$^{182}_{73}\mathrm{Ta}_{109}$

1 Decay Scheme

Ta-182 disintegrates by beta minus emissions to excited levels of W-182.
Le tantale 182 se désintègre par émission beta moins vers les niveaux excités du tungstène 182.

2 Nuclear Data

$T_{1/2}(^{182}\mathrm{Ta}\ )$: 114,61 (13) d
$Q^-(^{182}\mathrm{Ta}\ )$: 1814,3 (17) keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,13}$	261,1 (17)	29,0 (7)	Allowed	7,5
$\beta^-_{0,12}$	304,0 (17)	0,1414 (39)	1st Forbidden	10
$\beta^-_{0,11}$	326,8 (17)	1,5 (7)	Allowed	9,1
$\beta^-_{0,10}$	371,5 (17)	0,563 (10)	1st Forbidden	9,7
$\beta^-_{0,9}$	440,5 (17)	19,9 (7)	Allowed	8,4
$\beta^-_{0,8}$	483,2 (17)	2,39 (15)	1st Forbidden	9,5
$\beta^-_{0,7}$	525,2 (17)	45,1 (23)	Allowed	8,3
$\beta^-_{0,6}$	556,9 (17)	0,22 (21)	1st Forbidden	10,7
$\beta^-_{0,5}$	592,9 (17)	1,6 (22)	1st Forbidden	9,9
$\beta^-_{0,2}$	1484,9 (17)	~ 0	1st Forbidden	13
$\beta^-_{0,1}$	1714,2 (17)	~ 0	1st Forbidden	12,2

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{7,6}$(W)	31,7377 (15)	2,20 (16)	E1		1,259 (18)	0,293 (4)	1,628 (23)
$\gamma_{9,8}$(W)	42,7148 (14)	0,463 (12)	E1		0,557 (8)	0,1286 (18)	0,72 (1)
$\gamma_{13,11}$(W)	65,72215 (15)	11,6 (7)	M1+0,88%E2		2,25 (15)	0,52 (4)	2,92 (20)
$\gamma_{7,5}$(W)	67,74970 (10)	53,2 (22)	E1+0,03%M2		0,173 (21)	0,040 (6)	0,22 (3)
$\gamma_{9,7}$(W)	84,68024 (26)	22,7 (6)	M1+8,7%E2	5,88 (9)	1,36 (4)	0,321 (8)	7,66 (11)
$\gamma_{1,0}$(W)	100,10595 (7)	69,5 (12)	E2	0,878 (13)	2,28 (4)	0,576 (8)	3,89 (6)
$\gamma_{13,10}$(W)	110,388 (9)	0,1384 (43)	[E1]	0,238 (4)	0,0408 (6)	0,00931 (13)	0,290 (4)
$\gamma_{11,9}$(W)	113,67170 (22)	7,83 (13)	M1+10,3%E2	2,50 (5)	0,529 (16)	0,124 (4)	3,19 (5)
$\gamma_{9,6}$(W)	116,4179 (6)	0,557 (7)	E1	0,207 (3)	0,0353 (5)	0,00805 (12)	0,253 (4)
$\gamma_{6,4}$(W)	121,50 (14)	0,0060 (21)	[E2]	0,596 (9)	0,936 (15)	0,236 (4)	1,83 (3)
$\gamma_{9,5}$(W)	152,42991 (26)	7,89 (15)	E1	0,1038 (15)	0,01703 (24)	0,00387 (6)	0,1258 (18)
$\gamma_{11,8}$(W)	156,3864 (3)	2,976 (30)	E1	0,0972 (14)	0,01590 (23)	0,00362 (5)	0,1177 (17)
$\gamma_{13,9}$(W)	179,39381 (25)	5,05 (22)	M1+59,4%E2	0,44 (8)	0,148 (7)	0,0358 (21)	0,63 (7)
$\gamma_{11,7}$(W)	198,35187 (29)	1,925 (21)	E2	0,1725 (25)	0,1097 (16)	0,0273 (4)	0,317 (5)
$\gamma_{13,8}$(W)	222,1085 (3)	7,91 (8)	E1	0,0399 (6)	0,00630 (9)	0,001429 (20)	0,0480 (7)
$\gamma_{2,1}$(W)	229,3207 (6)	4,347 (45)	E2	0,1167 (17)	0,0605 (9)	0,01497 (21)	0,196 (3)
$\gamma_{13,7}$(W)	264,0740 (3)	4,054 (41)	E2	0,0799 (12)	0,0347 (5)	0,00852 (12)	0,1254 (18)
$\gamma_{3,2}$(W)	351,02 (6)	0,01219 (39)	E2	0,0380 (6)	0,01210 (17)	0,00293 (5)	0,0538 (8)
$\gamma_{12,3}$(W)	829,80 (9)	0,0142 (25)	[E2]	0,00536 (8)	0,000962 (14)	0,000222 (4)	0,00661 (10)
$\gamma_{5,2}$(W)	891,9733 (12)	0,0573 (25)	E2	0,00464 (7)	0,000810 (12)	0,000187 (3)	0,00569 (8)
$\gamma_{6,2}$(W)	927,9853 (13)	0,617 (7)	E2	0,00429 (6)	0,000738 (11)	0,0001698 (24)	0,00524 (8)
$\gamma_{7,2}$(W)	959,7230 (12)	0,352 (5)	M2+96,8%E3	0,00901 (15)	0,00196 (3)	0,000463 (7)	0,01157 (19)
$\gamma_{8,2}$(W)	1001,6885 (12)	2,08 (5)	M1+98,8%E2	0,00374 (6)	0,000627 (10)	0,0001438 (23)	0,00455 (8)
$\gamma_{4,1}$(W)	1035,80 (14)	0,0060 (21)	E2	0,00346 (5)	0,000575 (8)	0,0001317 (19)	0,00420 (6)
$\gamma_{9,2}$(W)	1044,4033 (12)	0,2394 (42)	E1+18,7%M2	0,00444 (12)	0,000703 (20)	0,000160 (5)	0,00535 (15)
$\gamma_{10,2}$(W)	1113,409 (9)	0,444 (8)	M1+96,1%E2	0,00311 (8)	0,000504 (12)	0,000115 (3)	0,00376 (10)
$\gamma_{5,1}$(W)	1121,290 (3)	35,30 (33)	M1+99,9%E2	0,00297 (5)	0,000483 (7)	0,0001104 (16)	0,00360 (5)
$\gamma_{4,0}$(W)	1135,91 (14)		E0				
$\gamma_{6,1}$(W)	1157,3061 (11)	0,84 (13)	M1+62,8%E2	0,0039 (11)	0,00060 (15)	0,00014 (4)	0,0046 (13)
$\gamma_{11,2}$(W)	1158,0750 (12)	0,296 (18)	E1	0,001159 (17)	0,0001632 (23)	0,0000366 (6)	0,001377 (20)
$\gamma_{12,2}$(W)	1180,82 (7)	0,0872 (29)	E2+88,7%M1	0,0030 (4)	0,00047 (5)	0,000108 (11)	0,0036 (4)
$\gamma_{7,1}$(W)	1189,040 (3)	16,66 (16)	60%E1+13%M2+27%E3	0,003732 (33)	0,000638 (6)	0,0001468 (14)	0,004567 (41)
$\gamma_{5,0}$(W)	1221,395 (3)	27,35 (27)	E2	0,00252 (4)	0,000402 (6)	0,0000915 (13)	0,00305 (5)
$\gamma_{13,2}$(W)	1223,7972 (12)	0,205 (21)	E1+12,6%M2	0,0024 (5)	0,00037 (8)	0,000083 (17)	0,0029 (6)
$\gamma_{8,1}$(W)	1231,004 (3)	11,66 (11)	M1+99,9%E2	0,00249 (4)	0,000395 (6)	0,0000901 (13)	0,00301 (5)
$\gamma_{6,0}$(W)	1257,407 (3)	1,515 (15)	E2	0,00239 (4)	0,000378 (6)	0,0000860 (12)	0,00289 (4)
$\gamma_{9,1}$(W)	1273,719 (3)	0,660 (7)	81%E1+11%M2+7%E3	0,002278 (21)	0,0003583 (31)	0,0000816 (8)	0,002781 (25)
$\gamma_{7,0}$(W)	1289,145 (3)	1,391 (17)	M2	0,01019 (15)	0,001630 (23)	0,000372 (6)	0,01231 (18)
$\gamma_{10,1}$(W)	1342,72 (5)	0,2569 (29)	E2+1,2%M3	0,0023 (5)	0,00036 (9)	0,000082 (21)	0,0028 (6)
$\gamma_{9,0}$(W)	1373,824 (3)	0,2237 (32)	E3	0,00400 (6)	0,000728 (11)	0,0001685 (24)	0,00496 (7)
$\gamma_{11,1}$(W)	1387,390 (3)	0,0729 (11)	M2+87,1%E3	0,00450 (15)	0,000791 (22)	0,000183 (5)	0,00554 (18)
$\gamma_{12,1}$(W)	1410,14 (7)	0,0400 (8)	E2	0,00193 (3)	0,000298 (5)	0,0000676 (10)	0,00235 (4)
$\gamma_{13,1}$(W)	1453,118 (1)	0,037 (7)	M2+81,5%E3	0,0043 (3)	0,00074 (5)	0,000169 (10)	0,0053 (4)

3 Atomic Data

3.1 W

ω_K : 0,954 (4)
$\bar{\omega}_L$: 0,283 (11)
n_{KL} : 0,825 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	57,9823		57,57
	$K\alpha_1$	59,3189		100
	$K\beta_3$	66,952	}	
	$K\beta_1$	67,2451	}	
	$K\beta_5''$	67,664	}	33,15
	$K\beta_2$	69,033	}	
	$K\beta_4$	69,295	}	9,08
	$KO_{2,3}$	69,484	}	
X_L				
	$L\ell$	7,3881		
	$L\alpha$	8,3352 – 8,3976		
	$L\eta$	8,725		
	$L\beta$	9,526 – 9,9485		
	$L\gamma$	10,9501 – 11,6761		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	45,109 – 48,882	100
KLX	54,514 – 59,312	53,7
KXY	63,89 – 69,51	7,18
Auger L	4,5 – 12,1	

4 Electron Emissions

		Energy keV			Electrons per 100 disint.
e_{AL}	(W)	4,5	-	12,1	59,5 (7)
e_{AK}	(W)				1,68 (15)
	KLL	45,109	-	48,882	}
	KLX	54,514	-	59,312	}
	KXY	63,89	-	69,51	}
$ec_{9,7\ K}$	(W)	15,1553		(14)	15,41 (42)
$ec_{7,6\ L}$	(W)	19,6379	-	21,5309	1,06 (8)
$ec_{7,6\ M}$	(W)	28,9181	-	29,9285	0,246 (18)
$ec_{1,0\ K}$	(W)	30,58098		(7)	12,49 (23)
$ec_{9,8\ L}$	(W)	30,615	-	32,508	0,1498 (45)
$ec_{11,9\ K}$	(W)	44,1467		(14)	4,67 (11)
$ec_{13,11\ L}$	(W)	53,6224	-	55,5154	6,8 (5)
$ec_{7,5\ L}$	(W)	55,6499	-	57,5429	7,5 (10)
$ec_{13,11\ M}$	(W)	62,9026	-	63,9130	1,57 (13)
$ec_{7,5\ M}$	(W)	64,9301	-	65,9405	1,74 (27)
$ec_{13,11\ N}$	(W)	65,1270	-	65,6864	0,374 (29)
$ec_{7,5\ N}$	(W)	67,1550	-	67,7139	0,41 (6)
$ec_{9,7\ L}$	(W)	72,5805	-	74,4735	3,56 (13)
$ec_{9,7\ M}$	(W)	81,8607	-	82,8711	0,841 (28)
$ec_{9,5\ K}$	(W)	82,90491		(26)	0,728 (17)
$ec_{9,7\ N}$	(W)	84,0850	-	84,6445	0,201 (7)
$ec_{11,8\ K}$	(W)	86,8614		(3)	0,2587 (46)
$ec_{1,0\ L}$	(W)	88,0062	-	89,8992	32,4 (7)
$ec_{1,0\ M}$	(W)	97,2864	-	98,2968	8,19 (15)
$ec_{1,0\ N}$	(W)	99,5110	-	100,0702	1,931 (35)
$ec_{11,9\ L}$	(W)	101,5719	-	103,4649	0,989 (32)
$ec_{13,9\ K}$	(W)	109,86881		(25)	1,36 (25)
$ec_{11,9\ M}$	(W)	110,8521	-	111,8625	0,232 (8)
$ec_{11,7\ K}$	(W)	128,82687		(29)	0,2520 (45)
$ec_{9,5\ L}$	(W)	140,3301	-	142,2231	0,1194 (28)
$ec_{13,8\ K}$	(W)	152,5835		(3)	0,301 (5)
$ec_{2,1\ K}$	(W)	159,7957		(6)	0,424 (7)
$ec_{13,9\ L}$	(W)	167,294	-	169,187	0,459 (22)
$ec_{13,9\ M}$	(W)	176,5742	-	177,5846	0,111 (7)
$ec_{11,7\ L}$	(W)	186,2521	-	188,1451	0,1603 (29)
$ec_{13,7\ K}$	(W)	194,5490		(3)	0,288 (5)
$ec_{2,1\ L}$	(W)	217,2209	-	219,1139	0,2199 (39)
$ec_{13,7\ L}$	(W)	251,974	-	253,867	0,1250 (22)
$ec_{5,1\ K}$	(W)	1051,765		(3)	0,1045 (20)
$\beta^-_{0,13}$	max:	261,1		(17)	29,0 (7)
$\beta^-_{0,13}$	avg:	72,5		(5)	
$\beta^-_{0,12}$	max:	304,0		(17)	0,1414 (39)

		Energy keV		Electrons per 100 disint.
$\beta^-_{0,12}$	avg:	85,7	(5)	
$\beta^-_{0,11}$	max:	326,8	(17)	1,5 (7)
$\beta^-_{0,11}$	avg:	92,8	(5)	
$\beta^-_{0,10}$	max:	371,5	(17)	0,563 (10)
$\beta^-_{0,10}$	avg:	107,0	(6)	
$\beta^-_{0,9}$	max:	440,5	(17)	19,9 (7)
$\beta^-_{0,9}$	avg:	129,6	(6)	
$\beta^-_{0,8}$	max:	483,2	(17)	2,39 (15)
$\beta^-_{0,8}$	avg:	143,9	(6)	
$\beta^-_{0,7}$	max:	525,2	(17)	45,1 (23)
$\beta^-_{0,7}$	avg:	158,2	(6)	
$\beta^-_{0,6}$	max:	556,9	(17)	0,22 (21)
$\beta^-_{0,6}$	avg:	169,2	(6)	
$\beta^-_{0,5}$	max:	592,9	(17)	1,6 (22)
$\beta^-_{0,5}$	avg:	181,8	(6)	
$\beta^-_{0,2}$	max:	1484,9	(17)	~ 0
$\beta^-_{0,2}$	avg:	529,0	(7)	
$\beta^-_{0,1}$	max:	1714,2	(17)	~ 0
$\beta^-_{0,1}$	avg:	625,2	(70)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(W)	7,3881 — 11,6761		24,4 (5)	
XKα_2	(W)	57,9823		10,06 (17)	} Kα
XKα_1	(W)	59,3189		17,48 (29)	}
XKβ_3	(W)	66,952	}		
XKβ_1	(W)	67,2451	}	5,79 (13)	K$'\beta_1$
XKβ''_5	(W)	67,664	}		
XKβ_2	(W)	69,033	}		
XKβ_4	(W)	69,295	}	1,59 (5)	K$'\beta_2$
XKO$_{2,3}$	(W)	69,484	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{7,6}$(W)	31,7377 (15)	0,84 (6)
$\gamma_{9,8}$(W)	42,7148 (14)	0,269 (7)
$\gamma_{13,11}$(W)	65,72215 (15)	2,97 (8)
$\gamma_{7,5}$(W)	67,74970 (10)	43,6 (15)
$\gamma_{9,7}$(W)	84,68024 (26)	2,62 (6)
$\gamma_{1,0}$(W)	100,10595 (7)	14,22 (16)
$\gamma_{13,10}$(W)	110,388 (9)	0,1073 (33)
$\gamma_{11,9}$(W)	113,67170 (22)	1,869 (20)
$\gamma_{9,6}$(W)	116,4179 (6)	0,445 (5)
$\gamma_{6,4}$(W)	121,50 (14)	0,0021 (7)
$\gamma_{9,5}$(W)	152,42991 (26)	7,01 (13)
$\gamma_{11,8}$(W)	156,3864 (3)	2,662 (27)
$\gamma_{13,9}$(W)	179,39381 (25)	3,099 (31)
$\gamma_{11,7}$(W)	198,35187 (29)	1,461 (15)
$\gamma_{13,8}$(W)	222,1085 (3)	7,54 (7)
$\gamma_{2,1}$(W)	229,3207 (6)	3,634 (36)
$\gamma_{13,7}$(W)	264,0740 (3)	3,602 (36)
$\gamma_{3,2}$(W)	351,02 (6)	0,01157 (37)
$\gamma_{12,3}$(W)	829,80 (9)	0,0141 (25)
$\gamma_{5,2}$(W)	891,9710 (12)	0,0570 (25)
$\gamma_{6,2}$(W)	927,9828 (13)	0,614 (7)
$\gamma_{7,2}$(W)	959,7203 (12)	0,348 (5)
$\gamma_{8,2}$(W)	1001,6856 (12)	2,07 (5)
$\gamma_{4,1}$(W)	1035,80 (14)	0,0060 (21)
$\gamma_{9,2}$(W)	1044,4001 (12)	0,2381 (42)
$\gamma_{10,2}$(W)	1113,406 (9)	0,442 (8)
$\gamma_{5,1}$(W)	1121,290 (3)	35,17 (33)
$\gamma_{6,1}$(W)	1157,3022 (11)	0,83 (13)
$\gamma_{11,2}$(W)	1158,0711 (12)	0,295 (18)
$\gamma_{12,2}$(W)	1180,82 (7)	0,0869 (29)
$\gamma_{7,1}$(W)	1189,040 (3)	16,58 (16)
$\gamma_{5,0}$(W)	1221,395 (3)	27,27 (27)
$\gamma_{13,2}$(W)	1223,7928 (12)	0,204 (21)
$\gamma_{8,1}$(W)	1231,004 (3)	11,62 (11)
$\gamma_{6,0}$(W)	1257,407 (3)	1,511 (15)
$\gamma_{9,1}$(W)	1273,719 (3)	0,658 (7)
$\gamma_{7,0}$(W)	1289,145 (3)	1,374 (17)
$\gamma_{10,1}$(W)	1342,72 (5)	0,2562 (28)
$\gamma_{9,0}$(W)	1373,824 (3)	0,2226 (32)
$\gamma_{11,1}$(W)	1387,390 (3)	0,0725 (11)
$\gamma_{12,1}$(W)	1410,14 (7)	0,0400 (8)
$\gamma_{13,1}$(W)	1453,1118 (10)	0,037 (7)

6 Main Production Modes

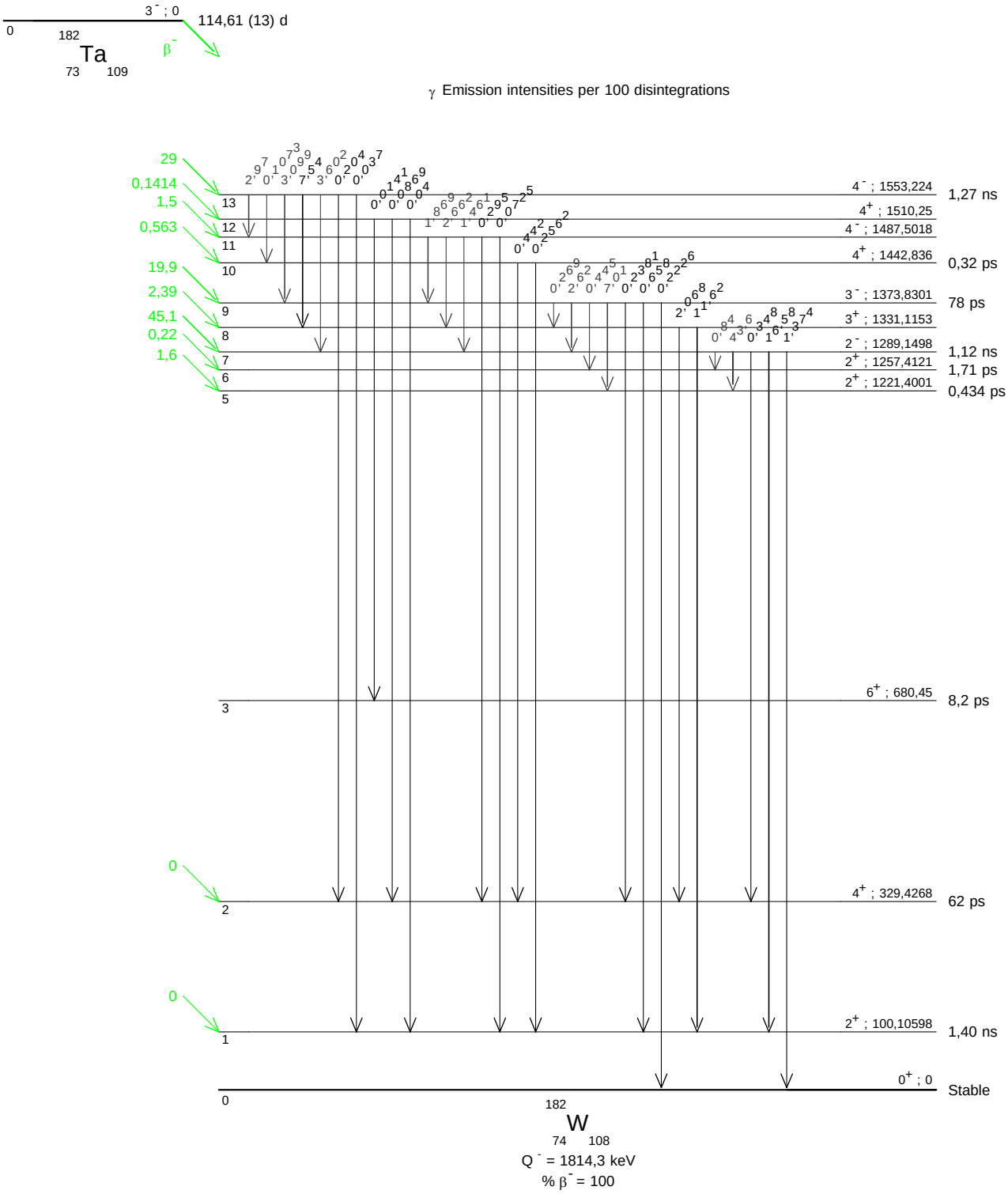
$\mathrm{Ta} - 182(\beta^-)\mathrm{W} - 182$

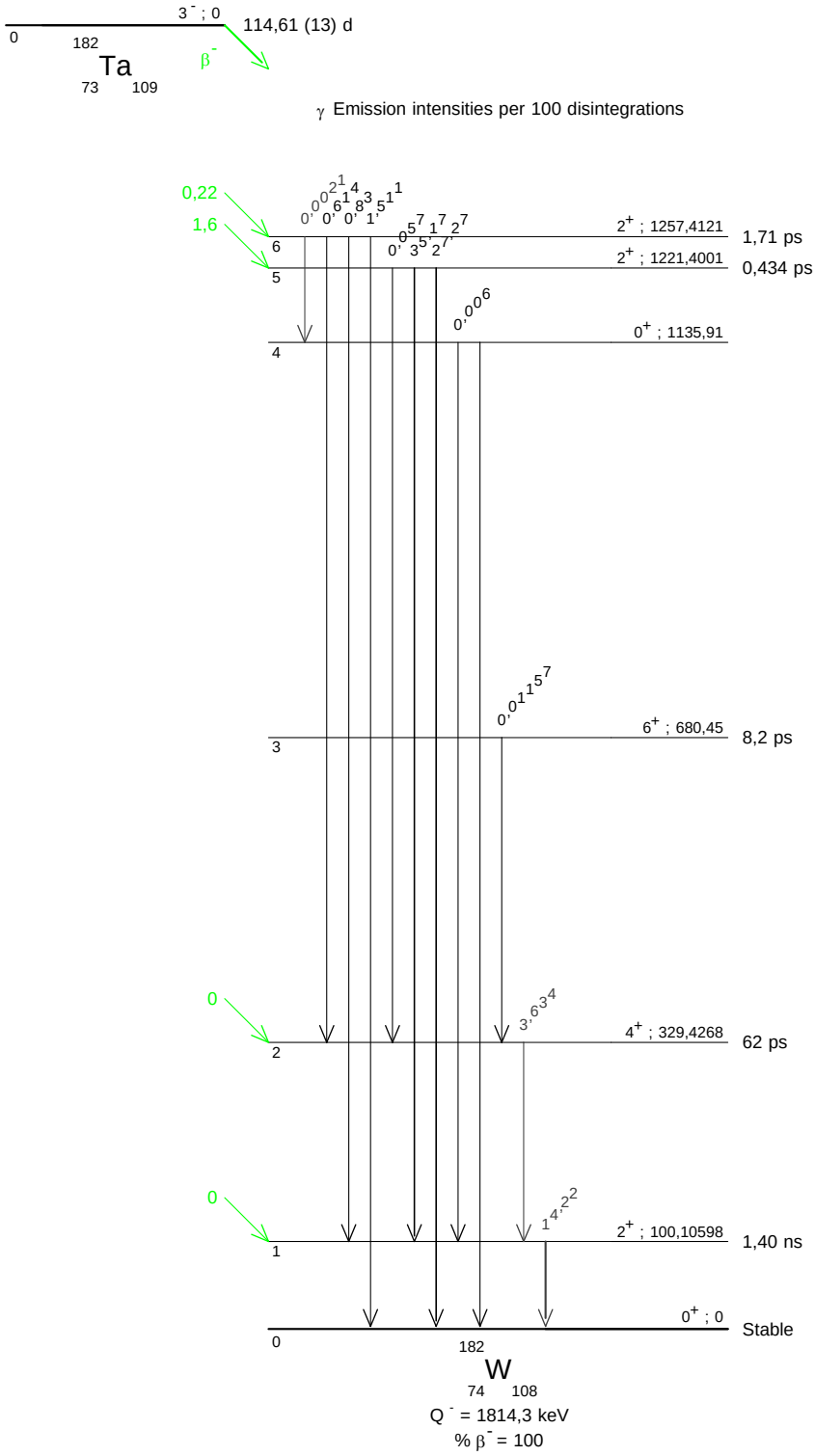
7 References

- R. V. Zumstein, J. D. Kurbatov, M. L. Pool. Phys. Rev. 63 (1943) 59
  (Half-life.)
- L. Seren, H. N. Friedlander, S. H. Turkel. Phys. Rev. 72 (1947) 888
  (Half-life.)
- L. Meitner. Ann. Phys. 6 (1948) 113
  (Half-life.)
- W. K. Sinclair, A. F. Holloway. Nature 167 (1951) 365
  (Half-life.)
- G. G. Eichholz, L. A. Ficko. Phys. Rev. 86 (1952) 794
  (Half-life.)
- H. W. Wright, E. I. Wyatt, S. A. Reynolds, W. S. Lyon, T. H. Handley. Nucl. Sci. Eng. 2 (1957) 427
  (Half-life.)
- J. P. Keene, L. A. Mackenzie, C. W. Gilbert. Phys. in Med. Biol. 2 (1958) 360
  (Half-life.)
- A. Speecke, J. Hoste. Bull. Soc. Chim. Belges 67 (1958) 131
  (Half-life.)
- N. A. Voinova, B. S. Dzhelepov, N. N. Zhukovskii. Bull. Acad. Sci. USSR, Phys. Ser. 23 (1959) 822
  (Gamma emission probabilities.)
- V. S. Grodzev, L. I. Rusinov, Y. L. Khazov. Bull. Acad. Sci. USSR, Phys. Ser. 24 (1960) 1439
  (K ICC.)
- H. Ryde, Z. Sujkowski. Ark. Fysik 20 (1961) 289
  (Gamma emission probabilities.)
- V. D. Vitman, N. A. Voinova, B. S. Dzhelepov, A. A. Karan. Bull. Acad. Sci. USSR, Phys. Ser. 25 (1962) 192
  (Gamma emission probabilities.)
- N. A. Voinova, B. S. Dzhelepov, Yu. V. Khol'nov. Bull. Acad. Sci. USSR, Phys. Ser. 25 (1962) 223
  (Gamma emission probabilities.)
- E. Bashandy, A. H. El-Farrash, M. S. El-Nesr. Nucl. Phys. 52 (1964) 61
  (Mixing ratio.)
- H. Daniel, J. Huefner, Th. Lorenz, O. W. B. Schult, U. Gruber. Nucl. Phys. 56 (1964) 147
  (Gamma emission probabilities.)
- V. A. Balalaev, N. A. Voinova, B. S. Dzhelepov, A. Meshter, S. A. Shestopalova. Bull. Acad. Sci. USSR, Phys. Ser. 28 (1964) 1596
  (Conversion electron intensities.)
- R. Henck, L. Stab, P. Siffert, A. Coche. Comp. Rend. Acad. Sci. (Paris) 260 (1965) 4991
  (Gamma emission probabilities.)
- W. F. Edwards, F. Boehm, J. Rogers, E. J. Seppi. Nucl. Phys. 63 (1965) 97
  (Gamma emission probabilities.)
- B. S. Dzhelepov, V. D. Vitman. Nucl. Phys. 75 (1966) 371
  (Gamma emission probabilities.)
- K. Korkman, A. Bäcklin. Nucl. Phys. 82 (1966) 561
  (Gamma emission probabilities.)
- E. P. Grigorev, A. V. Zolotavin, V. O. Sergeev, V. S. Bekrenev. Soviet J. Nucl. Phys. 4 (1966) 5
  (Mixing ratio.)
- O. Nilsson, S. Hogberg, S. -E. Karlsson, G. M. El-Sayad. Nucl. Phys. A100 (1967) 351
  (Mixing ratio, ICC experimental.)
- D. A. Walker. Nucl. Instrum. Meth. 48 (1967) 277
  (Half-life.)
- D. H. White, R. E. Birkett. Nucl. Phys. A136 (1969) 657
  (Gamma emission probabilities.)
- J. J. Sapyta, E. G. Funk, J. W. Mihelich. Nucl. Phys. A139 (1969) 161
  (Gamma emission probabilities.)

- P. Galan, T. Galanova, Z. Malek, N. Voinova, Z. Preibisz, K. Stryczniewicz. Nucl. Phys. A136 (1969) 673
  (ICC experimental.)
- D. H. White, R. E. Birkett, T. Thomson. Nucl. Instrum. Meth. 77 (1970) 261
  (Gamma emission probabilities.)
- L. J. Jardine. Nucl. Instrum. Meth. 96 (1971) 259
  (Gamma emission probabilities.)
- M. Mladenovic, M. Ninkovic, M. Stojanovic. Fizika 3 (1971) 219
  (Gamma emission probabilities.)
- J. F. Emery, E. I. Wyatt, S. A. Reynolds. Nucl. Sci. Eng. 48 (1972) 319
  (Half-life.)
- P. Galan, M. Vejs. Fys. Cas. 22 (1972) 60
  (Gamma emission probabilities.)
- K. S. Krane, J. R. Sites, W. A. Steyert. Phys. Rev. C5 (1972) 1104
  (Mixing ratio.)
- P. Herzog, M. J. Canty, K. D. Killig. Nucl. Phys. A187 (1972) 49
  (Mixing ratio.)
- C. J. Visser, J. H. M. Karsten, F. J. Haasbroek, P. G. Marais. Agrochemophysica 5 (1973) 15
  (Half-life.)
- N. Lavi. Nucl. Instrum. Meth. 116 (1974) 457
  (Gamma emission probabilities.)
- L. Westerberg, L. O. Edvardson, G. C. Madueme. Nucl. Phys. A255 (1975) 427
  (K ICC.)
- L. M. Quinones, Z. W. Grabowski. Nucl. Phys. A242 (1975) 243
  (Mixing ratio.)
- R. G. Helmer. Nucl. Phys. A272 (1976) 269
  (Gamma emission probabilities.)
- R. J. Gehrke, R. G. Helmer, R. C. Greenwood. Nucl. Instrum. Meth. 147 (1977) 405
  (Gamma emission probabilities.)
- R. A. Meyer. LLNL M-100 (1978)
  (Gamma emission probabilities.)
- U. Schötzig, K. Debertin, K. F. Walz. Nucl. Instrum. Methods 169 (1980) 43
  (Half-life, gamma emission probabilities.)
- R. Spanhoff, M. J. Canty, H. Postma, G. Mennenga. Phys. Rev. C21 (1980) 361
  (Mixing ratio.)
- W. M. Roney Jr., W. A. Seale. Nucl. Instrum. Meth. 171 (1980) 389
  (Gamma emission probabilities.)
- R. Kaur, A. K. Sharma, S. S. Sooch, H. R. Verma, P. N. Trehan. Indian J. Pure Appl. Phys. 19 (1981) 133
  (Mixing ratio.)
- H. A. Ismail, M. Morsy, H. Hanafi, S. Abdle-Malak, H. El-Samman. Rev. Roum. Phys. 26 (1981) 455
  (Gamma emission probabilities.)
- J. Jin, J. Takada, Y. Iwata, Y. Yoshizawa. Nucl. Instrum. Meth. 212 (1983) 259
  (Gamma emission probabilities.)
- J. Rikovska, D. Novakova, J. Ferencei, M. Finger. Z. Phys. A311 (1983) 185
  (Mixing ratio.)
- M. S. S. El-Daghmah, N. M. Stewart. Z. Phys. A309 (1983) 219
  (Gamma emission probabilities.)
- W. Xinlin, Li Xiaodi, Du Hongshan. Chin. J. Nucl. Phys. 8 (1986) 371
  (Gamma emission probabilities.)
- R. B. Firestone. Nucl. Data Sheets 54 (1988) 307
  (Spin, parity, energy levels, multipolarity)
- R. Kaur, P. N. Trehan. Appl. Rad. Isotopes 40 (1989) 727
  (Gamma emission probabilities.)
- R. A. Meyer. Fizika (Zagreb) 22 (1990) 153
  (Gamma emission probabilities.)
- J. K. Jabber, N. M. Stewart. J. Phys. (London) G16 (1990) 271
  (Gamma emission probabilities.)
- B. Chand, J. Goswany, D. Mehta, N. Singh, P. N. Trehan. Can. J. Phys. 70 (1992) 242
  (Gamma emission probabilities.)

- T.Kempisty, K. Pochwalski. Nucl. Instrum. Meth. Phys. Res. A312 (1992) 390
(Gamma emission probabilities.)
- Sun Huibin, Liu Yunzou, Zhou Jiewen, Wu Yaodong. Z. Physik A342 (1992) 141
(Gamma emission probabilities.)
- E. Schönfeld, H. Janssen. Nucl. Instrum. Meth. Phys. Res. A369 (1996) 527
(Atomic data.)
- H. Miyahara, H. Nagata, T. Furusawa, N. Murakami, C. Mori, N. Takeuchi, T. Genka. Appl. Rad. Isotopes 49 (1998) 1383
(Gamma emission probabilities.)
- R. G. Helmer, C. van der Leun. Nucl. Instrum. Meth. Phys. Res. A450 (2000) 35
(Gamma-ray energies.)
- I. M. Band, M. B. Trzhaskovskaya, C. W. Nestor Jr., P. O. Tikkanen, S. Raman. At. Data Nucl. Data Tables 81 (2002) 1
(Theoretical ICC.)
- G. Audi, A.H. Wapstra, C. Thibault. Nucl. Phys. A729 (2003) 1
(Q.)
- T. Kibédi, T. W. Burrows, M. B. Trzhaskovskaya, P. M. Davidson, C. W. Nestor Jr.. Nucl. Instrum. Meth. Phys. Res. A589 (2008) 202
(Theoretical ICC.)
- B. Singh, J. C. Roediger. Nucl. Data Sheets 111 (2010) 2081
(Spin, parity, energy levels, multipolarity)


3⁻ ; 0
114,61 (13) d
0
182
Ta
73 109
β⁻
γ Emission intensities per 100 disintegrations
29
0,1414
1,5
0,563
19,9
2,39
45,1
0,22
1,6
13
12
11
10
9
8
7
6
5
3
2
1
0
4⁻ ; 1553,224
1,27 ns
4⁺ ; 1510,25
4⁻ ; 1487,5018
4⁺ ; 1442,836
0,32 ps
3⁻ ; 1373,8301
78 ps
3⁺ ; 1331,1153
2⁻ ; 1289,1498
1,12 ns
2⁺ ; 1257,4121
1,71 ps
2⁺ ; 1221,4001
0,434 ps
6⁺ ; 680,45
8,2 ps
4⁺ ; 329,4268
62 ps
2⁺ ; 100,10598
1,40 ns
0⁺ ; 0
Stable
182
W
74 108
Q⁻ = 1814,3 keV
% β⁻ = 100


3⁻ ; 0
114,61 (13) d
0
182
Ta
73 109
β⁻
γ Emission intensities per 100 disintegrations
0,22
1,6
2⁺ ; 1257,4121
1,71 ps
2⁺ ; 1221,4001
0,434 ps
0⁺ ; 1135,91
6⁺ ; 680,45
8,2 ps
4⁺ ; 329,4268
62 ps
2⁺ ; 100,10598
1,40 ns
0⁺ ; 0
Stable
182
W
74 108
Q⁻ = 1814,3 keV
% β⁻ = 100