$^{242}_{95}\mathrm{Am}^{\,m}_{147}$

1 Decay Scheme

Am-242m undergoes 99.54% IT decay directly to the ground state of Am-242, along with a small alpha-decay branch of 0.46% to various nuclear levels of Np-238. A small spontaneous fission branch of 1.5(6) $\times 10^{-8}$% has been determined by Caldwell *et al.* (1967), compared with an upper limit of only 4.8 $\times 10^{-9}$% quoted by Zelenkov *et al.* (1986).
L'américium 242 métastable se désintègre principalement (99,54 %) par transition isomérique vers l'américium 242. Un faible branchement par transition alpha peuple des niveaux excités du neptunium 238.

2 Nuclear Data

$T_{1/2}(^{242}\mathrm{Am}^{m})$	:	143	(2)	a
$T_{1/2}(^{242}\mathrm{Am})$	:	16,01	(2)	h
$T_{1/2}(^{238}\mathrm{Np})$	:	2,102	(5)	d
$Q^{\alpha}(^{242}\mathrm{Am}^{m})$	:	5637,10	(25)	keV
$Q^{IT}(^{242}\mathrm{Am}^{m})$	:	48,60	(5)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,68}$	5059 (3)	0,000009 (5)	2400
$\alpha_{0,64}$	5111,8 (15)	0,00009 (5)	540
$\alpha_{0,59}$	5153 (3)	0,0012 (3)	81
$\alpha_{0,57}$	5168,0 (12)	0,00014 (5)	840
$\alpha_{0,56}$	5177,5 (7)	0,0009 (3)	146
$\alpha_{0,48}$	5229,51 (26)	0,0258 (11)	11,2
$\alpha_{0,47}$	5239,8 (15)	0,00009 (5)	3600
$\alpha_{0,42}$	5260,40 (26)	0,00009 (5)	4900
$\alpha_{0,41}$	5262,4 (10)	0,00009 (5)	5000
$\alpha_{0,36}$	5294,67 (25)	0,409 (9)	1,8
$\alpha_{0,35}$	5303,1 (7)	0,00014 (5)	6000
$\alpha_{0,28}$	5336,36 (25)	0,0018 (5)	730

	Energy keV	Probability × 100	F
$\alpha_{0,27}$	5336,42 (26)	0,0018 (5)	730
$\alpha_{0,25}$	5337,87 (26)	0,00009 (5)	14800
$\alpha_{0,23}$	5340,07 (25)	0,00009 (5)	15300
$\alpha_{0,20}$	5361,58 (25)	0,0046 (5)	414
$\alpha_{0,14}$	5404,27 (25)	0,0028 (5)	1250
$\alpha_{0,11}$	5421,58 (25)	0,0007 (5)	6400
$\alpha_{0,9}$	5457,95 (25)	0,0051 (9)	1430
$\alpha_{0,6}$	5501,06 (25)	0,0046 (9)	2820
$\alpha_{0,3}$	5550,43 (25)	0,00064 (18)	39000
$\alpha_{0,1}$	5610,67 (25)	0,000014 (14)	4000000

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{3,2}$(Np)	24,34 (1)	0,021 (3)	M1+E2		242 (4)	59,6 (9)	322 (5)
$\gamma_{1,0}$(Np)	26,427 (2)	< 0,24	M1+E2		252 (4)	63,7 (9)	338 (5)
$\gamma_{11,10}$(Np)	32,64 (1)	0,0026 (4)	M1+E2		102,6 (15)	25,0 (4)	136,4 (20)
$\gamma_{9,6}$(Np)	43,11 (1)	0,0040 (9)	M1+E2		46,1 (7)	11,25 (16)	61,3 (9)
$\gamma_{19,11}$(Np)	43,33 (1)	0,00112 (18)	M1+E2		93,5 (14)	24,6 (4)	126,7 (18)
$\gamma_{10,6}$(Np)	46,833 (3)	0,00037 (7)	M1+E2		36,7 (6)	8,97 (13)	48,8 (7)
$\gamma_{1,0}$(Am)	48,60 (5)	99,54 (1)	E4		333000 (5000)	266000 (5000)	704000 (8000)
$\gamma_{6,3}$(Np)	49,371 (3)	0,244 (8)	E1		0,615 (9)	0,1536 (22)	0,821 (12)
$\gamma_{14,9}$(Np)	53,67 (1)	0,097 (13)	M1+E2		34,2 (5)	8,73 (13)	46,0 (7)
$\gamma_{30,19}$(Np)	53,85 (2)	0,00011 (6)	M1+E2		27,8 (4)	6,93 (10)	37,2 (6)
$\gamma_{9,5}$(Np)	57,51 (1)	0,0015 (4)	E1		0,412 (6)	0,1023 (15)	0,549 (8)
$\gamma_{3,1}$(Np)	60,247 (3)	0,132 (12)	M1+E2		17,34 (25)	4,23 (6)	23,1 (4)
$\gamma_{36,20}$(Np)	66,92 (1)	0,0205 (6)	E1		0,277 (4)	0,0684 (10)	0,368 (6)
$\gamma_{28,14}$(Np)	67,92 (2)	0,100 (8)	M1+E2		17,7 (19)	4,6 (6)	24 (3)
$\gamma_{6,2}$(Np)	73,72 (1)	0,0101 (7)	E1		0,214 (3)	0,0529 (8)	0,285 (4)
$\gamma_{19,10}$(Np)	75,98 (1)	0,00052 (8)	E2		38,4 (6)	10,70 (15)	52,8 (8)
$\gamma_{11,6}$(Np)	79,48 (1)	0,0033 (8)	M1+E2		19 (3)	5,2 (8)	26 (4)
$\gamma_{27,11}$(Np)	85,16 (7)	0,020 (7)	M1+E2		14,3 (18)	3,9 (6)	19 (3)
$\gamma_{3,0}$(Np)	86,674 (2)	0,205 (7)	M1+E2		5,98 (9)	1,459 (21)	7,95 (12)
$\gamma_{(-1,1)}$(Np)	89,60 (5)	0,0013 (3)					
$\gamma_{9,3}$(Np)	92,48 (1)	0,00324 (35)	E1		0,1184 (17)	0,0291 (4)	0,1574 (22)
$\gamma_{11,5}$(Np)	93,88 (1)	0,0042 (5)	E1		0,1138 (16)	0,0280 (4)	0,1513 (22)
$\gamma_{14,6}$(Np)	96,78 (1)	0,0059 (10)	E2		12,28 (18)	3,42 (5)	16,90 (24)
$\gamma_{30,11}$(Np)	97,18 (2)	0,00013 (7)	E2		12,05 (17)	3,36 (5)	16,58 (24)
$\gamma_{36,14}$(Np)	109,61 (1)	≤ 0,14	M1+E2		4,9 (5)	1,32 (14)	6,7 (7)
$\gamma_{6,1}$(Np)	109,618 (3)	≤ 0,02	E1		0,0760 (11)	0,0186 (3)	0,1010 (15)
$\gamma_{14,5}$(Np)	111,18 (1)	0,0027 (5)	E1		0,0733 (11)	0,0180 (3)	0,0974 (14)
$\gamma_{19,6}$(Np)	122,81 (1)	0,00039 (18)	M1+E2	5,4 (12)	3,11 (22)	0,83 (7)	9,6 (9)
$\gamma_{36,11}$(Np)	126,92 (1)	0,0008 (4)	E2	0,196 (3)	3,51 (5)	0,979 (14)	5,03 (7)
$\gamma_{23,8}$(Np)	131,50 (5)	0,00034 (8)	E1	0,205 (3)	0,0475 (7)	0,01161 (17)	0,268 (4)
$\gamma_{28,8}$(Np)	135,21 (2)	0,0085 (5)	E1	0,192 (3)	0,0443 (7)	0,01081 (16)	0,251 (4)
$\gamma_{6,0}$(Np)	136,045 (2)	0,0118 (3)	E1	0,190 (3)	0,0436 (6)	0,01064 (15)	0,247 (4)
$\gamma_{28,7}$(Np)	139,05 (3)	≤ 0,00014	E1	0,180 (3)	0,0412 (6)	0,01006 (15)	0,235 (4)
$\gamma_{8,1}$(Np)	139,11 (2)	≤ 0,00049	E2	0,211 (3)	2,32 (4)	0,646 (9)	3,40 (5)
$\gamma_{30,7}$(Np)	151,01 (3)	0,000099 (22)	E1	0,1495 (21)	0,0334 (5)	0,00814 (12)	0,194 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{19,4}$(Np)	152,70 (2)	≤ 0,00082	E1	0,1458 (21)	0,0325 (5)	0,00791 (11)	0,189 (3)
$\gamma_{9,1}$(Np)	152,73 (1)	≤ 0,00082	E1	0,1457 (21)	0,0324 (5)	0,00791 (11)	0,189 (3)
$\gamma_{11,2}$(Np)	153,19 (1)	0,00037 (4)	E1	0,1447 (21)	0,0322 (5)	0,00785 (11)	0,187 (3)
$\gamma_{20,5}$(Np)	153,87 (1)	0,0266 (8)	M1+E2	5,53 (8)	1,123 (16)	0,273 (4)	7,02 (10)
$\gamma_{10,1}$(Np)	156,451 (3)	0,00032 (5)	E1	0,1379 (20)	0,0305 (5)	0,00744 (11)	0,1784 (25)
$\gamma_{(-1,2)}$(Np)	160,61 (2)	0,0004 (2)					
$\gamma_{34,8}$(Np)	163,1 (5)	≤ 0,079	M1+E2	2,5 (5)	1,04 (3)	0,273 (11)	3,9 (5)
$\gamma_{36,9}$(Np)	163,29 (1)	≤ 0,079	M1+E2	2,5 (5)	1,04 (3)	0,272 (11)	3,9 (5)
$\gamma_{(-1,3)}$(Np)	165,97 (15)	0,000046 (23)					
$\gamma_{45,13}$(Np)	170,7 (8)	0,00280 (22)	M1+E2	2,2 (5)	0,882 (23)	0,230 (9)	3,4 (5)
$\gamma_{48,14}$(Np)	174,76 (6)	0,00720 (16)	M1+E2	2,1 (5)	0,809 (17)	0,211 (7)	3,1 (4)
$\gamma_{30,6}$(Np)	176,66 (2)	0,00006 (3)	E2	0,181 (3)	0,804 (12)	0,223 (4)	1,285 (18)
$\gamma_{10,0}$(Np)	182,878 (2)	0,00103 (4)	E1	0,0965 (14)	0,0206 (3)	0,00502 (7)	0,1238 (18)
$\gamma_{11,1}$(Np)	189,10 (1)	0,00030 (5)	E1	0,0894 (13)	0,0190 (3)	0,00462 (7)	0,1146 (16)
$\gamma_{23,4}$(Np)	190,88 (5)	0,00012 (3)	E1	0,0875 (13)	0,0185 (3)	0,00451 (7)	0,1121 (16)
$\gamma_{28,4}$(Np)	194,59 (2)	0,00157 (5)	E1	0,0837 (12)	0,01768 (25)	0,00430 (6)	0,1072 (15)
$\gamma_{19,2}$(Np)	196,52 (1)	0,00011 (5)	E1	0,0819 (12)	0,01725 (25)	0,00419 (6)	0,1048 (15)
$\gamma_{36,6}$(Np)	206,39 (1)	0,0027 (3)	E2	0,1454 (21)	0,412 (6)	0,1138 (16)	0,711 (10)
$\gamma_{20,2}$(Np)	213,19 (1)	0,00015 (5)	M1+E2	1,19 (24)	0,401 (11)	0,1032 (17)	1,73 (25)
$\gamma_{11,0}$(Np)	215,522 (4)	0,00064 (10)	E1	0,0664 (10)	0,01376 (20)	0,00334 (5)	0,0847 (12)
$\gamma_{19,1}$(Np)	232,43 (1)	0,00060 (3)	E1	0,0560 (8)	0,01145 (16)	0,00278 (4)	0,0712 (10)
$\gamma_{(-1,4)}$(Np)	233,69 (10)	0,00013 (3)					
$\gamma_{25,2}$(Np)	236,90 (6)	0,00010 (5)	M1+E2	0,89 (18)	0,280 (12)	0,0717 (21)	1,27 (19)
$\gamma_{27,2}$(Np)	238,35 (7)	0,000017 (9)	E1	0,0530 (8)	0,01078 (16)	0,00261 (4)	0,0673 (10)
$\gamma_{17,0}$(Np)	250,33 (3)	≤ 0,0012	(M1+E2)	0,77 (15)	0,233 (12)	0,0595 (21)	1,08 (16)
$\gamma_{30,2}$(Np)	250,37 (2)	≤ 0,0006	E1	0,0475 (7)	0,00958 (14)	0,00232 (4)	0,0602 (9)
$\gamma_{42,4}$(Np)	270,55 (7)	0,000030 (9)	E1	0,0400 (6)	0,00798 (12)	0,00193 (3)	0,0506 (7)
$\gamma_{25,1}$(Np)	272,80 (6)	0,000069 (15)	M1+E2	0,61 (12)	0,176 (11)	0,0448 (21)	0,85 (13)
$\gamma_{36,2}$(Np)	280,11 (1)	0,000063 (7)	E1	0,0371 (6)	0,00735 (11)	0,00178 (3)	0,0468 (7)
$\gamma_{25,0}$(Np)	299,23 (6)	0,000046 (23)	M1+E2	0,48 (9)	0,131 (9)	0,0332 (19)	0,65 (10)

3 Atomic Data

3.1 Np

ω_K : 0,971 (4)
$\bar{\omega}_L$: 0,511 (20)
n_{KL} : 0,791 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	97,069		63,3
	$K\alpha_1$	101,059		100
	$K\beta_3$	113,303	}	
	$K\beta_1$	114,234	}	
	$K\beta_5''$	114,912	}	36,7
	$K\beta_2$	117,463	}	
	$K\beta_4$	117,876	}	12,3
	$KO_{2,3}$	118,429	}	
X_L				
	$L\ell$	11,871		
	$L\alpha$	13,761 – 13,946		
	$L\eta$	15,861		
	$L\beta$	16,109 – 17,992		
	$L\gamma$	20,784 – 21,491		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	73,501 – 83,134	100
KLX	90,358 – 101,054	63,6
KXY	107,19 – 118,66	9,09
Auger L	6,036 – 13,516	

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,68}$	4975 (3)	0,000009 (5)
$\alpha_{0,64}$	5027,3 (15)	0,00009 (5)
$\alpha_{0,59}$	5068 (3)	0,0012 (3)
$\alpha_{0,57}$	5082,6 (12)	0,00014 (5)
$\alpha_{0,56}$	5091,9 (7)	0,0009 (3)
$\alpha_{0,48}$	5143,07 (26)	0,0258 (11)
$\alpha_{0,47}$	5153,2 (15)	0,00009 (5)
$\alpha_{0,42}$	5173,45 (26)	0,00009 (5)
$\alpha_{0,41}$	5175,4 (10)	0,00009 (5)
$\alpha_{0,36}$	5207,15 (25)	0,409 (9)
$\alpha_{0,35}$	5215,4 (7)	0,00014 (5)
$\alpha_{0,28}$	5248,15 (25)	0,0018 (5)
$\alpha_{0,27}$	5248,21 (26)	0,0018 (5)
$\alpha_{0,25}$	5249,64 (26)	0,00009 (5)
$\alpha_{0,23}$	5251,80 (25)	0,00009 (5)
$\alpha_{0,20}$	5272,96 (25)	0,0046 (5)
$\alpha_{0,14}$	5314,95 (25)	0,0028 (5)
$\alpha_{0,11}$	5331,97 (25)	0,0007 (5)
$\alpha_{0,9}$	5367,73 (25)	0,0051 (9)
$\alpha_{0,6}$	5410,13 (25)	0,0046 (9)
$\alpha_{0,3}$	5458,68 (25)	0,00064 (18)
$\alpha_{0,1}$	5517,93 (25)	0,000014 (14)

5 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Am)	7,143 - 15,146	22,1 (11)
e_{AL}	(Np)	6,036 - 13,516	0,35 (4)
e_{AK}	(Np)		0,0019 (7)
	KLL	73,501 - 83,134	}
	KLX	90,358 - 101,054	}
	KXY	107,19 - 118,66	}
$ec_{1,0\ L}$	(Am)	24,79 - 30,10	47,1 (10)
$ec_{1,0\ M}$	(Am)	42,47 - 44,78	37,6 (9)
$ec_{1,0\ N}$	(Am)	47,0 - 48,2	11,9 (3)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Am)	12,377 — 22,836		25,0 (11)	
XL	(Np)	11,871 — 21,491		0,37 (4)	
XKα_2	(Np)	97,069		0,019 (9)	} Kα
XKα_1	(Np)	101,059		0,030 (14)	}
XKβ_3	(Np)	113,303	}		
XKβ_1	(Np)	114,234	}	0,011 (5)	K$'\beta_1$
XKβ_5''	(Np)	114,912	}		
XKβ_2	(Np)	117,463	}		
XKβ_4	(Np)	117,876	}	0,0037 (17)	K$'\beta_2$
XKO$_{2,3}$	(Np)	118,429	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{3,2}$(Np)	24,34 (1)	0,000064 (9)
$\gamma_{1,0}$(Np)	26,427 (2)	< 0,000708
$\gamma_{11,10}$(Np)	32,64 (1)	0,000019 (3)
$\gamma_{9,6}$(Np)	43,11 (1)	0,000064 (14)
$\gamma_{19,11}$(Np)	43,33 (1)	0,0000087 (14)
$\gamma_{10,6}$(Np)	46,833 (3)	0,0000074 (14)
$\gamma_{1,0}$(Am)	48,60 (5)	0,0001414 (22)
$\gamma_{6,3}$(Np)	49,371 (3)	0,134 (4)
$\gamma_{14,9}$(Np)	53,67 (1)	0,0021 (3)
$\gamma_{30,19}$(Np)	53,85 (2)	0,0000028 (14)
$\gamma_{9,5}$(Np)	57,51 (1)	0,00097 (23)
$\gamma_{3,1}$(Np)	60,247 (3)	0,0055 (5)
$\gamma_{36,20}$(Np)	66,92 (1)	0,0150 (5)
$\gamma_{28,14}$(Np)	67,92 (2)	0,0040 (3)
$\gamma_{6,2}$(Np)	73,72 (1)	0,0079 (6)
$\gamma_{19,10}$(Np)	75,98 (1)	0,0000097 (14)
$\gamma_{11,6}$(Np)	79,48 (1)	0,000124 (23)
$\gamma_{27,11}$(Np)	85,16 (7)	0,0010 (3)
$\gamma_{3,0}$(Np)	86,674 (2)	0,0229 (7)
$\gamma_{(-1,1)}$(Np)	89,60 (5)	0,0013 (3)
$\gamma_{9,3}$(Np)	92,48 (1)	0,0028 (3)
$\gamma_{11,5}$(Np)	93,88 (1)	0,0036 (4)
$\gamma_{14,6}$(Np)	96,78 (1)	0,00033 (6)

	Energy keV	Photons per 100 disint.
$\gamma_{30,11}$(Np)	97,18 (2)	0,000007 (4)
$\gamma_{36,14}$(Np)	109,61 (1)	$\leq$ 0,0184
$\gamma_{6,1}$(Np)	109,618 (3)	$\leq$ 0,0184
$\gamma_{14,5}$(Np)	111,18 (1)	0,0025 (4)
$\gamma_{19,6}$(Np)	122,81 (1)	0,00004 (2)
$\gamma_{36,11}$(Np)	126,92 (1)	0,00013 (7)
$\gamma_{23,8}$(Np)	131,50 (5)	0,00027 (6)
$\gamma_{28,8}$(Np)	135,21 (2)	0,0068 (4)
$\gamma_{6,0}$(Np)	136,045 (2)	0,0094 (3)
$\gamma_{28,7}$(Np)	139,05 (3)	$\leq$ 0,00011
$\gamma_{8,1}$(Np)	139,11 (2)	$\leq$ 0,00011
$\gamma_{30,7}$(Np)	151,01 (3)	0,000083 (18)
$\gamma_{19,4}$(Np)	152,70 (2)	$\leq$ 0,00069
$\gamma_{9,1}$(Np)	152,73 (1)	$\leq$ 0,00069
$\gamma_{11,2}$(Np)	153,19 (1)	0,00031 (4)
$\gamma_{20,5}$(Np)	153,87 (1)	0,00332 (10)
$\gamma_{10,1}$(Np)	156,451 (3)	0,00027 (5)
$\gamma_{(-1,2)}$(Np)	160,61 (2)	0,00041 (18)
$\gamma_{34,8}$(Np)	163,1 (5)	$\leq$ 0,0161
$\gamma_{36,9}$(Np)	163,29 (1)	$\leq$ 0,0161
$\gamma_{(-1,3)}$(Np)	165,97 (15)	0,000046 (23)
$\gamma_{45,13}$(Np)	170,7 (8)	0,00063 (5)
$\gamma_{48,14}$(Np)	174,76 (6)	0,00017 (4)
$\gamma_{30,6}$(Np)	176,66 (2)	0,000028 (14)
$\gamma_{10,0}$(Np)	182,878 (2)	0,00092 (3)
$\gamma_{11,1}$(Np)	189,10 (1)	0,00027 (5)
$\gamma_{23,4}$(Np)	190,88 (5)	0,000106 (24)
$\gamma_{28,4}$(Np)	194,59 (2)	0,00142 (5)
$\gamma_{19,2}$(Np)	196,52 (1)	0,00010 (5)
$\gamma_{36,6}$(Np)	206,39 (1)	0,00156 (18)
$\gamma_{20,2}$(Np)	213,19 (1)	0,000055 (18)
$\gamma_{11,0}$(Np)	215,522 (4)	0,00059 (10)
$\gamma_{19,1}$(Np)	232,43 (1)	0,00056 (3)
$\gamma_{(-1,4)}$(Np)	233,69 (10)	0,00013 (3)
$\gamma_{25,2}$(Np)	236,90 (6)	0,000046 (23)
$\gamma_{27,2}$(Np)	238,35 (7)	0,000016 (8)
$\gamma_{17,0}$(Np)	250,33 (3)	$\leq$ 0,00056
$\gamma_{30,2}$(Np)	250,37 (2)	$\leq$ 0,00056
$\gamma_{42,4}$(Np)	270,55 (7)	0,000029 (8)
$\gamma_{25,1}$(Np)	272,80 (6)	0,000037 (8)
$\gamma_{36,2}$(Np)	280,11 (1)	0,000060 (6)
$\gamma_{25,0}$(Np)	299,23 (6)	0,000028 (14)

7 Main Production Modes

Am − 241(n,γ)Am − 242m

U − 238(n,γ), beta decay and (n,γ)

8 References

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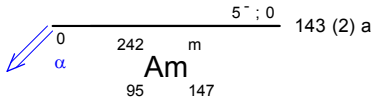
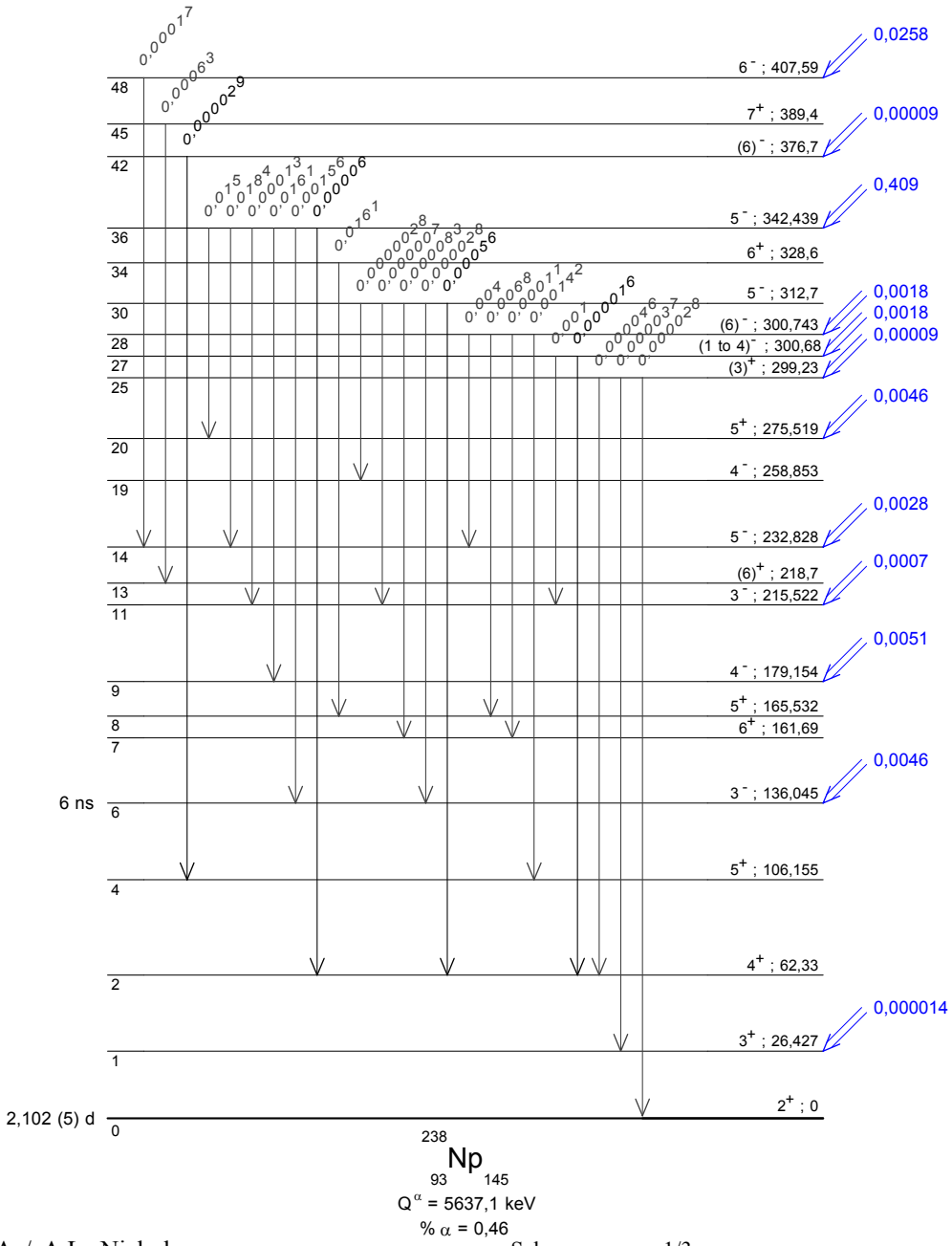
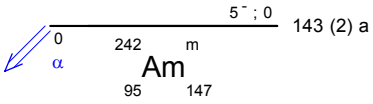
γ Emission intensities
per 100 disintegrations
0,0001414
5⁻ ; 48,6
143 a
1
1⁻ ; 0
16,01 (2) h
0
242
Am
95
147
Q^IT = 48,6 keV
% IT = 99,54

$^{242}_{95}Am^{m}_{147}$

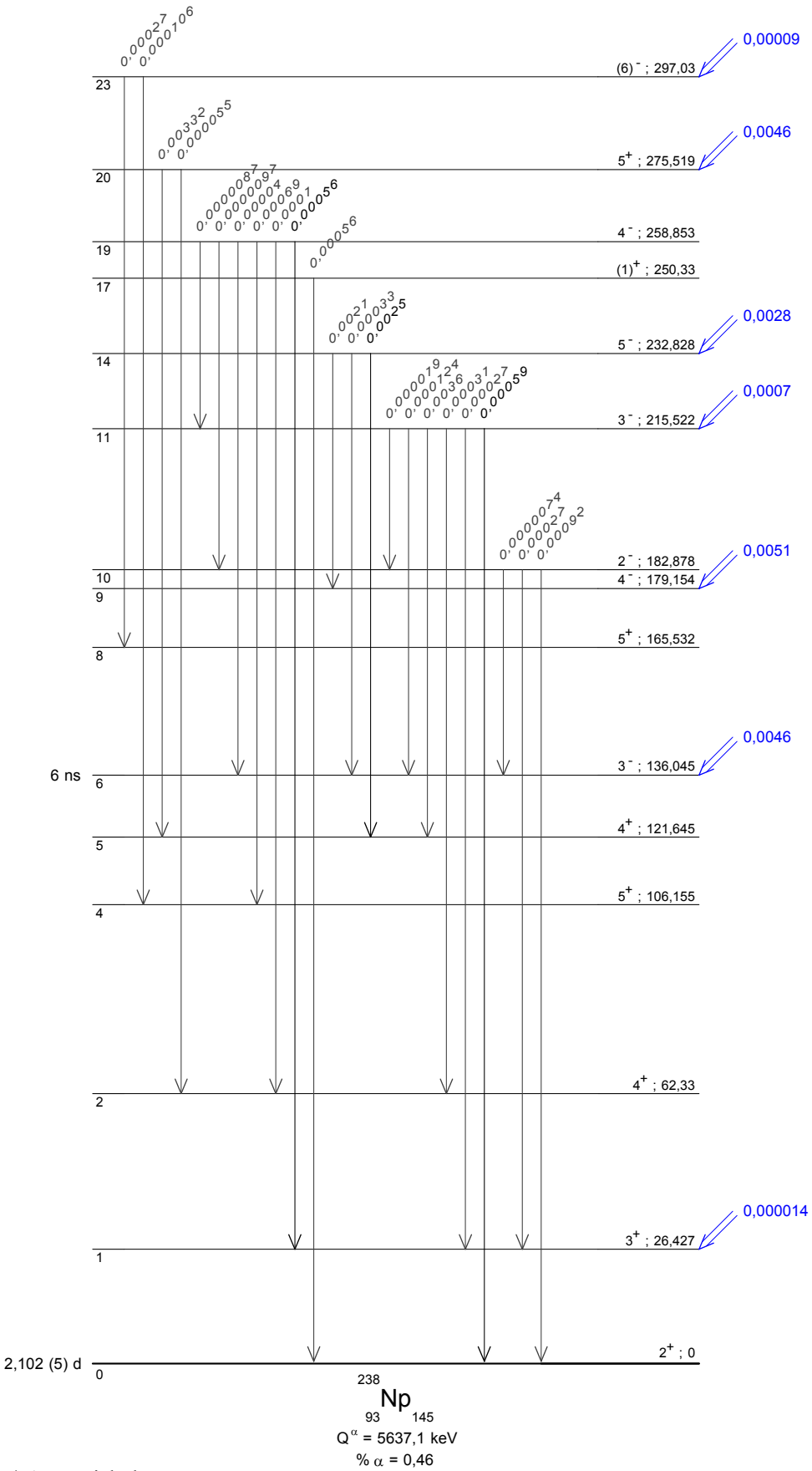


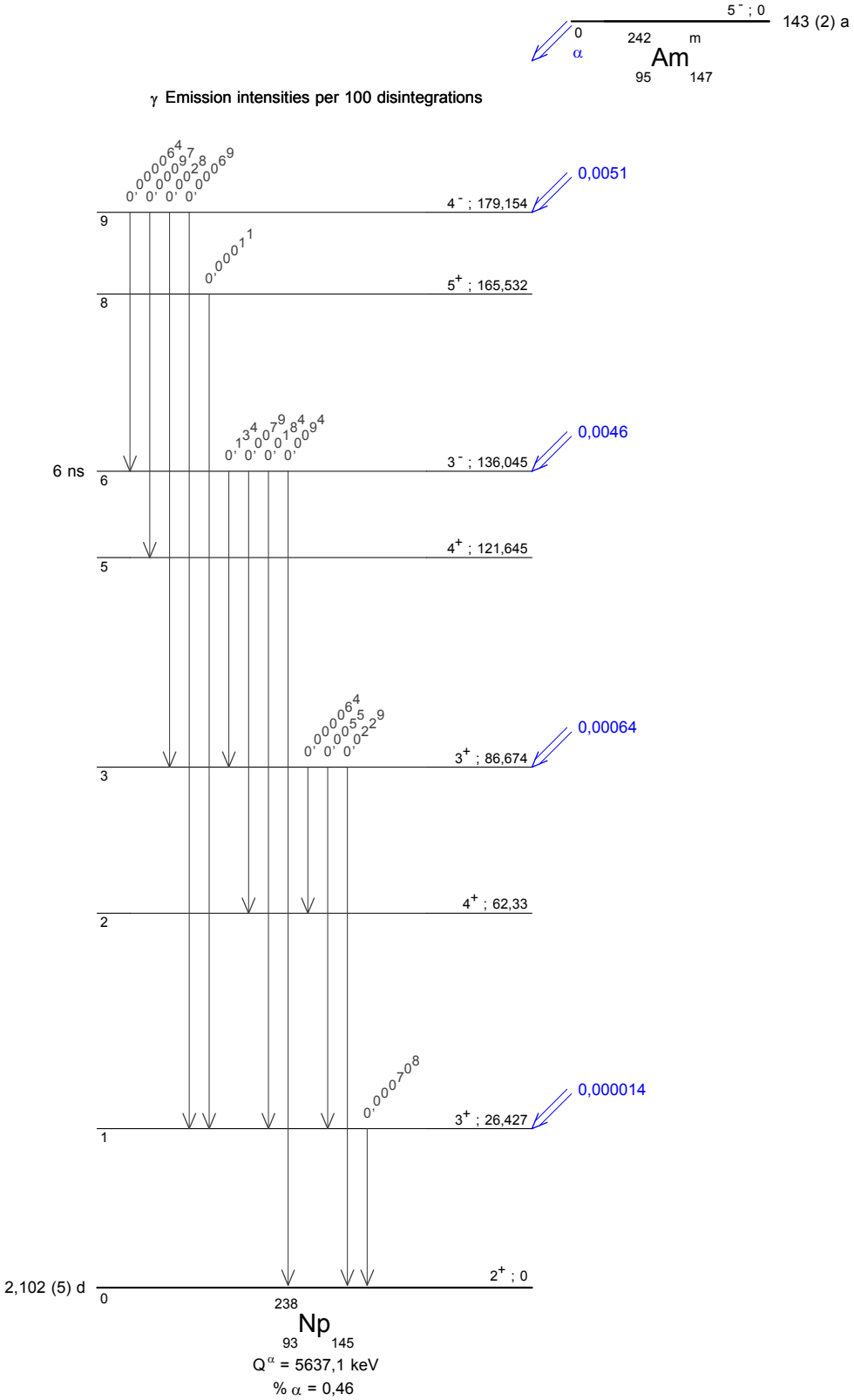
γ Emission intensities per 100 disintegrations





γ Emission intensities per 100 disintegrations




5⁻ ; 0
143 (2) a
0
α
242 m
Am
95 147
γ Emission intensities per 100 disintegrations
0,0051
4⁻ ; 179,154
9
5⁺ ; 165,532
8
0,0046
6 ns
3⁻ ; 136,045
6
4⁺ ; 121,645
5
0,00064
3⁺ ; 86,674
3
4⁺ ; 62,33
2
0,000014
3⁺ ; 26,427
1
2,102 (5) d
2⁺ ; 0
0
238
Np
93 145
Q^α = 5637,1 keV
% α = 0,46