$^{240}_{94}\mathrm{Pu}_{146}$

1 Decay Scheme

Pu-240 decays 100% by alpha transitions to U-236 and by spontaneous fission with branching fraction of 5.7 (2)E-06 %. Most of the alpha decay populates the U-236 ground state (72.7 %) and the U-236 first excited level with energy of 45.24 keV (27.2 %).
Le plutonium 240 décroit à 100% par émission alpha vers l'uranium 236, et pour une faible proportion par fission spontanée (5,7 (2)E-06 %). Les branchements alpha principaux se font vers le niveau fondamental (72,7 %) et le niveau excité de 45,24 keV (27,2 %).

2 Nuclear Data

$T_{1/2}(^{240}\mathrm{Pu})$	:	6561	(7)	a
$T_{1/2}(^{236}\mathrm{U})$	:	2,343	(6)	10^7 a
$Q^{\alpha}(^{240}\mathrm{Pu})$	:	5255,75	(15)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,10}$	4289,13 (18)	< 0,0000001	
$\alpha_{0,9}$	4295,5 (4)	< 0,00000013	
$\alpha_{0,8}$	4297,85 (23)	< 0,00000017	
$\alpha_{0,7}$	4336,61 (23)	0,00000065 (8)	27
$\alpha_{0,6}$	4511,57 (17)	0,000000013 (7)	35000
$\alpha_{0,5}$	4568,16 (16)	0,0000193 (4)	65,9
$\alpha_{0,4}$	4733,50 (16)	0,000047 (5)	471
$\alpha_{0,3}$	4945,97 (15)	0,001082 (18)	646
$\alpha_{0,2}$	5106,27 (15)	0,0863 (18)	94,6
$\alpha_{0,1}$	5210,54 (15)	27,16 (19)	1,4
$\alpha_{0,0}$	5255,75 (15)	72,74 (18)	1

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(U)	45,244 (2)	27,3 (8)	E2		429 (9)	118,6 (24)	589 (12)
$\gamma_{6,5}$(U)	56,6 (5)		(E2)		145 (7)	40,1 (19)	199 (10)
$\gamma_{2,1}$(U)	104,233 (5)	0,0856 (14)	E2		8,00 (16)	2,22 (4)	10,99 (22)
$\gamma_{3,2}$(U)	160,308 (3)	0,001116 (17)	E2	0,208 (4)	1,132 (23)	0,313 (6)	1,76 (4)
$\gamma_{4,3}$(U)	212,46 (5)	0,0000464 (48)	E2	0,140 (3)	0,335 (7)	0,0920 (18)	0,599 (12)
$\gamma_{10,6}$(U)	222,44						
$\gamma_{10,5}$(U)	279,0 (1)		(M1 + E2)	0,5 (5)	0,15 (4)	0,038 (8)	0,7 (5)
$\gamma_{5,2}$(U)	538,1 (1)	0,000000168 (14)	E3	0,0623 (12)	0,0587 (12)	0,0160 (3)	0,143 (3)
$\gamma_{6,2}$(U)	594,5 (3)						
$\gamma_{5,1}$(U)	642,34 (5)	0,00001449 (43)	E1 + (M2 + E3)	0,112 (10)	0,031 (3)		0,15 (2)
$\gamma_{5,0}$(U)	687,56 (10)	0,00000466 (14)	E1	0,219 (14)	0,069 (9)		0,31 (2)
$\gamma_{6,1}$(U)	698,94	< 0,000000025					
$\gamma_{9,2}$(U)	810,8	< 0,000000043					
$\gamma_{7,1}$(U)	874,0 (2)	0,00000059 (6)	(E2)	0,01060 (15)	0,00283 (6)	0,000711 (14)	0,0144 (3)
$\gamma_{8,1}$(U)	912,4 (3)	< 0,00000007	(M1)	0,0400 (8)	0,00753 (11)	0,00181 (4)	0,050 (1)
$\gamma_{9,1}$(U)	915,1 (3)	< 0,000000063	(M1 + E0)				
$\gamma_{7,0}$(U)	918,9 (3)	≈0,00000006	(E0)				
$\gamma_{10,1}$(U)	921,2 (2)	< 0,000000022	E1	0,00353 (7)	0,000599 (12)	0,000142 (3)	0,00432 (9)
$\gamma_{8,0}$(U)	958,0 (2)	< 0,0000001					
$\gamma_{9,0}$(U)	960,3	< 0,00000005					
$\gamma_{10,0}$(U)	966,9 (2)	< 0,00000005	E1	0,00324 (6)	0,000549 (11)	0,000130 (3)	0,00397 (8)

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	}	36,06
	$K\beta_2$	114,407	}	
	$K\beta_4$	115,012	}	12,33
	$KO_{2,3}$	115,377	}	

		Energy keV	Relative probability
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	5,01 – 21,60	

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,10}$	4217,6 (2)	< 0,0000001
$\alpha_{0,9}$	4223,8 (4)	< 0,00000013
$\alpha_{0,8}$	4226,1 (3)	< 0,00000017
$\alpha_{0,7}$	4264,3 (3)	0,00000065 (8)
$\alpha_{0,6}$	4436,4 (2)	0,000000013 (7)
$\alpha_{0,5}$	4492,0 (2)	0,0000193 (4)
$\alpha_{0,4}$	4654,5 (2)	0,000047 (5)
$\alpha_{0,3}$	4863,5 (2)	0,001082 (18)
$\alpha_{0,2}$	5021,1 (2)	0,0863 (18)
$\alpha_{0,1}$	5123,6 (2)	27,16 (19)
$\alpha_{0,0}$	5168,13 (15)	72,74 (18)

5 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(U)	5,01 - 21,60		10,3 (8)
e_{AK}	(U)			0,0000027 (4)
	KLL	71,78 - 80,95	}	
	KLX	88,15 - 98,43	}	
	KXY	104,51 - 115,59	}	
$ec_{1,0\ L}$	(U)	23,486 - 28,076		19,8 (6)
$ec_{1,0\ M}$	(U)	39,696 - 41,690		5,48 (15)
$ec_{1,0\ N}$	(U)	43,803 - 44,865		1,483 (40)
$ec_{2,1\ L}$	(U)	82,475 - 87,067		0,0571 (10)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(U)	11,619 — 20,714		10,34 (15)	
$XK\alpha_2$	(U)	94,666		0,0000260 (6)	} $K\alpha$
$XK\alpha_1$	(U)	98,44		0,0000416 (9)	}
$XK\beta_3$	(U)	110,421	}		
$XK\beta_1$	(U)	111,298	}	0,0000150 (4)	$K'\beta_1$
$XK\beta_5''$	(U)	111,964	}		
$XK\beta_2$	(U)	114,407	}		
$XK\beta_4$	(U)	115,012	}	0,00000513 (16)	$K'\beta_2$
$XKO_{2,3}$	(U)	115,377	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(U)	45,244 (2)	0,0462 (9)
$\gamma_{2,1}$(U)	104,233 (5)	0,00714 (7)
$\gamma_{3,2}$(U)	160,308 (3)	0,0004045 (22)
$\gamma_{4,3}$(U)	212,46 (5)	0,000029 (3)
$\gamma_{5,2}$(U)	538,1 (1)	0,000000147 (12)

	Energy keV	Photons per 100 disint.
$\gamma_{5,1}$(U)	642,34 (5)	0,0000126 (3)
$\gamma_{5,0}$(U)	687,56 (10)	0,00000356 (9)
$\gamma_{6,1}$(U)	698,94	< 0,000000025
$\gamma_{9,2}$(U)	810,8	< 0,000000043
$\gamma_{7,1}$(U)	874,0 (2)	0,00000058 (6)
$\gamma_{8,1}$(U)	912,4 (3)	< 0,00000007
$\gamma_{9,1}$(U)	915,1 (3)	< 0,000000063
$\gamma_{10,1}$(U)	921,2 (2)	< 0,000000022
$\gamma_{8,0}$(U)	958,0 (2)	< 0,0000001
$\gamma_{9,0}$(U)	960,3	< 0,00000005
$\gamma_{10,0}$(U)	966,9 (2)	< 0,00000005

7 Main Production Modes

U – 238(n,γ)Np – 240
U – 238(α,2n)Pu – 240
U – 238(α,pn)Np – 240
Np – 240(β^-)Pu – 240

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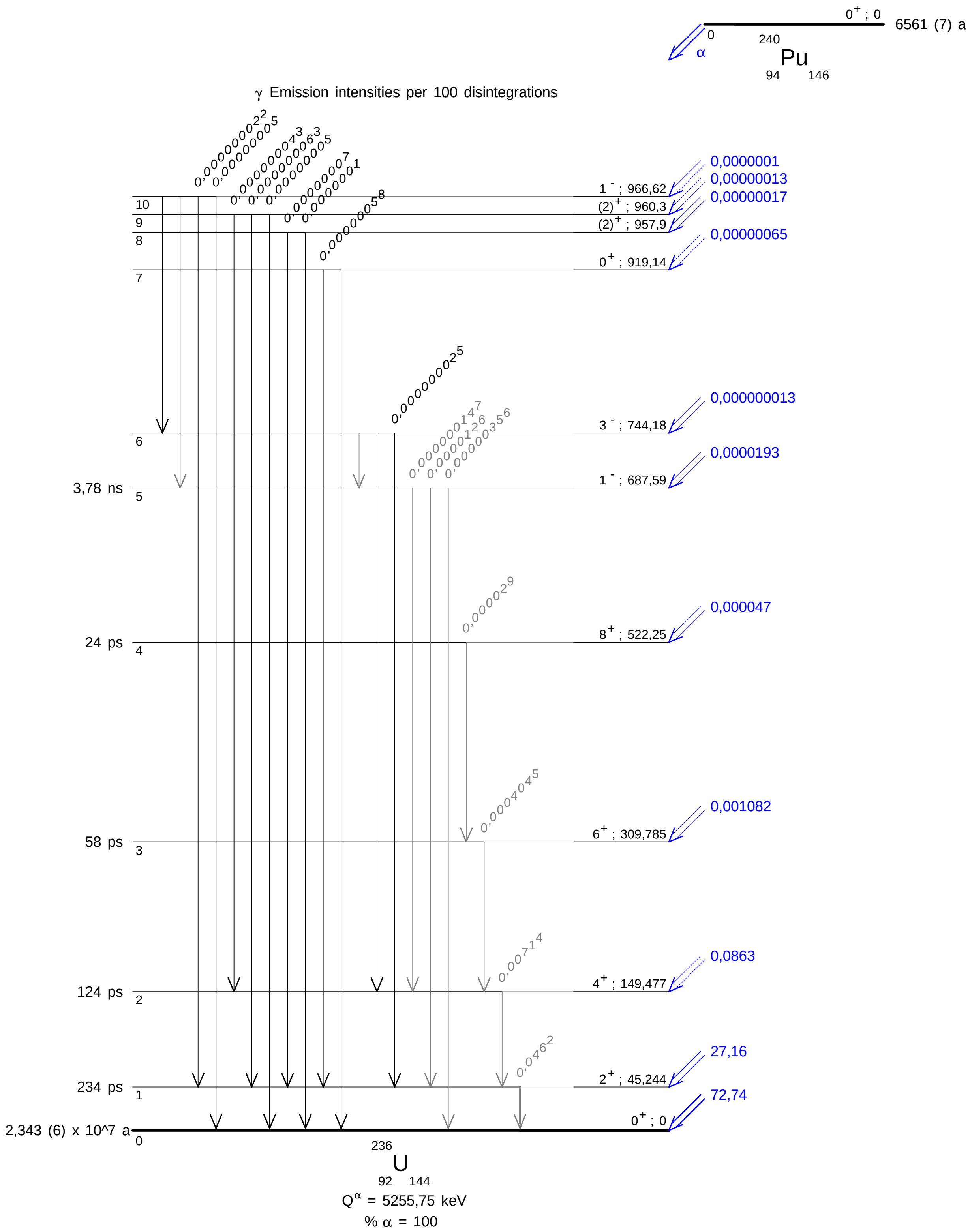

0+ ; 0
6561 (7) a
α
240 Pu 94 146
γ Emission intensities per 100 disintegrations
1 - ; 966,62
(2)+ ; 960,3
(2)+ ; 957,9
0+ ; 919,14
3 - ; 744,18
1 - ; 687,59
8+ ; 522,25
6+ ; 309,785
4+ ; 149,477
2+ ; 45,244
0+ ; 0
0,0000001
0,00000013
0,00000017
0,00000065
0,000000013
0,0000193
0,000047
0,001082
0,0863
27,16
72,74
3,78 ns
24 ps
58 ps
124 ps
234 ps
2,343 (6) x 10^7 a
236 U 92 144
Qα = 5255,75 keV
% α = 100