^{145}Nd(n,γ) E=0.2-0.5 keV 1976Bu14

History

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

1976Bu14: Nd(n,γ), E=0.2-0.5 keV; measured Eγ, Iγ. ^{146}Nd; deduced levels, J^π, γ branching, mult. Reactor, resonance-averaged neutron capture method (target contained in boron absorber).
1982RaZG,1983Ra18: ^{145}Nd(n,γ), E≈2 keV; measured Eγ, Iγ. ^{146}Nd; deduced primary transition, levels, J^π. Resonance-averaged neutron capture method, Sc-filtered neutrons.
1988Mu26,1990MuZX,1994MuZU: ^{145}Nd(n,γ), E=1.9-144 keV; measured Eγ, Iγ(E(n)) and resonance-averaged neutron capture measurement. Filtered neutron beams.
Other: 1983Ha01.

^{146}Nd Levels

E(level)[†]	J^{π}[c]	Comments
0.0	0^+	
453.75 16	2^+	
1043.8[a] 4	4^+	
1189.53[a] 19	3^-	
1377.7 6	1^-	
1470.39 25	2^+	
1517.2[#a] 10	5^-	
1745.76 20	4^+	
1768.5[#] 10		
1777.30 16	3^+	
1787.25 19	2^+	
1812.1 5	$2^-,5^-,(3^-,4^-)$	
1884.8[b] 4	$2^-,5^-,(3^-,4^-)$	
1895.5 10		
1905.1 10	2^+	
1918.88 20	4^+	
1977.15 19	2^+	
1989.55 24	4^+	
2045.2 10	$4^-,5$	
2072.9 3	3^-	
2095.8 3	$(4)^+$	
2167.3 10	3^-	
2197.3 3	2^+	
2219.8 5	3^+	
2226.4 5	$3^+,4^+$	J^π: 2^+:5^+ in 1976Bu14, see 'Adopted Levels'.
2230.9 7	3^-	
2287.0 6	2^+	
2302.0[b] 5	2^+ to 5^+	
2357.00 20	(4^+)	
2419.3[#] 3	2^+ to 5^+	
2433.6 5	4^-	
2436.4 5	2^+ to 5^+	
2438.8 5	2^+ to 5^+	
2469.9 3	$2^+,5^+,(3^+,4^+)$	
2485.3 5	2^+ to 5^+	
2491.4 5	$2^+,3^+$	
2516.3 3	$2^-,5^-,(3^-,4^-)$	
2521.3 4	2^+ to 5^+	
2528.3 3	2^+	
2547.2[@&b] 4	2^+ to 5^+	

Continued on next page (footnotes at end of table)

^{145}Nd(n,γ) E=0.2-0.5 keV 1976Bu14 (continued)

^{146}Nd Levels (continued)

E(level)[†]	J$^{\pi}$[c]	Comments
2552.83[&] *15*	2$^+$,3,4$^+$	
2555.54[@&b] *25*	3$^+$,4$^+$	
2562.04[&] *23*	3$^+$	
2574.27[&] *22*	2$^+$	
2589.68[&] *20*	3$^+$,4$^+$	
2601.3[&] *4*	2$^-$,5$^-$,(3$^-$,4$^-$)	
2660.72[&] *15*	3$^+$,4$^+$	
2707.1[@] *5*	(2$^+$)	
2750.1 *5*	5$^+$	
2783.8 *4*	3$^+$,4$^+$	
2803.0[@] *5*	3$^+$,4$^+$	
2905.7[@] *6*	2$^+$ to 5$^+$	
2930.6 *5*	2$^+$ to 5$^+$	
2958.5[@] *5*	2$^+$ to 5$^+$	
2996.7 *5*	3$^+$	
3013.2 *4*	3$^+$,4$^+$	
3034.6[@] *5*	(2)$^+$	
3042.2 *5*	2$^+$	
3064.6[@] *5*	3$^+$,4$^+$	
3172.0[@] *5*	2$^+$	
3178.2 *5*	2$^+$ to 5$^+$	
3229.7[@] *4*	3$^+$,4$^+$	
7564.7+x[‡] *4*	3$^-$,4$^-$	X=0.2-0.5 keV. Additional information 1.

† From a least-squares fit to primary Eγ from resonance-average capture; normalized χ^2=1.4.

‡ From thermal neutron capture (systematic error is included) (1976Bu14). In resonance-average neutron capture (by about 20 resonances (2006Ba19)), the energy value is shifted up by 0.2-0.5 keV.

Primary γ's to these levels were observed only at E(n)≈2 keV (1983Ra18).

@ Uncertain isotopic identification (1976Bu14).

& Suggested by resonance-average neutron capture and thermal capture low-energy transitions (1976Bu14).

a Observed at E(n)=1.9-144 keV by 1994MuZU.

b From resonance-average neutron capture data; E(level) is shifted down by 0.2-0.5 keV from thermal value (1976Bu14).

c From E1 or M1 multipolarities for γ from 3$^-$, 4$^-$ neutron resonances (1976Bu14), however, other spin choice is suggested by low-energy transitions connected to this state or by other works.

γ(^{146}Nd) (continued)

Eγ[†]	Iγ[b]	Ei(level)	J^π_i	Ef	J^π_f	Mult.[d]	α[e]	Comments
479.2[a] 5	0.83 17	2552.83	2+,3,4+	2072.9	3−			
528.3[&] 4	0.56[&] 8	2601.3	2−,5−,(3−,4−)	2072.9	3−			
565.1[af] 6	0.25[f] 6	2555.54	3+,4+	1989.55	4+			
565.1[af] 6	0.25[cf] 6	2660.72	3+,4+	2095.8	(4)+			
578.0[a] 5	0.29 6	2555.54	3+,4+	1977.15	2+			
584.6[a] 6	0.32 5	2574.27	2+	1989.55	4+			
600.0[a] 8	0.12 6	2589.68	3+,4+	1989.55	4+			
677.1[a] 5	0.10 5	2562.04	3+	1884.8	2−,5−,(3−,4−)			
765.1[a] 5	0.12 5	2552.83	2+,3,4+	1787.25	2+			
807.3[a] 2	0.70 5	2552.83	2+,3,4+	1745.76	4+			
883.3[a] 2	1.10 5	2660.72	3+,4+	1777.30	3+			
1169.5[a] 4	0.30 5	2547.2	2+ to 5+	1377.7	1−			
1190.8[a] 4	0.30 5	2660.72	3+,4+	1470.39	2+			
1363.5[a] 3	0.79 5	2552.83	2+,3,4+	1189.53	3−			
1471.0[af] 3	4.4[f] 5	2660.72	3+,4+	1189.53	3−			
1502.9[a] 4	0.22 4	2547.2	2+ to 5+	1043.8	4+			
2108.3[a] 2	0.46 5	2562.04	3+	453.75	2+			
2120.2[a] 3	0.38 4	2574.27	2+	453.75	2+			
2136.0[a] 2	0.71 4	2589.68	3+,4+	453.75	2+			
2207.0[a] 3	0.23 5	2660.72	3+,4+	453.75	2+			
4334.9[‡@] 4	8.0 16	7564.7+x	3−,4−	3229.7	3+,4+	E1	0.00187	
4386.4 5	5.8 14	7564.7+x	3−,4−	3178.2	2+ to 5+	E1	0.00188	
4392.6[‡@] 5	7.2 16	7564.7+x	3−,4−	3172.0	2+	E1	0.00189	
4500.0[‡@] 5	6.7 15	7564.7+x	3−,4−	3064.6	3+,4+	E1	0.00192	
4522.4 5	6.7 15	7564.7+x	3−,4−	3042.2	2+	E1	0.00193	
4530.0[‡@] 5	5.0 15	7564.7+x	3−,4−	3034.6	(2)+	E1	0.00193	
4551.4 4	8.2 15	7564.7+x	3−,4−	3013.2	3+,4+	E1	0.00194	
4567.9 5	7.1 15	7564.7+x	3−,4−	2996.7	3+	E1	0.00194	
4606.1[‡@] 5	5.6 14	7564.7+x	3−,4−	2958.5	2+ to 5+	E1	0.00196	
4634.0 5	6.0 12	7564.7+x	3−,4−	2930.6	2+ to 5+	E1	0.00196	
4658.9[‡@] 6	6.2 16	7564.7+x	3−,4−	2905.7	2+ to 5+	E1	0.00197	
4761.6[‡@] 5	10.6 15	7564.7+x	3−,4−	2803.0	3+,4+	E1	0.00201	
4780.8 4	8.2 12	7564.7+x	3−,4−	2783.8	3+,4+	E1	0.00201	
4814.5 5	5.2 13	7564.7+x	3−,4−	2750.1	5+	E1	0.00202	
4857.5 5	7.0 14	7564.7+x	3−,4−	2707.1	(2+)	(E1)	0.00204	Eγ,Iγ,Mult.: the transition may have admixture of ^{144}Nd.
4903.8 3	10.0 10	7564.7+x	3−,4−	2660.72	3+,4+	E1	0.00205	
4963.1 6	1.5 11	7564.7+x	3−,4−	2601.3	2−,5−,(3−,4−)	M1	1.72×10^{-3}	
4975.1 3	12.0 24	7564.7+x	3−,4−	2589.68	3+,4+	E1	0.00207	

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γ(^{146}Nd) (continued)

E_γ [†]	I_γ [b]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [d]	α [e]
4990.0 3	10.3 8	7564.7+x	$3^-,4^-$	2574.27	2^+	E1	0.00207
5002.5 5	5.3 11	7564.7+x	$3^-,4^-$	2562.04	3^+	E1	0.00208
5008.7[‡] 3	9.2 9	7564.7+x	$3^-,4^-$	2555.54	$3^+,4^+$	E1	0.00208
5011.9 2	6.7 10	7564.7+x	$3^-,4^-$	2552.83	$2^+,3,4^+$	E1	0.00208
5016.9[‡] 4	5.7 11	7564.7+x	$3^-,4^-$	2547.2	2^+ to 5^+	E1	0.00208
5036.3 3	5.3 12	7564.7+x	$3^-,4^-$	2528.3	2^+	E1	0.00208
5043.3 4	4.5 12	7564.7+x	$3^-,4^-$	2521.3	2^+ to 5^+	E1	0.00209
5048.3 3	0.9 6	7564.7+x	$3^-,4^-$	2516.3	$2^-,5^-,(3^-,4^-)$	M1	1.74×10^{-3}
5073.2 5	6.5 12	7564.7+x	$3^-,4^-$	2491.4	$2^+,3^+$	E1	0.00210
5079.3[‡] 5	5.8 12	7564.7+x	$3^-,4^-$	2485.3	2^+ to 5^+	E1	0.00210
5094.7 3	6.0 11	7564.7+x	$3^-,4^-$	2469.9	$2^+,5^+,(3^+,4^+)$	E1	0.00210
5125.8 5	4.3 11	7564.7+x	$3^-,4^-$	2438.8	2^+ to 5^+	E1	0.00211
5128.2 5	4.5 11	7564.7+x	$3^-,4^-$	2436.4	2^+ to 5^+	E1	0.00211
5131.0 5	1.7 10	7564.7+x	$3^-,4^-$	2433.6	4^-	M1	1.76×10^{-3}
5145.3[‡] 3	4.9 11	7564.7+x	$3^-,4^-$	2419.3	2^+ to 5^+	E1	0.00212
5207.6 2	5.8 10	7564.7+x	$3^-,4^-$	2357.00	(4^+)	E1	0.00213
5262.6[‡] 5	4.7 10	7564.7+x	$3^-,4^-$	2302.0	2^+ to 5^+	E1	0.00215
5277.6[‡] 6	5.1 9	7564.7+x	$3^-,4^-$	2287.0	2^+	E1	0.00215
5333.7[‡] 7	1.8 9	7564.7+x	$3^-,4^-$	2230.9	3^-	M1	0.00182
5338.2 5	4.2 9	7564.7+x	$3^-,4^-$	2226.4	$3^+,4^+$	E1	0.00217
5344.8 5	5.0 9	7564.7+x	$3^-,4^-$	2219.8	3^+	E1	0.00217
5367.3 3	9.5 10	7564.7+x	$3^-,4^-$	2197.3	2^+	E1	0.00218
5397.3[#]		7564.7+x	$3^-,4^-$	2167.3	3^-		
5468.7 3	6.2 8	7564.7+x	$3^-,4^-$	2095.8	$(4)^+$	E1	0.00221
5492.3 4	1.4 12	7564.7+x	$3^-,4^-$	2072.9	3^-	M1	0.00186
5519.4[#]		7564.7+x	$3^-,4^-$	2045.2	$4^-,5$		
5575.3 3	5.6 7	7564.7+x	$3^-,4^-$	1989.55	4^+	E1	0.00224
5587.5 2	3.4 7	7564.7+x	$3^-,4^-$	1977.15	2^+	E1	0.00224
5645.7 2	5.3 6	7564.7+x	$3^-,4^-$	1918.88	4^+	E1	0.00226
5659.5[#]		7564.7+x	$3^-,4^-$	1905.1	2^+		
5669.1[‡] 10	0.43 4	7564.7+x	$3^-,4^-$	1895.5		M1	0.00191
5680.0[‡] 5	0.86 7	7564.7+x	$3^-,4^-$	1884.8	$2^-,5^-,(3^-,4^-)$	M1	0.00191
5752.5 5	0.81 6	7564.7+x	$3^-,4^-$	1812.1	$2^-,5^-,(3^-,4^-)$	M1	0.00193
5777.4 2	4.7 7	7564.7+x	$3^-,4^-$	1787.25	2^+	E1	0.00230
5787.4 2	10.0 7	7564.7+x	$3^-,4^-$	1777.30	3^+	E1	0.00230
5796.1[#]		7564.7+x	$3^-,4^-$	1768.5			
5818.3 3	10.7 8	7564.7+x	$3^-,4^-$	1745.76	4^+	E1	0.00231
6047.4[#]		7564.7+x	$3^-,4^-$	1517.2	5^-		
6093.9 3	5.7 6	7564.7+x	$3^-,4^-$	1470.39	2^+	E1	
6375.0 3	1.6 5	7564.7+x	$3^-,4^-$	1189.53	3^-	M1	

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γ(^{146}Nd) (continued)

E_γ [†]	I_γ [b]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [d]
6521.3 *4*	17.6 *11*	7564.7+x	$3^-,4^-$	1043.8	4^+	E1
7110.8 *3*	5.5 *7*	7564.7+x	$3^-,4^-$	453.75	2^+	E1

[†] Obtained from the calibration of the thermal-capture spectrum, except where noted otherwise.
[‡] From resonance-averaged capture measurements, not observed in thermal neutron capture; Eγ's are shifted up by 0.2-0.5 keV from the E(thermal) values (1976Bu14).
[#] Eγ=Eγ(exp)−2 keV to normalize to E(n)=thermal; observed at neutron capture with E(n)≈2 keV (1983Ra18).
[@] Uncertain isotopic identification (1976Bu14).
[&] Also placed from 2045.9 keV level in (n,γ), E(n)=thermal (1983Sn01).
[a] Low-energy transition from thermal capture suggested the level average-resonance capture.
[b] For primary transitions (>4330 keV), reduced γ ray intensities are quoted (Iγ×(Eγ_0/Eγ)^3), where Eγ_0 is the capture state energy; for low-energy of γ's, Iγ's are taken from thermal neutron capture data (1976Bu14).
[c] Most of line intensity is believed to be in the γ line from 1470.4 keV level to the g.s.
[d] From data on reduced Iγ. In most cases, reduced Iγ<2 corresponds to M1, whereas reduced Iγ>3 corresponds to E1 (1976Bu14).
[e] Additional information 2.
[f] Multiply placed with undivided intensity.

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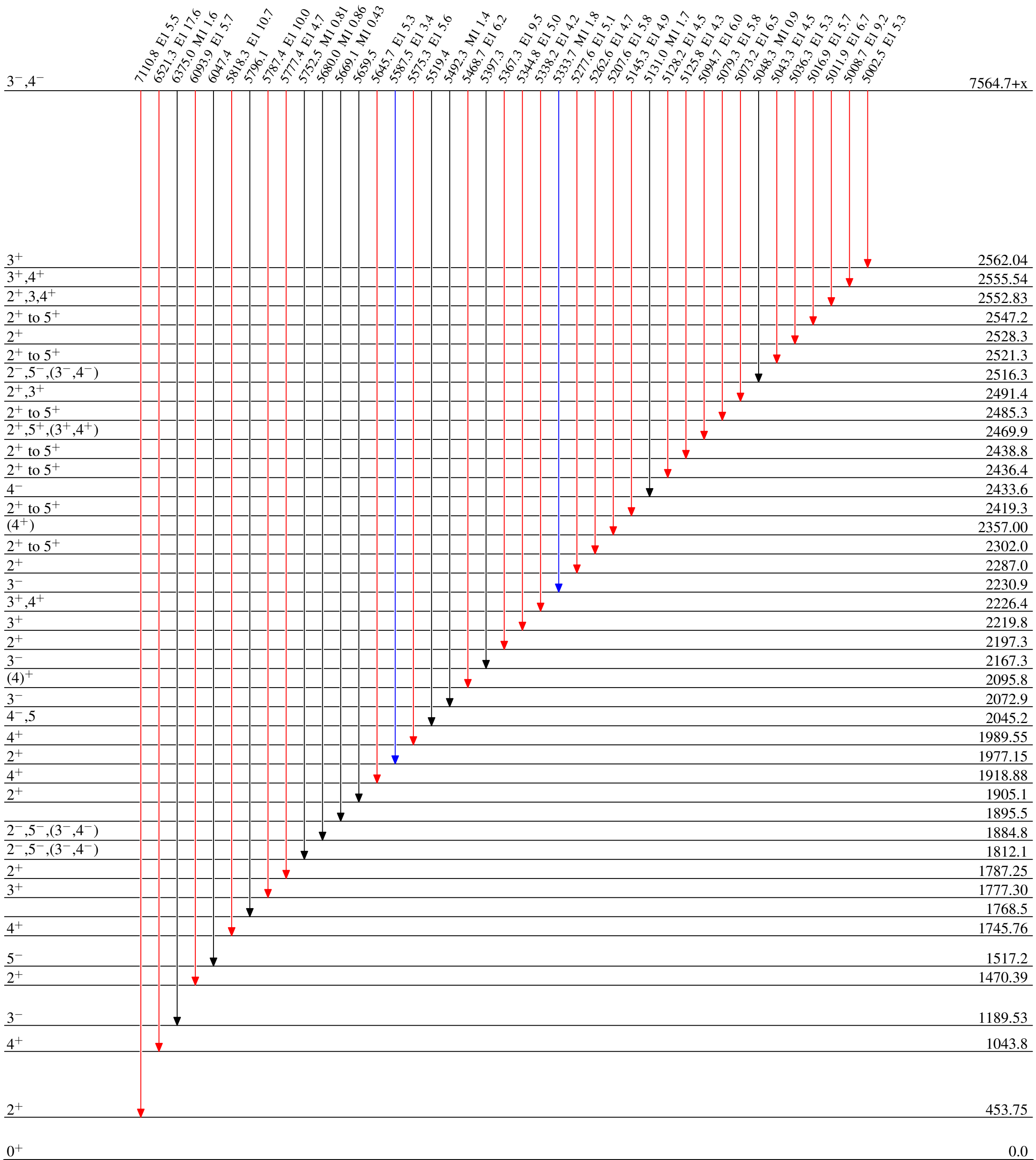
^{145}Nd(n,γ) E=0.2-0.5 keV 1976Bu14

Legend

Level Scheme

Intensities: Relative I_γ

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



$^{146}_{60}Nd_{86}$

^{145}Nd(n,γ) E=0.2-0.5 keV 1976Bu14

Level Scheme (continued)

Intensities: Relative I_γ

& Multiply placed: undivided intensity given

Legend

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

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

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