33 (4) a
0
241
Pu
94
147
β-
99,99756
5/2 - ; 0
432,6 (6) a
0
241
Am
95
146
Q - = 20,8 keV
% β- = 99,99756