



1 Decay Scheme

Pu-242 decays 100% by alpha transitions to U-238 and by spontaneous fission with branching fraction of $5.5 \cdot 10^{-4}$ %. Most of the alpha decay populates the U-238 ground state (76.5 %) and the U-238 first excited level with energy of 44.9 keV (23.4 %).

Le plutonium 242 se désintègre par émission alpha et par fission spontanée dans une proportion de $5,5 \cdot 10^{-4}$ %. L' émission alpha a lieu principalement vers le niveau excité de 44,9 keV (23,4 %) et le niveau fondamental (76,5 %) de l'uranium 238.

2 Nuclear Data

$T_{1/2}(^{242}\text{Pu})$:	3,73	(3)	10^5 a
$T_{1/2}(^{238}\text{U})$:	4,468	(5)	10^9 a
$Q^\alpha(^{242}\text{Pu})$:	4984,5	(10)	keV

2.1 α Transitions

	Energy keV	Probability $\times 100$	F
$\alpha_{0,3}$	4677,3 (10)	0,00084 (6)	609
$\alpha_{0,2}$	4836,1 (10)	0,0304 (13)	238
$\alpha_{0,1}$	4939,6 (10)	23,44 (17)	1,62
$\alpha_{0,0}$	4984,5 (10)	76,53 (17)	1

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ $\times 100$	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}(\text{U})$	44,915 (13)	23,5 (7)	E2		445 (9)	122,8 (25)	610 (12)
$\gamma_{2,1}(\text{U})$	103,50 (4)	0,0313 (16)	E2		8,27 (17)	2,29 (5)	11,36 (23)
$\gamma_{3,2}(\text{U})$	158,80 (8)	0,00084 (6)	E2	0,210 (4)	1,180 (24)	0,326 (7)	1,83 (4)

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 α_2	94,666	62,47
	K α_1	98,44	100
	K β_3	110,421	}
	K β_1	111,298	
	K β_5''	111,964	
			36,06
	K β_2	114,407	}
	K β_4	115,012	
	KO _{2,3}	115,377	
			12,33
X _L	L ℓ	11,62	
	L α	13,44 – 13,62	
	L η	15,4	
	L β	15,73 – 18,21	
	L γ	19,51 – 21,73	

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			
		5,1 – 21,6	

4 α Emissions

	Energy keV	Probability $\times 100$
$\alpha_{0,3}$	4600,1 (10)	0,00084 (6)
$\alpha_{0,2}$	4756,2 (10)	0,0304 (13)
$\alpha_{0,1}$	4858,2 (10)	23,44 (17)
$\alpha_{0,0}$	4902,3 (10)	76,53 (17)

5 Electron Emissions

		Energy keV	Electrons per 100 disint.
e _{AL}	(U)	5,1 - 21,6	8,40 (19)
e _{AK}	(U)		0,00000188 (29)
	KLL	71,78 - 80,95	}
	KLX	88,15 - 98,43	}
	KXY	104,51 - 115,59	}
ec _{1,0} L	(U)	23,157 - 27,747	17,1 (5)
ec _{1,0} M	(U)	39,367 - 41,360	4,72 (14)
ec _{1,0} N	(U)	43,474 - 44,536	1,28 (4)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(U)	11,62 — 21,73	8,71 (21)	
XK α_2	(U)	94,666	0,0000180 (13)	} K α
XK α_1	(U)	98,44	0,0000288 (21)	
XK β_3	(U)	110,421	}	} K' β_1
XK β_1	(U)	111,298	}	
XK β_5''	(U)	111,964	}	
XK β_2	(U)	114,407	}	
XK β_4	(U)	115,012	}	
XKO _{2,3}	(U)	115,377	}	0,00000355 (27) K' β_2

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}(\text{U})$	44,915 (13)	0,0384 (8)
$\gamma_{2,1}(\text{U})$	103,50 (4)	0,00253 (12)
$\gamma_{3,2}(\text{U})$	158,80 (8)	0,000298 (20)

7 Main Production Modes

$\left\{ \begin{array}{l} \text{Pu} - 241(\text{n},\gamma)\text{Pu} - 242 \\ \text{Possible impurities : Pu} - 238, \text{Pu} - 239, \text{Pu} - 240, \text{Pu} - 241, \text{Am} - 241 \end{array} \right.$

$\left\{ \begin{array}{l} \text{Am} - 241(\text{n},\gamma)\text{Am} - 242 \\ \text{Possible impurities : Am} - 241, \text{Cm} - 242 \end{array} \right.$

$\text{Am} - 242(\text{E.C.})\text{Pu} - 242$

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