Nd(α,xnγ) **1980Ko07,2012Ku07**

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, A. Rodionov and G. Shulyak	NDS 136, 163 (2016)	14-Jul-2016

2012Ku07: ^{143}Nd(α,nγ), E=19 MeV; ^{144}Nd(α,2nγ), E=23 MeV; measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma\gamma(\theta)$. ^{146}Sm; deduced levels, J^π, δ, B(E1)/B(E2) ratios. (α,nγ) reaction was studied with OSIRIS detector array consisting of six HPGe shielded with BGO. (α,2nγ) reaction was studied with array consisting of eight HPGe detectors.

1980Ko07: ^{144}Nd(α,2nγ), E=26 MeV, ^{146}Nd(^{3}He,3nγ), E=27 MeV; measured Eγ, Iγ, $\gamma(\theta)$, $\gamma\gamma$(t), ce, $T_{1/2}$. ^{146}Sm; deduced levels, J^π, α. Cyclotron, Ge detectors, solenoidal and double focusing electron spectrometers with Si(Li) detectors.

1975Si03: ^{144}Nd(α,2nγ), E=22, 25, 27 MeV; measured Eγ, Iγ, $\gamma\gamma$, I(ce). ^{146}Sm; deduced levels, J^π. Ge(Li) and NaI(Tl) detectors, orange beta spectrometer.

1978Ki11: ^{146}Nd(α,4nγ), E=47.9 MeV; measured Eγ, I$\gamma(\theta)$, $\gamma\gamma$, $\alpha\gamma$ delayed. ^{146}Sm; deduced levels, J^π. Cyclotron, enriched target, Ge(Li) detectors.

The level scheme deduced from 2012Ku07, 1980Ko07, 1978Ki11 and 1975Si03 data. In 1980Ko07, results were deduced from (α,2nγ) and (^{3}He,3nγ) reactions, authors quote identical set of Eγ's for both spectra. In 1978Ki11, measurement of delayed γ rays showed the decay of 2797.6 keV level with $0.6<T_{1/2}<1.6$ ns, other levels populated with significant strength have $T_{1/2}<0.6$ ns. Five pairs of levels with 3326.6/3327.8, 3473.3/3474.4, 3579.8/3580.9, 3618.2/3619.5 and 4281.7/4282.7 keV energy were determined from the (α,n) and (α,2n) reactions in 2012Ku07, which the authors regarded as tentative states. Based on the adopted level scheme, the evaluators consider each pair of states as single state, namely, 3327.1, 3474.2, 3580.3, 3620.0 and 4282.3 keV.

^{146}Sm Levels

E(level)†	J$^\pi$#	$T_{1/2}$@	Comments
0.0	0^+		
747.182 *20*	2^+		
1380.29 *6*	3^-		
1381.24 *6*	4^+		
1648.11 *10*	2^+		
1811.59 *7*	6^+		
2045.75 *9*	4^-		
2083.47 *7*	5^-		
2156.1 *6*	2^+		
2222.42 *8*	6^+		
2269.77 *14*	3^+		
2280.92 *9*	4^+		
2398.7 *10*			
2401.3 *7*	2^+		
2439.05 *17*	4^+		
2513.32 *12*	3^-		
2531.92 *19*	4^+		
2589.25 *16*			
2600.35 *7*	7^-		
2649.4 *10*	(2^+)		
2667.11 *11*	4^-		J$^\pi$: 2012Ku07: $J^\pi=6^-$.
2678.53 *18*	4^+		
2684.75 *13*	(2^+)		
2737.14 *10*	8^+		
2744.29 *14*	$(4^+,5,6^+)$		
2782.85 *20*	$(4^+,5^-)$		J$^\pi$: 2012Ku07: $J^\pi=6,(5^+)$.
2788.12 *12*	5^-		
2797.65 *9*	9^-	1.1& ns *5*	
2799.6 *4*	3^+		
2826.2 *7*	6^-		
2850.38 *9*	4^+		
2898.35 *14*	5^+		

Continued on next page (footnotes at end of table)

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

^{146}Sm Levels (continued)

E(level)[†]	Jπ[#]	Comments
2932.05 *12*	(4$^+$)	
2969.0 *10*	2$^+$,3$^+$	
2973.8 *6*	3$^+$,4$^+$	
2977.9 *10*		
2984.4 *3*	$^+$	
3011.22 *13*	$^+$	E(level): suggested by 1975Si03 only.
3014.70 *18*	3$^+$	
3019.52 *22*		
3043.10 *8*	8$^+$	
3068.1 *10*	3$^+$	
3072.7 *6*	5$^+$	
3092.39 *12*	(4$^+$,5,6$^+$)	
3092.9 *10*	3$^+$	
3099.46 *10*	7$^-$	
3136.6 *7*	3$^-$	
3166.89 *8*	8$^-$	
3183.26 *10*	8$^-$	
3184.2 *6*	3$^+$	
3185.68 *11*		
3198.82 *22*		Jπ: 2012Ku07: J^π=7.
3200.1 *7*	4$^-$	
3208.29[‡] *9*	(8$^+$)	
3220.9 *10*	(3$^-$,4,5$^-$)	
3238.92 *17*	4$^+$	
3258.82 *16*	5$^-$	
3278.12 *22*		
3290.6 *3*	8$^+$	
3327.1 *4*		
3340.24 *10*	(5$^-$,6$^-$)	
3354.61 *8*	9$^-$	
3360.8 *8*	3$^-$,4$^-$	
3377.11 *17*		
3378.0 *7*	(3$^-$,4,5$^-$)	
3391.1 *5*		
3412.7 *8*	(4$^+$,5,6$^-$)	
3419.0 *7*	3$^+$	
3461.8 *6*	5$^-$	
3474.2 *6*	5$^+$,(6$^+$)	
3484.2 *3*	(4$^+$,5,6$^-$)	
3515.8 *10*	3$^+$	
3560.25 *22*		
3565.4 *4*		
3567.45 *9*	9$^+$	
3568.4 *10*		
3580.3 *3*	(4$^+$)	
3583.7 *10*	4$^-$	
3593.2 *10*		
3594.81 *21*		
3620.0 *3*		
3625.9 *8*	4$^+$	
3633.5 *10*		
3669.76 *21*		
3685.3 *10*		
3701.07 *13*	(7$^-$,8,9)	Jπ: 2012Ku07: J^π=7$^-$,9$^-$.
3753.55 *9*	10$^-$	
3766.9 *10*		

Continued on next page (footnotes at end of table)

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

^{146}Sm Levels (continued)

E(level)[†]	J$^{\pi}$[#]	Comments
3774.65 *9*	10^+	
3783.45 *11*	11^-	
3800.6 *10*		
3809.6 *10*		
3815.1 *10*		
3825.5 *10*		
3869.6 *10*		
3924.46 *10*	(9^-)	
3963.3 *10*		
3970.23 *17*		
3990.2 *10*	$(3^-),4^-$	
4005.6 *8*		
4032.4 *3*		
4080.12 *22*		J$^{\pi}$: 2012Ku07: $J^{\pi}=8^-,9^-$.
4091.23 *9*	11^-	
4125.97 *13*		
4127.7 *10*		
4135.6 *10*		
4143.86 *22*	(11^-)	
4145.4 *10*	(10^+)	
4164.5 *10*		
4194.80 *17*	12^+	
4202.18 *9*	(11^+)	
4239.2 *4*		
4282.30 *18*		
4341.17 *13*	(11^-)	
4461.32 *9*	(12^-)	
4579.74 *13*	(12^-)	
4628.75 *10*	13^-	
4752.22 *12*	(13^-)	
4969.49 *12*	(14^-)	
5129.46 *15*	13^-	
5206.20 *19*	14^+	
5218.00 *14*	(15^-)	
5517.40 *16*	(16^-)	
5613.89 *16*	(15^-)	
5697.11 *20*	(16^+)	
5873.7 *4*		
5972.3 *4*		
6176.7 *4*	(18^+)	

[†] From a least-squares fit to Eγ data.
[‡] Suggested by 1975Si03 only.
[#] From 'Adopted Levels'.
[@] From $\gamma\gamma$(t) 1980Ko07 except as noted.
[&] From $0.6<T_{1/2}<1.6$ ns (γ(t), 1978Ki11).

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

$\gamma(^{146}Sm)$

α(exp): from 1980Ko07, except as noted; α(exp) were normalized to α(K)(747γ, E2)=0.00397 *6* (from BrIcc calculation).
A_2/A_0 and A_4/A_0 from 1980Ko07 at Eα=26 MeV, except as noted.

E_γ [†]	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [f]	δ [gi]	α [h]	Comments
60.75 *19*	100 *1*	2797.65	9^-	2737.14	8^+	E1		1.048 *17*	α(K)exp=0.8 *4* (1975Si03) α(K)=0.871 *15*; α(L)=0.1394 *24*; α(M)=0.0299 *5* α(N)=0.00661 *11*; α(O)=0.000905 *15*; α(P)=3.94×10^{-5} *7* A_2=−0.25 *10*, A_4=−0.10 *8*; A_2=−0.30 *10* (1975Si03); A_2=−0.23 *2*, A_4=−0.02 *3*, ΔJ=1 stretched (1978Ki11); D from RUL.
120.5[a] *2*	18[e] *2*	4461.32	(12^-)	4341.17	(11^-)	(M1+E2)		1.10 *11*	α(K)=0.77 *8*; α(L)=0.25 *14*; α(M)=0.06 *4* α(N)=0.013 *7*; α(O)=0.0017 *9*; α(P)=4.2×10^{-5} *12* Mult.: D+Q ΔJ=1 from A_2=−0.17 *2*, A_4=+0.01 *3* (1978Ki11); D, E2 from RUL.
136.82 *25*	2.55[d] *25*	2737.14	8^+	2600.35	7^-	E1		0.1175	α(K)exp≤0.16 (1975Si03) α(K)=0.0996 *15*; α(L)=0.01417 *22*; α(M)=0.00303 *5* α(N)=0.000678 *10*; α(O)=9.71×10^{-5} *15*; α(P)=5.03×10^{-6} *8* A_2=−0.15 *5*, A_4=+0.05 *5*; A_2=−0.30 *10* (1975Si03); A_2=−0.22 *10*, A_4=+0.05 *15*, ΔJ=1 stretched (1978Ki11).
167.43 *3*	100[e] *10*	4628.75	13^-	4461.32	(12^-)	M1+E2		0.388 *9*	α(K)exp=0.034 *11* α(K)=0.30 *4*; α(L)=0.071 *24*; α(M)=0.016 *6* α(N)=0.0035 *13*; α(O)=0.00048 *14*; α(P)=1.7×10^{-5} *5* Mult.: D+Q, ΔJ=1, A_2=−0.18 *9*, A_4=+0.06 *2*; A_2=−0.17 *1*, A_4=+0.01 *2* (1978Ki11). D, E2 from RUL. α(K)exp agrees with E1 mult., which conflicts with $\gamma(\theta)$ data.
171.5[#] *10*	22[c] *5*	3924.46	(9^-)	3753.55	10^-				
172.5[a] *1*	36[e] *5*	4752.22	(13^-)	4579.74	(12^-)	(M1+E2)		0.353 *11*	α(K)=0.27 *4*; α(L)=0.063 *20*; α(M)=0.014 *5* α(N)=0.0031 *11*; α(O)=0.00043 *12*; α(P)=1.5×10^{-5} *5* Mult.: D+Q, ΔJ=1, A_2=−0.15 *5*, A_4=+0.02 *8* (1978Ki11); D, E2 from RUL.
187.75 *5*	5.6[d] *28*	3354.61	9^-	3166.89	8^-				
197.38 *15*	21 *1*	2797.65	9^-	2600.35	7^-	E2		0.218	α(K)exp=0.13 *5*; α(K)exp=0.23 *5* (1975Si03) α(K)=0.1563 *23*; α(L)=0.0481 *7*; α(M)=0.01090 *16* α(N)=0.00241 *4*; α(O)=0.000320 *5*; α(P)=7.72×10^{-6} *11* A_2=+0.23 *5*, A_4=−0.08 *4*; A_2=+0.26 *3*, A_4=−0.05 *4* (1978Ki11).
207.16 *7*	100 *4*	3774.65	10^+	3567.45	9^+	M1+E2	0.665	0.209	α(K)exp=0.17 *7* α(K)=0.1703 *24*; α(L)=0.0302 *5*; α(M)=0.00662 *10* α(N)=0.001487 *21*; α(O)=0.000213 *3*; α(P)=1.026×10^{-5} *15* α(K)exp: from weighted average of α(K)exp=0.11 *4* (1980Ko07) and 0.25 *5* (1975Si03). δ: from α(K)exp. A_2=−0.29 *15*, A_4=−0.15 *10*; A_2=−0.30 *10* (1975Si03); A_2=−0.19 *3*, A_4=−0.01 *5*, ΔJ=1 (1978Ki11); D, E2 from RUL.

$^{146}_{62}Sm_{84}$-4

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

$\gamma(^{146}Sm)$ (continued)

E_γ[†]	I_γ[b]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[f]	α[h]	Comments
210.6[#] *10*	100[c] *23*	3377.11		3166.89	8^-			
217.3[a] *1*	16.9[e] *16*	4969.49	(14^-)	4752.22	(13^-)	D		Mult.: D stretched ΔJ=1, A_2=−0.26 *4*, A_4=−0.03 *6* (1978Ki11).
224.0[‡] *10*		2269.77	3^+	2045.75	4^-			
238.6[a] *1*	100[e]	4579.74	(12^-)	4341.17	(11^-)	D		Mult.: D ΔJ=1, stretched from A_2=−0.13 *7*, A_4=−0.06 *10* (1978Ki11).
248.5[a] *1*	100[e] *10*	5218.00	(15^-)	4969.49	(14^-)	D		Mult.: D stretched, ΔJ=1, A_2=−0.10 *3*, A_4=+0.02 *5* (1978Ki11); D, E2 from RUL.
250.0[a] *2*	80[e] *8*	4341.17	(11^-)	4091.23	11^-	D		A_2=+0.42 *13*, A_4=−0.04 *19*, ΔJ=0 (1978Ki11).
259.13 *3*	9[e] *5*	4461.32	(12^-)	4202.18	(11^+)	E1	0.0214	α(K)exp=0.014 *15* α(K)=0.0182 *3*; α(L)=0.00249 *4*; α(M)=0.000532 *8* α(N)=0.0001197 *17*; α(O)=1.752×10^{-5} *25*; α(P)=9.90×10^{-7} *14*
259.8[a] *3*	100[e]	5873.7		5613.89	(15^-)			
267.8 *2*	3.2[c] *7*	1648.11	2^+	1380.29	3^-			
271.85 *12*	9.7[c] *19*	2083.47	5^-	1811.59	6^+	E1	0.0189	α(K)exp≤0.025 (1975Si03) α(K)=0.01612 *23*; α(L)=0.00220 *3*; α(M)=0.000469 *7* α(N)=0.0001056 *15*; α(O)=1.547×10^{-5} *22*; α(P)=8.79×10^{-7} *13* A_2=−0.12 *7* (1975Si03).
290.9[a] *1*	100[e] *10*	4752.22	(13^-)	4461.32	(12^-)	D		Mult.: D stretched, ΔJ=1, A_2=−0.15 *3*, A_4=−0.01 *5* (1978Ki11).
299.4[a] *1*	100[e] *10*	5517.40	(16^-)	5218.00	(15^-)	(M1+E2)	0.069 *13*	α(K)=0.057 *13*; α(L)=0.00968 *18*; α(M)=0.00212 *8* α(N)=0.000476 *12*; α(O)=6.83×10^{-5} *19*; α(P)=3.4×10^{-6} *10* Mult.: D+Q, ΔJ=1, A_2=−0.02 *2*, A_4=+0.02 *3* (1978Ki11); D, E2 from RUL.
305.5[a] *5*	3.3[e] *33*	3043.10	8^+	2737.14	8^+			
340.7[a] *1*	100[e] *10*	4969.49	(14^-)	4628.75	13^-	D		Mult.: D stretched ΔJ=1, A_2=−0.07 *2*, A_4=−0.01 *3* (1978Ki11).
346.5[#] *10*	100[c] *25*	3701.07	$(7^-,8,9)$	3354.61	9^-			
362.25 *15*	6 *4*	3099.46	7^-	2737.14	8^+			
369.54 *16*	16[c] *4*	3166.89	8^-	2797.65	9^-			I_γ: doublet with 370.0γ from 4461.4 level: Iγ(369.3)/Iγ(370.0)=0.14 *6*. A_2=+0.07 *2*, A_4=−0.10 *10*; A_2=−0.01 *3*, A_4=+0.00 *4* from (α,4nγ) of 1978Ki11.
370.07 *7*	100[e] *8*	4461.32	(12^-)	4091.23	11^-	M1	0.0466	α(K)exp=0.031 *7*; α(K)exp=0.05 *1* (1975Si03) α(K)=0.0397 *6*; α(L)=0.00546 *8*; α(M)=0.001169 *17* α(N)=0.000265 *4*; α(O)=3.98×10^{-5} *6*; α(P)=2.50×10^{-6} *4* I_γ: see comment for 3166.9 keV level. A_2=+0.07 *2*, A_4=−0.10 *5*; A_2=−0.39 *3* (1975Si03); A_2=−0.01 *3*, A_4=+0.00 *4* (1978Ki11).
377.1[#] *10*		2531.92	4^+	2156.1	2^+			
385.60 *6*	25[c] *6*	3183.26	8^-	2797.65	9^-	M1	0.0419	α(K)exp=0.042 *10* α(K)=0.0356 *5*; α(L)=0.00490 *7*; α(M)=0.001049 *15* α(N)=0.000238 *4*; α(O)=3.58×10^{-5} *5*; α(P)=2.24×10^{-6} *4* A_2=−0.30 *10* (1975Si03); A_2=−0.07 *9*, A_4=−0.11 *13* (1978Ki11).
393.2[#] *10*	100[c] *22*	3560.25		3166.89	8^-			
397.6 *2*	31[c] *5*	2678.53	4^+	2280.92	4^+			

$^{146}_{62}Sm_{84}$-5

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

γ(^{146}Sm) (continued)

E_γ [†]	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [f]	δ [gi]	α [h]	Comments
401[#] *1*	2.4[c] *6*	3567.45	9^+	3166.89	8^-				
403.75 *25*	100[c] *19*	2684.75	(2^+)	2280.92	4^+				
410.84 *7*	100[c] *26*	2222.42	6^+	1811.59	6^+	M1+E2	0.14 *3*	0.0353	α(K)exp=0.031 *1*; α(K)exp=0.033 *3* (1975Si03) α(K)=0.0300 *5*; α(L)=0.00413 *6*; α(M)=0.000886 *13* α(N)=0.000201 *3*; α(O)=3.02×10^{-5} *5*; α(P)=1.89×10^{-6} *3* I_γ: doublet with 411.35γ from 4194.9 level (1980Ko07); Iγ(410.80)/Iγ(411.35)=1.2 *4* from (α,4nγ) 1978Ki11. Mult.: D, ΔJ=0 from γ(θ), A_2=+0.22 *5*, A_4=−0.09 *4* (1980Ko07).
411.1[‡] *10*		2850.38	4^+	2439.05	4^+				
411.35[a] *15*	100	4194.80	12^+	3783.45	11^-				I_γ,Mult.: doublet, see comment for the 2222 keV level.
427.53 *3*	88[e] *20*	4202.18	(11^+)	3774.65	10^+	D			A_2=−0.12 *4*, A_4=0.07 *5*, ΔJ=1 (1978Ki11); D, E2 from RUL.
430.38 *5*	100	1811.59	6^+	1381.24	4^+	E2		0.0193	α(K)exp=0.017 *1* α(K)=0.01568 *22*; α(L)=0.00286 *4*; α(M)=0.000628 *9* α(N)=0.0001407 *20*; α(O)=1.99×10^{-5} *3*; α(P)=8.88×10^{-7} *13* A_2=+0.30 *1*, A_4=−0.10 *5*; A_2=+0.32 *2*, A_4=−0.08 *3* (1978Ki11).
442.4[a] *3*	7[e] *4*	3043.10	8^+	2600.35	7^-				
445.9[‡] *10*		3183.26	8^-	2737.14	8^+				
454.9[a] *3*	100[e]	5972.3		5517.40	(16^-)				
459.6[‡] *10*		2898.35	5^+	2439.05	4^+				
460.8 *2*	98[c] *28*	3560.25		3099.46	7^-				
463.35 *15*	28[c] *5*	2744.29	$(4^+,5,6^+)$	2280.92	4^+				
467.7[‡] *10*		2513.32	3^-	2045.75	4^-				
479.1[a] *3*	100[e] *27*	5697.11	(16^+)	5218.00	(15^-)				
479.6[a] *3*	100[e]	6176.7	(18^+)	5697.11	(16^+)				
490.9[a] *1*	76[e] *8*	5697.11	(16^+)	5206.20	14^+	E2		0.01347	α(K)=0.01104 *16*; α(L)=0.00190 *3*; α(M)=0.000416 *6* α(N)=9.34×10^{-5} *13*; α(O)=1.335×10^{-5} *19*; α(P)=6.34×10^{-7} *9* A_2=+0.36 *5*, A_4=−0.09 *8* (1978Ki11).
492.7[‡] *10*	29 *11*	3290.6	8^+	2797.65	9^-				
499.1 *1*	50 *7*	3099.46	7^-	2600.35	7^-				
515.3[a] *8*	1.6[e] *16*	2737.14	8^+	2222.42	6^+				
516.88 *3*	9.9[c] *11*	2600.35	7^-	2083.47	5^-	E2		0.01175	α(K)exp=0.007 *3*; α(K)exp=0.018 *5* (1975Si03) α(K)=0.00967 *14*; α(L)=0.001632 *23*; α(M)=0.000356 *5* α(N)=8.00×10^{-5} *12*; α(O)=1.148×10^{-5} *16*; α(P)=5.58×10^{-7} *8* A_2=+0.26 *7*, A_4=−0.03 *5*; A_2=+0.35 7 (1975Si03); A_2=−0.26 is a misprint in 1980Ko07; A_2=+0.32 *4*, A_4=−0.02 *6* (1978Ki11).
521.9 *2*	100[c] *20*	2744.29	$(4^+,5,6^+)$	2222.42	6^+				
524.33 *3*	100[c] *7*	3567.45	9^+	3043.10	8^+	M1		0.0191	α(K)exp=0.014 *4*; α(K)exp=0.018 *5* (1975Si03) α(K)=0.01628 *23*; α(L)=0.00221 *3*; α(M)=0.000474 *7* α(N)=0.0001074 *15*; α(O)=1.615×10^{-5} *23*; α(P)=1.019×10^{-6} *15*

$^{146}_{62}Sm_{84}$-6

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

$\gamma(^{146}Sm)$ (continued)

E_γ [†]	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [f]	δ [gi]	α [h]	Comments
									A_2=−0.10 *8*, A_4=+0.08 *8*; A_2=−0.11 *4* (1975Si03); A_2=−0.02 *2*, A_4=+0.00 *3*, D+Q ΔJ=1 (1978Ki11). D, E2 from RUL.
534.2‡ *10*		2973.8	3^+,4^+	2439.05	4^+				
534.20 *12*	34[c] *8*	3701.07	(7^-,8,9)	3166.89	8^-				
537.5[a] *1*	58[e] *6*	4628.75	13^-	4091.23	11^-	E2		0.01060	α(K)=0.00875 *13*; α(L)=0.001456 *21*; α(M)=0.000317 *5* α(N)=7.13×10^{-5} *10*; α(O)=1.026×10^{-5} *15*; α(P)=5.06×10^{-7} *7* A_2=+0.33 *3*, A_4=−0.08 *5* (1978Ki11).
547.9[a] *2*	35[e] *5*	5517.40	(16^-)	4969.49	(14^-)	E2		0.01009	α(K)=0.00834 *12*; α(L)=0.001377 *20*; α(M)=0.000300 *5* α(N)=6.74×10^{-5} *10*; α(O)=9.71×10^{-6} *14*; α(P)=4.83×10^{-7} *7* A_2=+0.47 *13*, A_4=−0.35 *21* (1978Ki11).
552.0‡ *10*		3340.24	(5^-,6^-)	2788.12	5^-				
556.9 *1*	100[e] *6*	3354.61	9^-	2797.65	9^-	M1+E2	−0.35 *+19−17*	0.0157 *8*	α(K)exp=0.011 *2*; α(K)exp=0.019 *6* (1975Si03) α(K)=0.0133 *7*; α(L)=0.00184 *7*; α(M)=0.000393 *14* α(N)=8.9×10^{-5} *4*; α(O)=1.34×10^{-5} *6*; α(P)=8.3×10^{-7} *5* α(K)exp: from weighted average of α(K)exp=0.11 *4* (1980Ko07) and 0.25 *5* (1975Si03). I_γ: doublet with 558.1γ from 4341.1 keV level: Iγ(556.9)/Iγ(558.1)=12 *8*, A_2=+0.23 *1*, A_4=−0.04 *5*, ΔJ=0; A_2=+0.39 *1*, A_4=−0.02 *2* from (α,4nγ) of 1978Ki11; A_2=+0.30 *5* (1975Si03).
558.1 *2*	100[e] *70*	4341.17	(11^-)	3783.45	11^-				A_2=−0.53 *8*, A_4=+0.01 *11* for doublet with 556.9γ from 3354.6 keV level, Iγ(556.9)/Iγ(558.1)=12 *8* from 1978Ki11.
566.54 *4*	100[c] *6*	3166.89	8^-	2600.35	7^-	M1		0.01572	α(K)exp=0.019 *7* (1975Si03) α(K)=0.01341 *19*; α(L)=0.00182 *3*; α(M)=0.000389 *6* α(N)=8.82×10^{-5} *13*; α(O)=1.327×10^{-5} *19*; α(P)=8.38×10^{-7} *12* A_2=−0.32 *10*, A_4=−0.04 *6*; A_2=−0.39 *7* (1975Si03); A_2=−0.31 *5*, A_4=−0.01 *7*, ΔJ=1, stretched; D, E2 from RUL (1978Ki11).
569.6 *1*	75[c] *18*	2850.38	4^+	2280.92	4^+				
569.83 *7*	98[c] *15*	3924.46	(9^-)	3354.61	9^-	D			A_2=+0.33 *3*, A_4=−0.07 *5*, ΔJ=0 (1978Ki11).
582.95 *19*	100[c] *6*	3183.26	8^-	2600.35	7^-	D+Q			A_2=−0.53 *8*, A_4=+0.01 *11* for doublet (1978Ki11). I_γ: see comment for the 2667.1 keV level.
583.5[j] *3*	100[jc] *6*	2667.11	4^-	2083.47	5^-	M1		0.01460	α(K)exp=0.013 *4* (1975Si03) α(K)=0.01246 *18*; α(L)=0.001687 *24*; α(M)=0.000361 *5* α(N)=8.19×10^{-5} *12*; α(O)=1.231×10^{-5} *18*; α(P)=7.78×10^{-7} *11* A_2=−0.53 *18*, A_4=+0.01 *11* (1978Ki11). I_γ: doublet with 582.95γ from 3183.2 keV level: Iγ(583.5)/Iγ(582.9)=2.2 (from fig. 8 in 1975Si03).
589.3[a] *2*	44[e] *8*	5218.00	(15^-)	4628.75	13^-				
617.43 *12*	10[e] *3*	3354.61	9^-	2737.14	8^+				

$^{146}_{62}Sm_{84}$-7

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

$\gamma(^{146}Sm)$ (continued)

E_γ [†]	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [f]	δ [gi]	α [h]	Comments
621.4 *1*	26.4[c] *11*	2667.11	4^-	2045.75	4^-	E0+M1+E2		0.010 *3*	α(K)exp=0.06 *1* (1975Si03) α(K)=0.0084 *23*; α(L)=0.00120 *24*; α(M)=0.00026 *5* α(N)=5.9×10^{-5} *12*; α(O)=8.7×10^{-6} *19*; α(P)=5.1×10^{-7} *16* α(K)exp: from fig. 5 1975Si03; E0-component is 5% *1* (1975Si03). α: calculated for M1+E2.
621.65 *15*	27[c] *7*	2269.77	3^+	1648.11	2^+				
633.00 *7*	100	1380.29	3^-	747.182	2^+	E1		0.00257	α(K)=0.00220 *3*; α(L)=0.000289 *4*; α(M)=6.15×10^{-5} *9* α(N)=1.389×10^{-5} *20*; α(O)=2.07×10^{-6} *3*; α(P)=1.262×10^{-7} *18* I_γ: see comment for 634.06γ from 1381.2 keV level. Mult.: from 'Adopted Gammas'.
633.8[#] *10*	67[c] *8*	2280.92	4^+	1648.11	2^+				
634.10 *7*	100	1381.24	4^+	747.182	2^+	E2		0.00699	α(K)exp=0.0057 *5* α(K)=0.00582 *9*; α(L)=0.000916 *13*; α(M)=0.000199 *3* α(N)=4.47×10^{-5} *7*; α(O)=6.50×10^{-6} *9*; α(P)=3.41×10^{-7} *5* I_γ,α(exp): doublet with 632.95γ, E1 from 1380.18 keV level: Iγ(634.05)/Iγ(632.95)=0.79 *2* from ε decay (1992Ad04). Mult.: from 'Adopted Gammas'. A_2=+0.30 *3*, A_4=−0.06 *6*; A_2=+0.31 *1*, A_4=−0.08 *2* (1978Ki11).
644.4[a] *1*	100[e]	5613.89	(15^-)	4969.49	(14^-)	(M1+E2)		0.0091 *24*	α(K)=0.0077 *21*; α(L)=0.00110 *22*; α(M)=0.00024 *5* α(N)=5.3×10^{-5} *11*; α(O)=7.9×10^{-6} *17*; α(P)=4.7×10^{-7} *14* Mult.: D+Q ΔJ=1, D, E2 from RUL, A_2=−0.32 *9*, A_4=+0.00 *14* (1978Ki11).
650.0[‡] *10*	100	3990.2	(3^-),4^-	3340.24	$(5^-,6^-)$				
657.85 *25*	58[c] *11*	3701.07	$(7^-,8,9)$	3043.10	8^+				
658.3[#] *10*		3258.82	5^-	2600.35	7^-				
665.37 *9*	100	2045.75	4^-	1380.29	3^-	E2+M1	1.4 *9*	0.0077 *20*	α(K)exp=0.0065 *15* (1975Si03) α(K)=0.0065 *18*; α(L)=0.00094 *19*; α(M)=0.00020 *4* α(N)=4.6×10^{-5} *9*; α(O)=6.8×10^{-6} *15*; α(P)=3.9×10^{-7} *12* δ: from α(K)exp. A_2=−0.71 *7* (1975Si03).
672.9[‡] *10*		3340.24	$(5^-,6^-)$	2667.11	4^-				
678.0[a] *3*	15[e] *5*	4461.32	(12^-)	3783.45	11^-				
690.2[‡] *10*	20 *10*	3290.6	8^+	2600.35	7^-				
699.6[‡] *10*		2782.85	$(4^+,5^-)$	2083.47	5^-				
702.20 *7*	100 *4*	2083.47	5^-	1381.24	4^+	E1		0.00207	α(K)=0.001775 *25*; α(L)=0.000232 *4*; α(M)=4.92×10^{-5} *7* α(N)=1.113×10^{-5} *16*; α(O)=1.660×10^{-6} *24*; α(P)=1.020×10^{-7} *15* I_γ: see comment for 703.60γ from this level. Mult.: from 'Adopted Gammas'.

$^{146}_{62}Sm_{84}$-8

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

γ(^{146}Sm) (continued)

E_γ [†]	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [f]	δ [gi]	α [h]	Comments
703.11 *7*	6.2 *4*	2083.47	5⁻	1380.29	3⁻	E2		0.00545	α(K)exp=0.0016 *7*; α(K)exp=0.0023 *6* (1975Si03) α(K)=0.00457 *7*; α(L)=0.000697 *10*; α(M)=0.0001508 *22* α(N)=3.40×10⁻⁵ *5*; α(O)=4.96×10⁻⁶ *7*; α(P)=2.69×10⁻⁷ *4* I_γ,α(exp): doublet with 702.35γ E1: Iγ(703.60)/Iγ(702.35)=0.93 *9* from ε decay (1992Ad04). Mult.: from 'Adopted Gammas'. A_2=+0.22 *5*, A_4=−0.09 *4*.
704.65 *15*	30 [c] *6*	2788.12	5⁻	2083.47	5⁻				
725.5 *2*	100	4080.12		3354.61	9⁻				
731.55 *15*	36 *3*	3774.65	10⁺	3043.10	8⁺				
736.63 *7*	100 [d] *10*	4091.23	11⁻	3354.61	9⁻	E2		0.00489	α(K)exp=0.003 *2* α(K)=0.00410 *6*; α(L)=0.000618 *9*; α(M)=0.0001336 *19* α(N)=3.01×10⁻⁵ *5*; α(O)=4.41×10⁻⁶ *7*; α(P)=2.42×10⁻⁷ *4* A_2=+0.25 *5*, A_4=−0.04 *4*; A_2=+0.29 *3*, A_4=−0.09 *5* (1978Ki11).
739.85 *10*	86 [c] *14*	3340.24	(5⁻,6⁻)	2600.35	7⁻				
742.45 *15*	11.0 [c] *18*	2788.12	5⁻	2045.75	4⁻	E2+M1	−1.2 *+6−11*	0.0061 *11*	α(K)=0.0052 *10*; α(L)=0.00074 *11*; α(M)=0.000158 *22* α(N)=3.6×10⁻⁵ *5*; α(O)=5.3×10⁻⁶ *8*; α(P)=3.2×10⁻⁷ *7*
747.18 *2*	100	747.182	2⁺	0.0	0⁺	E2		0.00473	α(K)=0.00397 *6*; α(L)=0.000596 *9*; α(M)=0.0001288 *18* α(N)=2.90×10⁻⁵ *4*; α(O)=4.25×10⁻⁶ *6*; α(P)=2.34×10⁻⁷ *4* A_2=+0.25 *1*, A_4=−0.04 *1*; A_2=+0.31 *1*, A_4=−0.07 *2* (1978Ki11).
754.2 [a] *2*	6.7 [e] *6*	3354.61	9⁻	2600.35	7⁻	E2		0.00463	α(K)=0.00389 *6*; α(L)=0.000582 *9*; α(M)=0.0001258 *18* α(N)=2.84×10⁻⁵ *4*; α(O)=4.16×10⁻⁶ *6*; α(P)=2.29×10⁻⁷ *4* E_γ: suggested by 1978Ki11 only. A_2=+0.48 *25*, A_4=+0.28 *37* (1978Ki11).
757.6 [a] *1*	100 [e] *10*	3924.46	(9⁻)	3166.89	8⁻	D+Q			A_2=+0.56 *13*, A_4=+0.00 *20*, ΔJ=1 (1978Ki11).
766.5 [‡] *10*	100	3809.6		3043.10	8⁺				
766.8 *2*	54 [c] *17*	2850.38	4⁺	2083.47	5⁻				
771.35 *10*	100	4125.97		3354.61	9⁻				
776.75 *15*	91 [c] *17*	3377.11		2600.35	7⁻				
788.76 [j] *3*	100 [jc] *13*	2600.35	7⁻	1811.59	6⁺	E1		1.63×10^{-3}	α(K)exp=0.0020 *4*; α(K)exp=0.0016 *4* (1975Si03) α(K)=0.001402 *20*; α(L)=0.000182 *3*; α(M)=3.87×10⁻⁵ *6* α(N)=8.75×10⁻⁶ *13*; α(O)=1.306×10⁻⁶ *19*; α(P)=8.08×10⁻⁸ *12* A_2=−0.25 *8*, A_4=+0.05 *4*; A_2=−0.26 *6* (1975Si03);

$^{146}_{62}Sm_{84}$-9

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

γ(^{146}Sm) (continued)

E_γ †	I_γ b	E_i(level)	J_i^π	E_f	J_f^π	Mult. f	δ gi	α h	Comments
									A_2=−0.21 *1*, A_4=+0.02 *2*, ΔJ=1 stretched (1978Ki11).
									I_γ: Doublet, other 788.8γ *1* from 3011.2 level. Iγ(788.7)/Iγ(788.8)=2 taken from fig. 8 of 1975Si03.
788.8 j& *1*	100 j	3011.22	+	2222.42	6^+				
791.1 *2*	6.6 c *1*	2439.05	4^+	1648.11	2^+				
797.1 *2*	100	3019.52		2222.42	6^+				
804.45 *10*	70 c *14*	2850.38	4^+	2045.75	4^-				
811.35 *15*	34 c *6*	3092.39	$(4^+,5,6^+)$	2280.92	4^+				
818.3‡ *10*		3484.2	$(4^+,5,6^-)$	2667.11	4^-				
820.0‡ *10*		3258.82	5^-	2439.05	4^+				
820.68 *3*	100 e *10*	3043.10	8^+	2222.42	6^+	E2		0.00382	α(K)exp=0.0040 *8*; α(K)exp=0.0036 *7* (1975Si03) α(K)=0.00322 *5*; α(L)=0.000473 *7*; α(M)=0.0001019 *15* α(N)=2.30×10^{-5} *4*; α(O)=3.38×10^{-6} *5*; α(P)=1.91×10^{-7} *3* A_2=+0.20 *6*, A_4=−0.10 *5*; A_2=+0.55 *9* (1975Si03); A_2=+0.33 *2*, A_4=−0.10 *3* (1978Ki11).
830.6 a *3*	≤22.4 e	3567.45	9^+	2737.14	8^+				
833.55 *15*	100	4032.4		3198.82					
841.0 *4*	5.6 c *10*	2222.42	6^+	1381.24	4^+				
847.5‡ *10*		3360.8	$3^-,4^-$	2513.32	3^-				
848.55 *10*	100 c *11*	2932.05	(4^+)	2083.47	5^-				
850.5‡ *10*		3072.7	5^+	2222.42	6^+				
852.2‡ *10*		2898.35	5^+	2045.75	4^-				
855.45 *15*	18 c *2*	2667.11	4^-	1811.59	6^+	(M2+E3)	+0.05 *+20−29*	0.0149 *5*	α(K)=0.0126 *4*; α(L)=0.00182 *5*; α(M)=0.000393 *10* α(N)=8.91×10^{-5} *23*; α(O)=1.34×10^{-5} *4*; α(P)=8.3×10^{-7} *3*
865.15 *10*		2513.32	3^-	1648.11	2^+				
877.1 *2*	68 *8*	3099.46	7^-	2222.42	6^+				
887.65 *85*	26 c *22*	2269.77	3^+	1381.24	4^+				
889.3 *3*	100 c *33*	2269.77	3^+	1380.29	3^-	D+Q			Mult.: A_2=−0.71 *7* (1975Si03).
899.57 *22*	57 c *6*	2280.92	4^+	1381.24	4^+	M1+E2		0.0041 *10*	α(K)=0.0035 *9*; α(L)=0.00048 *10*; α(M)=0.000103 *21* α(N)=2.3×10^{-5} *5*; α(O)=3.5×10^{-6} *8*; α(P)=2.1×10^{-7} *6* Mult.: from 'Adopted Gammas'.
900.6‡ *10*	24 *7*	2280.92	4^+	1380.29	3^-				
900.81 *19*	100 c *2*	1648.11	2^+	747.182	2^+	M1+E2	−1.19 *+21−26*	0.00391 *20*	α(K)exp=0.0038 *8* (1975Si03) α(K)=0.00333 *17*; α(L)=0.000460 *21*; α(M)=9.9×10^{-5} *5* α(N)=2.23×10^{-5} *10*; α(O)=3.33×10^{-6} *16*; α(P)=2.02×10^{-7} *12*

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

γ(^{146}Sm) (continued)

E_γ [†]	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [f]	α [h]	Comments
914.4 [‡] *10*		3184.2	3^+	2269.77	3^+			
925.53 *25*	100 [e] *10*	2737.14	8^+	1811.59	6^+	E2	0.00293	α(K)exp=0.0025 *3*; α(K)exp=0.0026 *5* (1975Si03) α(K)=0.00248 *4*; α(L)=0.000355 *5*; α(M)=7.63×10^{-5} *11* α(N)=1.723×10^{-5} *25*; α(O)=2.55×10^{-6} *4*; α(P)=1.473×10^{-7} *21* A_2=+0.20 *6*, A_4=−0.11 *5*; A_2=+0.43 *3* (1975Si03); A_2=+0.33 *1*, A_4=−0.10 *2* (1978Ki11).
948.6 *2*	100	4239.2		3290.6	8^+			
955.90 *3*	100	3753.55	10^-	2797.65	9^-	M1	0.00438	α(K)exp=0.0005 *20*; α(K)exp=0.0044 *10* (1975Si03) α(K)=0.00375 *6*; α(L)=0.000499 *7*; α(M)=0.0001066 *15* α(N)=2.42×10^{-5} *4*; α(O)=3.64×10^{-6} *5*; α(P)=2.32×10^{-7} *4* A_2=−0.11 *8*, A_4=+0.03 *6*; A_2=−0.20 *10* (1975Si03); A_2=−0.19 *3*, A_4=−0.01 *5*, D stretched, ΔJ=1 (1978Ki11).
968.6 [‡] *10*		3014.70	3^+	2045.75	4^-			
971.3 *2*	100 [c] *28*	2782.85	$(4^+,5^-)$	1811.59	6^+			
976.4 [‡] *4*	100 [c] *13*	2788.12	5^-	1811.59	6^+			
976.4 *2*	100	3198.82		2222.42	6^+			
985.85 [j] *7*	100 [j]	3783.45	11^-	2797.65	9^-	E2	0.00256	α(K)exp=0.0026 *6*; α(K)exp=0.0029 *6* (1975Si03) α(K)=0.00217 *3*; α(L)=0.000307 *5*; α(M)=6.59×10^{-5} *10* α(N)=1.489×10^{-5} *21*; α(O)=2.21×10^{-6} *3*; α(P)=1.290×10^{-7} *18* A_2=+0.40 *6*, A_4=−0.08 *7*; A_2=+0.36 *2*, A_4=−0.108 *4* (1978Ki11); A_2=+0.35 *9* (1975Si03). I_γ: doublet in 1975Si03 is not suggested by 2012Ku07, 1978Ki11.
985.87 [j&] *3*	100 [j]	3208.29	(8^+)	2222.42	6^+	(E2)	0.00256	α(K)exp=0.0029 *6* (1975Si03) α(K)=0.00217 *3*; α(L)=0.000307 *5*; α(M)=6.59×10^{-5} *10* α(N)=1.489×10^{-5} *21*; α(O)=2.21×10^{-6} *3*; α(P)=1.290×10^{-7} *18* I_γ: doublet, the second 985.88γ from 3783.6 level. A_2=+0.30 *5* (1975Si03).
985.9 [‡] *10*	7 *1*	2797.65	9^-	1811.59	6^+			
1009.1 *2*	100 [c] *7*	3092.39	$(4^+,5,6^+)$	2083.47	5^-			
1011.4 [a] *1*	100 [e]	5206.20	14^+	4194.80	12^+	E2	0.00243	α(K)=0.00206 *3*; α(L)=0.000290 *4*; α(M)=6.22×10^{-5} *9* α(N)=1.405×10^{-5} *20*; α(O)=2.08×10^{-6} *3*; α(P)=1.224×10^{-7} *18* A_2=+0.30 *5*, A_4=−0.08 *8* (1978Ki11).
1014.6 *7*	100 *7*	2826.2	6^-	1811.59	6^+	E1	1.00×10^{-3}	α(K)exp=0.0005 *3* α(K)=0.000863 *13*; α(L)=0.0001109 *16*; α(M)=2.36×10^{-5} *4* α(N)=5.33×10^{-6} *8*; α(O)=7.98×10^{-7} *12*; α(P)=5.00×10^{-8} *7* A_2=+0.30 *5*, A_4=−0.10 *10*.
1014.65 *45*	7 *5*	3099.46	7^-	2083.47	5^-			
1027.5 [‡] *10*		3072.7	5^+	2045.75	4^-			
1027.8 [‡] *10*	100	3825.5		2797.65	9^-			
1033.1 [‡] *10*	100	3633.5		2600.35	7^-			

$^{146}_{62}Sm_{84}$-11

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

$\gamma(^{146}Sm)$ (continued)

E_γ [†]	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [f]	α [h]	Comments
1036.55 *15*	10[c] *6*	2684.75	(2^+)	1648.11	2^+			
1055.7 *2*	100	3278.12		2222.42	6^+			
1057.8 *10*	100 *5*	2439.05	4^+	1381.24	4^+	M1+E2	0.0028 *7*	α(K)=0.0024 *6*; α(L)=0.00033 *7*; α(M)=7.0×10^{-5} *14* α(N)=1.6×10^{-5} *4*; α(O)=2.4×10^{-6} *5*; α(P)=1.5×10^{-7} *4* I_γ: see comment for 1058.5γ from this level. Mult.: from 'Adopted Gammas'.
1058.47[‡] *26*	22 *3*	2439.05	4^+	1380.29	3^-			α(K)exp=0.002 *1* (1975Si03) A_2=−0.30 *1* (1975Si03). I_γ,α(exp): doublet with 1058.5γ from this level: Iγ(1058.5)/Iγ(1057.8)=1.7 *3* from ε decay (1992Ad04).
1069.4 *2*	100	3669.76		2600.35	7^-			
1078.0[‡] *10*	100	3815.1		2737.14	8^+			
1084.9[‡] *10*	100	3685.3		2600.35	7^-			
1086.35 *25*		2898.35	5^+	1811.59	6^+			
1091.0[‡] *10*		3136.6	3^-	2045.75	4^-			
1102.15 *10*	100[c] *10*	3185.68		2083.47	5^-			
1116.6[‡] *10*		3200.1	4^-	2083.47	5^-			
1117.95 *15*	100[c] *18*	3340.24	$(5^-,6^-)$	2222.42	6^+			
1121.4[‡] *10*	100	4164.5		3043.10	8^+			
1132.1 *2*	79[c] *12*	2513.32	3^-	1381.24	4^+			
1133.5 *4*	86[c] *15*	2513.32	3^-	1380.29	3^-			
1150.7 *2*		2531.92	4^+	1381.24	4^+			
1155.3 *2*	73[c] *13*	3238.92	4^+	2083.47	5^-			
1166.5[‡] *10*	100	3766.9		2600.35	7^-			
1172.57 *14*	100	3970.23		2797.65	9^-			
1172.8[@] *3*	100	2984.4	$^+$	1811.59	6^+			
1175.1[‡] *10*	100	3220.9	$(3^-,4,5^-)$	2045.75	4^-			
1175.35 *15*		3258.82	5^-	2083.47	5^-			
1190.2[‡] *10*		3412.7	$(4^+,5,6^-)$	2222.42	6^+			
1202.9 *3*	16[c] *4*	3014.70	3^+	1811.59	6^+			Mult.: would be M3/E4.
1208.0[‡] *10*		4005.6		2797.65	9^-			
1208.95 *15*	100	2589.25		1380.29	3^-			
1231.47 *18*	10.0[e] *11*	3043.10	8^+	1811.59	6^+	E2	1.63×10^{-3}	α(K)=0.001382 *20*; α(L)=0.000189 *3*; α(M)=4.04×10^{-5} *6* α(N)=9.13×10^{-6} *13*; α(O)=1.360×10^{-6} *19*; α(P)=8.23×10^{-8} *12*; α(IPF)=9.59×10^{-6} *14* A_2=+0.39 *18*, A_4=−0.18 *23* (1978Ki11).
1243.6 *4*	100	3327.1		2083.47	5^-			
1256.7 *2*	29[c] *4*	3340.24	$(5^-,6^-)$	2083.47	5^-			
1268.5[‡] *10*		4005.6		2737.14	8^+			

$^{146}_{62}Sm_{84}$-12

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

$\gamma(^{146}Sm)$ (continued)

E_γ †	I_γ b	E_i(level)	J_i^π	E_f	J_f^π	Mult. f	δ g i	α h	Comments
1280.8 *2*	13.5 c *18*	3092.39	$(4^+,5,6^+)$	1811.59	6^+				
1287.6 & *6*	20 d	2667.11	4^-	1380.29	3^-				
1288.05 *15*	100 *10*	3099.46	7^-	1811.59	6^+	E1(+M2)	+0.016 *64*	0.00072 *3*	α(K)=0.000562 *25*; α(L)=7.2×10^{-5} *4*; α(M)=1.52×10^{-5} *8* α(N)=3.44×10^{-6} *17*; α(O)=5.16×10^{-7} *25*; α(P)=3.26×10^{-8} *16*; α(IPF)=6.82×10^{-5} *11* δ: from (1287.9γ)(430.3γ)(θ).
1293.57 *3*	71 d *7*	4091.23	11^-	2797.65	9^-	E2		1.49×10^{-3}	α(K)exp=0.0015 *10* α(K)=0.001254 *18*; α(L)=0.0001701 *24*; α(M)=3.64×10^{-5} *5* α(N)=8.23×10^{-6} *12*; α(O)=1.227×10^{-6} *18*; α(P)=7.47×10^{-8} *11*; α(IPF)=1.93×10^{-5} *3* A_2=+0.40 *12*, A_4=−0.10 *10*; A_2=+0.32 *4*, A_4=−0.13 *8* (1978Ki11).
1294.3 ‡ *10*		3378.0	$(3^-,4,5^-)$	2083.47	5^-				
1297.3 *3*	100 c *6*	2678.53	4^+	1381.24	4^+				
1303.7 *2*	66 c *14*	2684.75	(2^+)	1381.24	4^+				
1326.0 ‡ *10*		2973.8	$3^+,4^+$	1648.11	2^+				
1332.4 ‡ *10*		3378.0	$(3^-,4,5^-)$	2045.75	4^-				
1346.0 a *1*	100 e	5129.46	13^-	3783.45	11^-	E2		1.39×10^{-3}	α(K)=0.001160 *17*; α(L)=0.0001566 *22*; α(M)=3.35×10^{-5} *5* α(N)=7.57×10^{-6} *11*; α(O)=1.130×10^{-6} *16*; α(P)=6.91×10^{-8} *10*; α(IPF)=3.01×10^{-5} *5* A_2=+0.29 *9*, A_4=−0.13 *13* (1978Ki11).
1346.2 # *2*	100	4143.86	(11^-)	2797.65	9^-				
1356.0 ‡ *10*		3625.9	4^+	2269.77	3^+				
1367.1 ‡ *10*		3412.7	$(4^+,5,6^-)$	2045.75	4^-				
1373.4 ‡ *10*		3419.0	3^+	2045.75	4^-				
1374.3 *2*	71 c *11*	3185.68		1811.59	6^+				
1390.6 ‡ *10*	100	4127.7		2737.14	8^+				
1398.5 ‡ *10*	100	4135.6		2737.14	8^+				
1400.8 *7*	18 c *8*	2782.85	$(4^+,5^-)$	1381.24	4^+				
1402.9 # *10*	26 c *13*	2782.85	$(4^+,5^-)$	1380.29	3^-				
1407.4 *4*	36 c *7*	2788.12	5^-	1380.29	3^-				
1408.3 # *10*	100	4145.4	(10^+)	2737.14	8^+				
1409.6 ‡ *10*		2156.1	2^+	747.182	2^+				
1427.55 *25*	100 c *18*	3238.92	4^+	1811.59	6^+				
1444.8 ‡ *10*	100	3092.9	3^+	1648.11	2^+				

$^{146}_{62}Sm_{84}$-13

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

$\gamma(^{146}Sm)$ (continued)

E_γ [†]	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [f]	δ [g,i]	α [h]	Comments
1470.0[‡] *10*	100	3515.8	3^+	2045.75	4^-				
1470.25 *15*	100[c] *22*	2850.38	4^+	1380.29	3^-				
1479.0 *3*	100 *26*	3290.6	8^+	1811.59	6^+	E2(+M3)	−0.11 *+12−13*	0.00126 *23*	α(K)=0.00102 *20*; α(L)=0.00014 *3*; α(M)=2.9×10^{-5} *7* α(N)=6.6×10^{-6} *15*; α(O)=9.9×10^{-7} *22*; α(P)=6.1×10^{-8} *14*; α(IPF)=6.8×10^{-5} *3* δ: from (1478.7γ→430.3γ)(θ).
1496.8 *3*		3580.3	(4^+)	2083.47	5^-				
1500.2[‡] *10*	100	3583.7	4^-	2083.47	5^-				
1517.25 *15*		2898.35	5^+	1381.24	4^+				
1522.95 *35*	37[c] *10*	2269.77	3^+	747.182	2^+				
1528.3[‡] *10*		3340.24	$(5^-,6^-)$	1811.59	6^+				
1533.97 *17*	100[c] *14*	2280.92	4^+	747.182	2^+				
1545.15 *15*	100	4282.30		2737.14	8^+				
1552.3[#] *10*	49[c] *8*	2932.05	(4^+)	1381.24	4^+				
1552.8 *11*	32[c] *8*	2932.05	(4^+)	1380.29	3^-				
1579.45 *45*	100	3391.1		1811.59	6^+				
1580.3[‡] *10*		3625.9	4^+	2045.75	4^-				
1592.8[‡] *10*		2973.8	$3^+,4^+$	1381.24	4^+				
1596.7[‡] *10*	100	2977.9		1381.24	4^+				
1633.5 *5*	100[c] *12*	3014.70	3^+	1381.24	4^+				
1648.0[‡] *10*	20 *8*	1648.11	2^+	0.0	0^+				
1651.5[‡] *10*	100	2398.7		747.182	2^+				
1654.2[‡] *10*		2401.3	2^+	747.182	2^+				
1663.0[‡] *10*	100	3474.2	$5^+,(6^+)$	1811.59	6^+				
1672.5 *3*		3484.2	$(4^+,5,6^-)$	1811.59	6^+				
1686.9[‡] *10*	100	3068.1	3^+	1381.24	4^+				
1691.6[#] *10*	13[c] *3*	2439.05	4^+	747.182	2^+				
1691.6[‡] *10*		3072.7	5^+	1380.29	3^-				
1753.75 *35*	100	3565.4		1811.59	6^+				
1756.1[‡] *10*		3136.6	3^-	1380.29	3^-				
1766.5 *4*	100[c] *16*	2513.32	3^-	747.182	2^+				
1783.2 *2*	100	3594.81		1811.59	6^+				
1784.3 *5*		2531.92	4^+	747.182	2^+				
1803.3[‡] *10*		3184.2	3^+	1381.24	4^+				
1808.35 *25*	100	3620.0		1811.59	6^+				
1818.8[‡] *10*		3200.1	4^-	1381.24	4^+				
1877.4[‡] *10*		3258.82	5^-	1381.24	4^+				
1902.2[‡] *10*	100	2649.4	(2^+)	747.182	2^+				

$^{146}_{62}Sm_{84}$-14

Nd(α,xnγ) 1980Ko07,2012Ku07 (continued)

$\gamma(^{146}Sm)$ (continued)

E_γ †	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	I_γ [b]	E_i(level)	J_i^π	E_f	J_f^π
1937.7‡ *10*		2684.75	(2^+)	747.182	2^+	2151.7‡ *10*	100	3963.3		1811.59	6^+
1980.4‡ *10*		3360.8	3^-,4^-	1380.29	3^-	2156.7‡ *10*		2156.1	2^+	0.0	0^+
1989.0‡ *10*	100	3800.6		1811.59	6^+	2187.1‡ *10*	100	3568.4		1381.24	4^+
2037.6‡ *10*		3419.0	3^+	1381.24	4^+	2212.9‡ *10*	100	3593.2		1380.29	3^-
2052.4 *4*	100	2799.6	3^+	747.182	2^+	2221.8‡ *10*	100	2969.0	2^+,3^+	747.182	2^+
2058.0‡ *10*	100	3869.6		1811.59	6^+	2267.65 *25*	3.6[c] *9*	3014.70	3^+	747.182	2^+
2080.6‡ *6*		3461.8	5^-	1381.24	4^+	2401.1‡ *10*		2401.3	2^+	0.0	0^+
2081.2‡ *10*		3461.8	5^-	1380.29	3^-	2436.6‡ *10*		3184.2	3^+	747.182	2^+
2092.7 *7*	100	3474.2	5^+,(6^+)	1381.24	4^+						

† Unweighted average Eγ from (α,nγ), (α,2nγ), and (α,4nγ) reactions, except as noted.
‡ From (α,nγ) (2012Ku07).
# From (α,2nγ) (2012Ku07).
@ From (α,2nγ) and (^{3}He,3nγ) (1980Ko07).
& From (α,2nγ) (1975Si03).
a From (α,4nγ) (1978Ki11).
b % branching from (α,nγ) (2012Ku07).
c % branching from (α,2nγ) (2012Ku07).
d % branching from (α,4nγ) (1975Si03).
e % branching from (α,4nγ) (1978Ki11).
f From α(exp) and/or $\gamma(\theta)$ data (1980Ko07), except as noted; mult=Q (stretched) assumed as E2.
g From $\gamma\gamma(\theta)$ (2012Ku07).
h Additional information 1.
i If No value given it was assumed δ=1.00 for E2/M1 and δ=0.10 for the other multipolarities.
j Multiply placed with intensity suitably divided.

$^{146}_{62}Sm_{84}$-15

Nd(α,xnγ) 1980Ko07,2012Ku07

Level Scheme

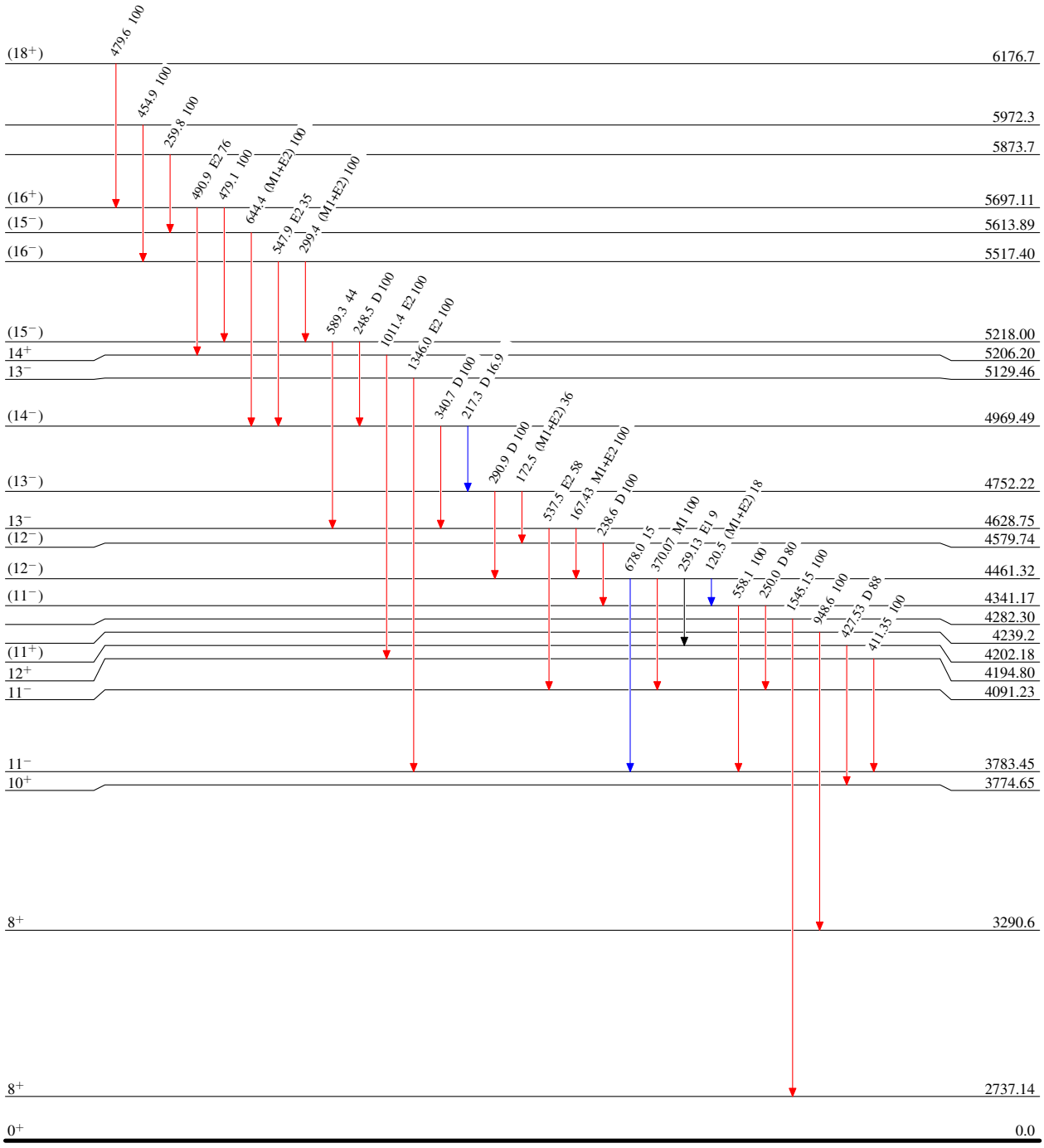
Intensities: Type not specified

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



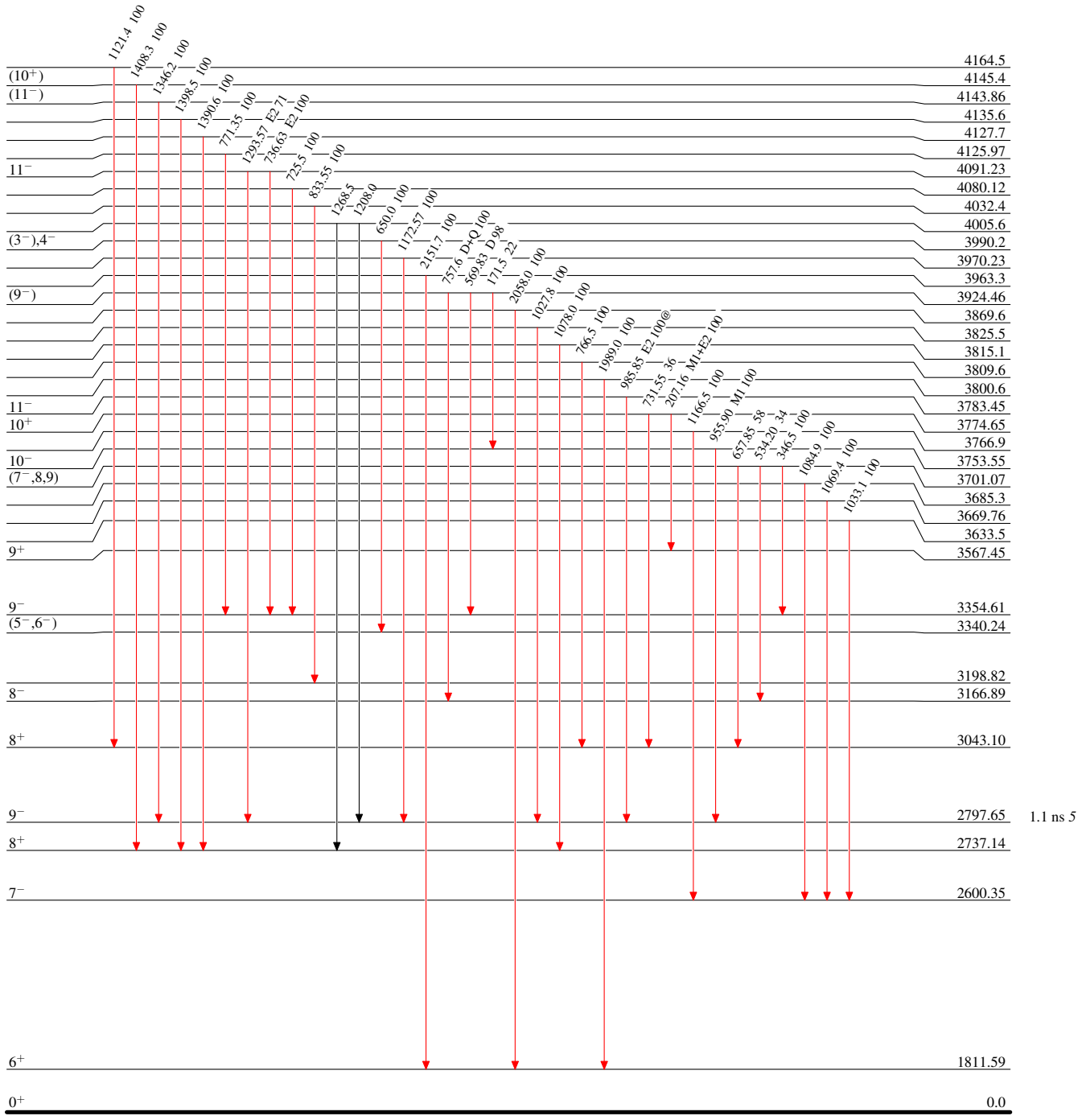
$^{146}_{62}Sm_{84}$

Nd(α,xnγ) 1980Ko07,2012Ku07

Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



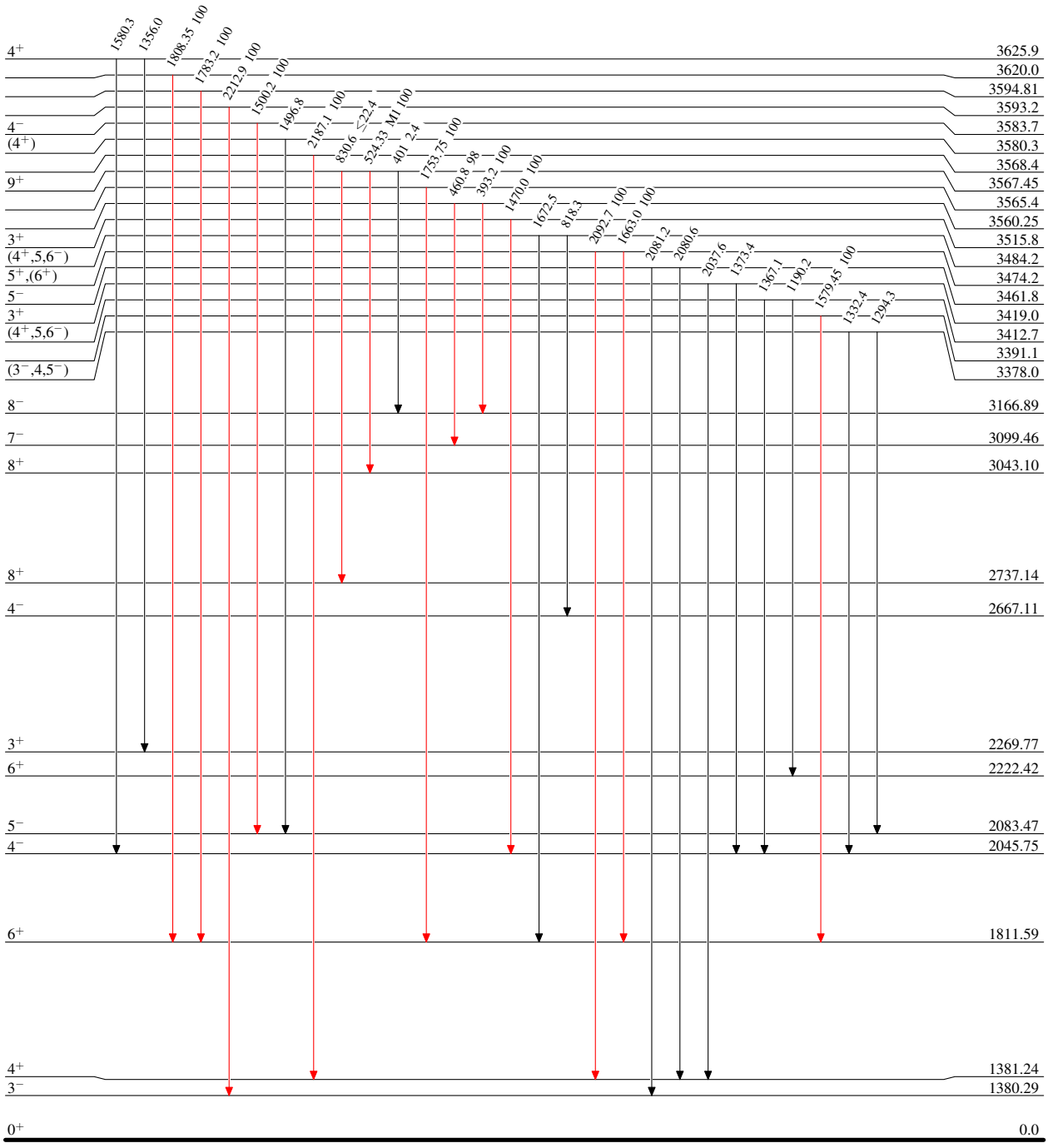
$^{146}_{62}Sm_{84}$

Nd(α,xnγ) 1980Ko07,2012Ku07

Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



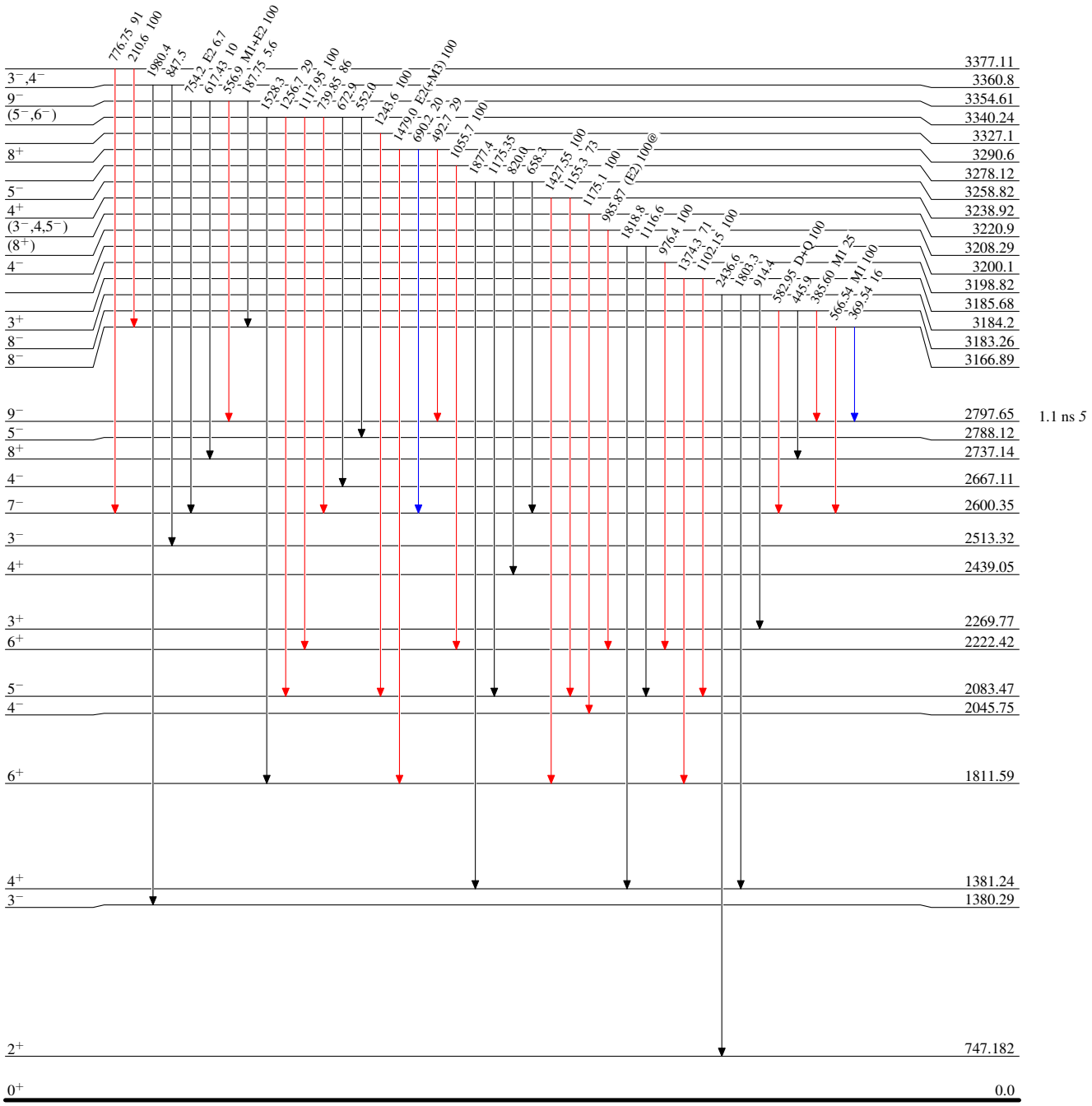
$^{146}_{62}Sm_{84}$

Nd(α,xnγ) 1980Ko07,2012Ku07

Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



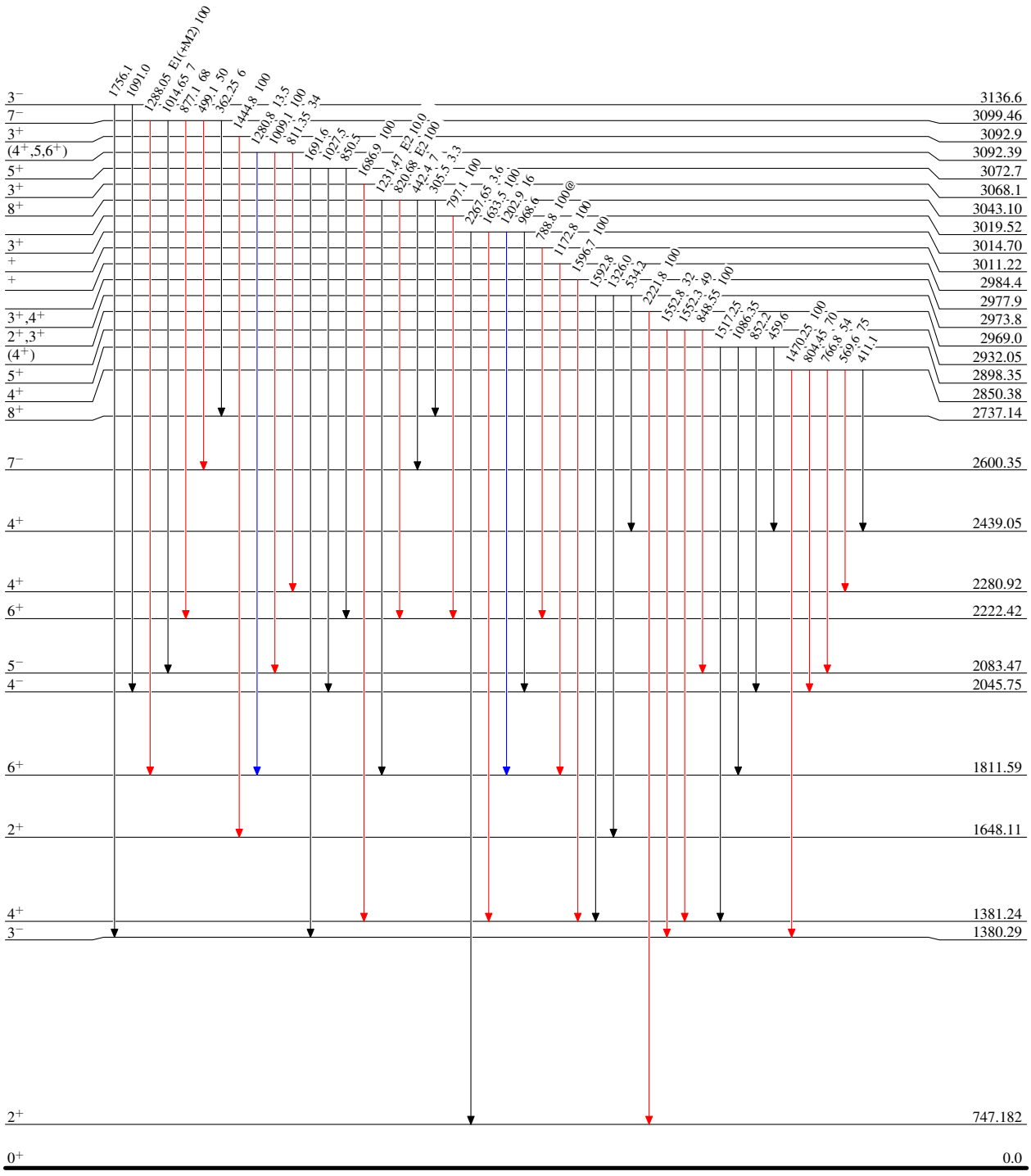
$^{146}_{62}Sm_{84}$

Nd(α,xnγ) 1980Ko07,2012Ku07

Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



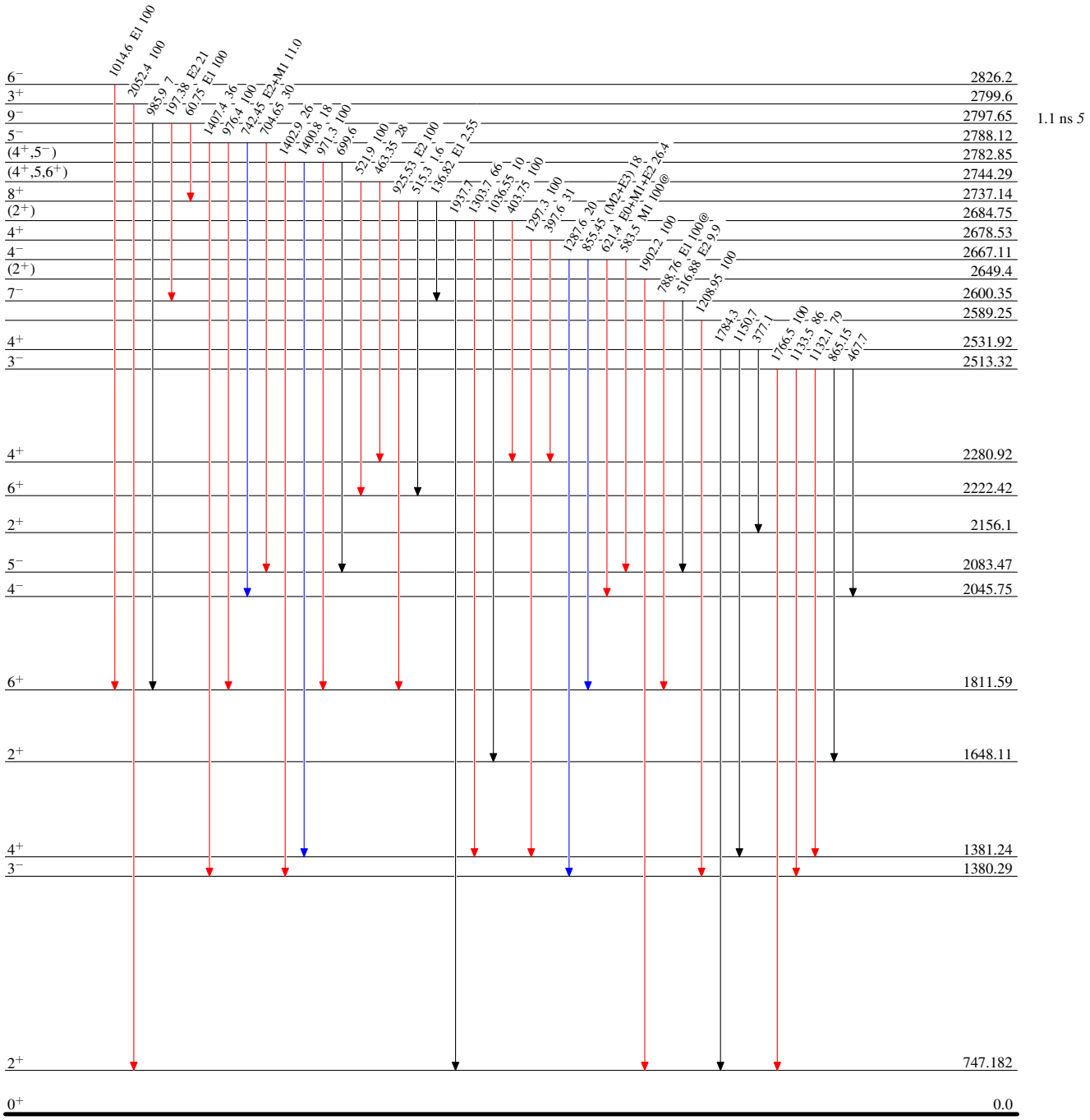
$^{146}_{62}Sm_{84}$

Nd(α,xnγ) 1980Ko07,2012Ku07

Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



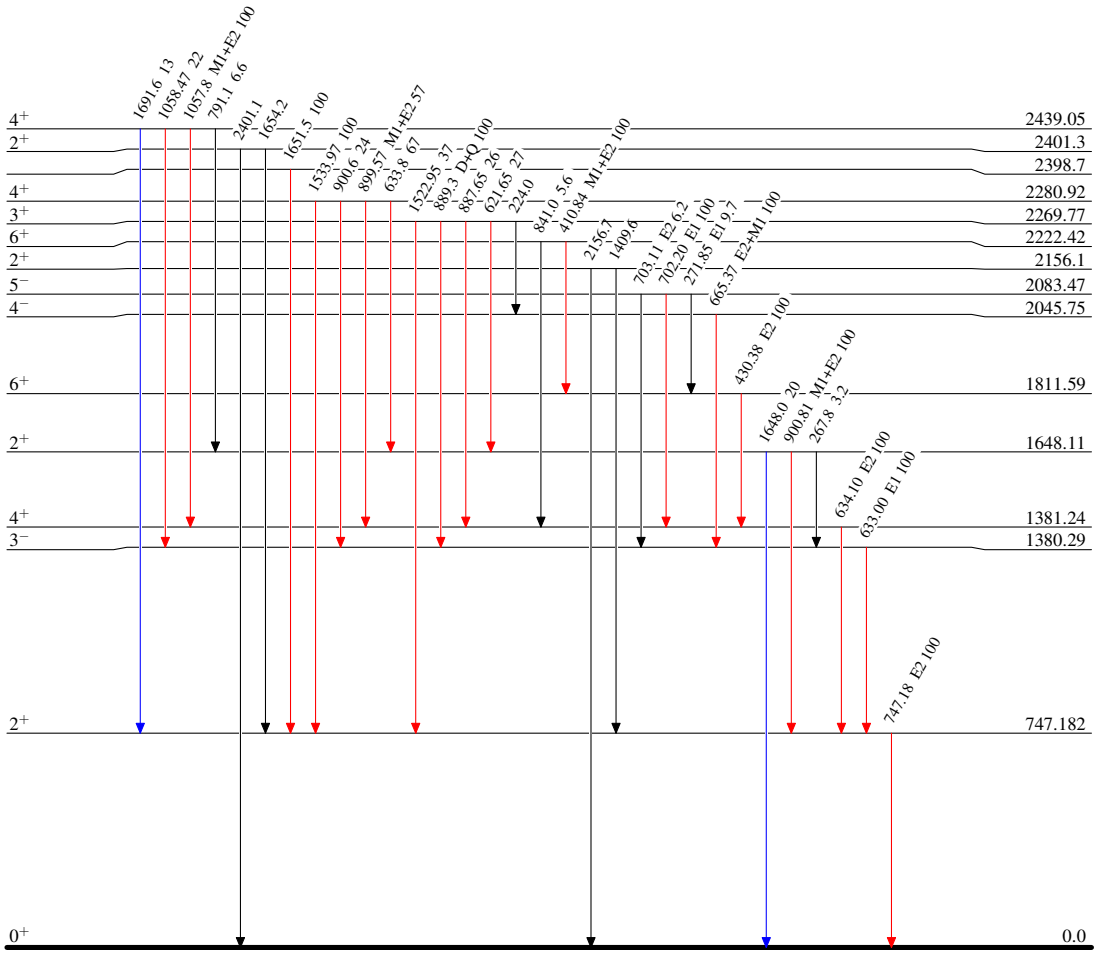
$^{146}_{62}Sm_{84}$

Nd(α,xnγ) 1980Ko07,2012Ku07

Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{146}_{62}Sm_{84}$