

$^{142}\text{Ce}(\alpha,3n\gamma)$ 1977Ha04

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli		NDS 113, 715 (2012)	31-May-2011

E=28-43 MeV.

Measured: γ ray, $\gamma\gamma$ coin, $\gamma(\theta)$, $\gamma(t)$, excitation function (1977Ha04,1977BeZI), ce (1977BeZI). Measured g-factor, $T_{1/2}$, time-integral perturbed angular distribution method (1994Ka23).

 ^{143}Nd Levels

E(level)	$J^\pi^\dagger$	$T_{1/2}$	Comments
0.0	$7/2^-$		
741.8 10	$3/2^-$		
1229.61 20	$13/2^+$	6.79 ns 2	g=0.058 5 (1994Ka23) $T_{1/2}$: from 1994Ka23. Other: 7.0 ns 4 (1977Ha04).
1407.9 10	$9/2^-$		
1432.01 20	$11/2^-$		
2020.3 3	$15/2^-$		
2076.6 3	$11/2^-$		
2360.8 3	$15/2^+$		
2399.5 4	$17/2^-$		
2491.5 4	$19/2^-$		
2912.3 5	$21/2^+$		g=0.69 12 (1984Ka23)
3025.6 5	$21/2^+$		
3086.0 5	$23/2^+$		
3458.4 5	$25/2^+$		
3736.1? 12			
3742.6? 9			
3807.8? 12			
4226.9 10	$27/2^+$		
4317.5? 12			
4636.2 10	$29/2^+$		
5130.3	$31/2^+$		
5343.6	$33/2^+$		
5791.8			

 † From Adopted Levels. $\gamma(^{143}\text{Nd})$

$E_\gamma^\ddagger$	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [#]	$\alpha^\dagger$	Comments
60.5 2	1.1 3	3086.0	$23/2^+$	3025.6	$21/2^+$			
92.0 2	21.2 12	2491.5	$19/2^-$	2399.5	$17/2^-$	M1	1.80	$\alpha(\text{K})=1.528$ 24; $\alpha(\text{L})=0.213$ 4; $\alpha(\text{M})=0.0452$ 7; $\alpha(\text{N}+..)=0.01176$ 18 $\alpha(\text{N})=0.01012$ 16; $\alpha(\text{O})=0.001536$ 24; $\alpha(\text{P})=9.91 \times 10^{-5}$ 16 Mult.: $A_2=-0.19$ 4, $A_4=+0.16$ 5; M1 or E1 from transition intensity imbalance.
^x 131.6	1.2 3							
173.7 2	23.5 13	3086.0	$23/2^+$	2912.3	$21/2^+$	M1	0.299	$\alpha(\text{K})=0.255$ 4; $\alpha(\text{L})=0.0351$ 5; $\alpha(\text{M})=0.00745$ 11; $\alpha(\text{N}+..)=0.00194$ 3 $\alpha(\text{N})=0.001669$ 24; $\alpha(\text{O})=0.000254$ 4; $\alpha(\text{P})=1.646 \times 10^{-5}$ 24 Mult.: $A_2=-0.27$ 4, $A_4=+0.22$ 5 (1977Ha04), $\alpha(\text{K})_{\text{exp}}=0.33$ 7 (1977BeZI).

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$^{142}\text{Ce}(\alpha, 3n\gamma)$ **1977Ha04 (continued)** $\gamma(^{143}\text{Nd})$ (continued)

E_γ ‡	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. #	δ	$\alpha^\dagger$	Comments
213.3 @		5343.6	33/2 ⁺	5130.3	31/2 ⁺	M1		0.1704	$\alpha(\text{K})=0.1452$ 2I; $\alpha(\text{L})=0.0199$ 3; $\alpha(\text{M})=0.00422$ 6; $\alpha(\text{N}+..)=0.001099$ 16 $\alpha(\text{N})=0.000946$ 14; $\alpha(\text{O})=0.0001438$ 2I; $\alpha(\text{P})=9.36\times 10^{-6}$ 14 E_γ : from 1987Bu08. E_γ : placed from 6518 level in ($^{18}\text{O}, 5n\gamma$).
277.7	3.8 5	3736.1?		3458.4	25/2 ⁺				
340.5	1.7 4	2360.8	15/2 ⁺	2020.3	15/2 ⁻				
349.4	2.2 4	3807.8?		3458.4	25/2 ⁺				
372.4 2	17.8 15	3458.4	25/2 ⁺	3086.0	23/2 ⁺	M1+E2	0.115 15	0.0387	$\alpha(\text{K})=0.0330$ 5; $\alpha(\text{L})=0.00447$ 7; $\alpha(\text{M})=0.000946$ 14; $\alpha(\text{N}+..)=0.000246$ 4 $\alpha(\text{N})=0.000212$ 3; $\alpha(\text{O})=3.22\times 10^{-5}$ 5; $\alpha(\text{P})=2.11\times 10^{-6}$ 3 Mult.: $A_2=-0.15$ 2, $A_4=+0.05$ 3. $\alpha(\text{K})=0.0316$ 5; $\alpha(\text{L})=0.00427$ 6; $\alpha(\text{M})=0.000903$ 13; $\alpha(\text{N}+..)=0.000235$ 4 $\alpha(\text{N})=0.000202$ 3; $\alpha(\text{O})=3.08\times 10^{-5}$ 5; $\alpha(\text{P})=2.02\times 10^{-6}$ 3 Mult.: $A_2=-0.18$ 2, $A_4=+0.21$ 3 (1977Ha04); $A_2=-0.23$ 1I, $\alpha(\text{K})_{\text{exp}}=7.9\times 10^{-2}$ 7 (1977BeZI).
379.2 2	61 5	2399.5	17/2 ⁻	2020.3	15/2 ⁻	M1		0.0370	$\alpha(\text{K})=0.0260$ 4; $\alpha(\text{L})=0.00350$ 5; $\alpha(\text{M})=0.000741$ 1I; $\alpha(\text{N}+..)=0.000193$ 3 $\alpha(\text{N})=0.0001659$ 24; $\alpha(\text{O})=2.53\times 10^{-5}$ 4; $\alpha(\text{P})=1.662\times 10^{-6}$ 24 $\alpha=0.00589$ 9; $\alpha(\text{K})=0.00505$ 7; $\alpha(\text{L})=0.000662$ 10; $\alpha(\text{M})=0.0001395$ 20; $\alpha(\text{N}+..)=3.60\times 10^{-5}$ 5 $\alpha(\text{N})=3.11\times 10^{-5}$ 5; $\alpha(\text{O})=4.67\times 10^{-6}$ 7; $\alpha(\text{P})=2.91\times 10^{-7}$ 4 Mult.: $A_2=-0.29$ 3, $A_4=+0.23$ 4.
409.1	2.1 4	4636.2	29/2 ⁺	4226.9	27/2 ⁺	M1		0.0305	$\alpha(\text{K})=0.0260$ 4; $\alpha(\text{L})=0.00350$ 5; $\alpha(\text{M})=0.000741$ 1I; $\alpha(\text{N}+..)=0.000193$ 3 $\alpha(\text{N})=0.0001659$ 24; $\alpha(\text{O})=2.53\times 10^{-5}$ 4; $\alpha(\text{P})=1.662\times 10^{-6}$ 24 $\alpha=0.00589$ 9; $\alpha(\text{K})=0.00505$ 7; $\alpha(\text{L})=0.000662$ 10; $\alpha(\text{M})=0.0001395$ 20; $\alpha(\text{N}+..)=3.60\times 10^{-5}$ 5 $\alpha(\text{N})=3.11\times 10^{-5}$ 5; $\alpha(\text{O})=4.67\times 10^{-6}$ 7; $\alpha(\text{P})=2.91\times 10^{-7}$ 4 Mult.: $A_2=-0.29$ 3, $A_4=+0.23$ 4.
420.7 2	40 2	2912.3	21/2 ⁺	2491.5	19/2 ⁻	E1		0.00589 9	$\alpha(\text{K})=0.0260$ 4; $\alpha(\text{L})=0.00350$ 5; $\alpha(\text{M})=0.000741$ 1I; $\alpha(\text{N}+..)=0.000193$ 3 $\alpha(\text{N})=0.0001659$ 24; $\alpha(\text{O})=2.53\times 10^{-5}$ 4; $\alpha(\text{P})=1.662\times 10^{-6}$ 24 $\alpha=0.00589$ 9; $\alpha(\text{K})=0.00505$ 7; $\alpha(\text{L})=0.000662$ 10; $\alpha(\text{M})=0.0001395$ 20; $\alpha(\text{N}+..)=3.60\times 10^{-5}$ 5 $\alpha(\text{N})=3.11\times 10^{-5}$ 5; $\alpha(\text{O})=4.67\times 10^{-6}$ 7; $\alpha(\text{P})=2.91\times 10^{-7}$ 4 Mult.: $A_2=-0.29$ 3, $A_4=+0.23$ 4.
448.2 &	3.0 4	5791.8		5343.6	33/2 ⁺	D			
^x 456.4	1.2 3								
494.1 &	1.6 3	5130.3	31/2 ⁺	4636.2	29/2 ⁺				
534.1 2	12.0 9	3025.6	21/2 ⁺	2491.5	19/2 ⁻				
^x 587.5	1.3 3								
656.6	1.9 3	3742.6?		3086.0	23/2 ⁺				
741.8	1.5 4	741.8	3/2 ⁻	0.0	7/2 ⁻	Q			Mult.: $A_2=+0.10$ 4, $A_4=+0.01$ 7 (1977Ha04); $A_2=-0.05$ 1I; $\alpha(\text{K})_{\text{exp}}=93\times 10^{-4}$ 4 (1977BeZI).
790.7 2	85 5	2020.3	15/2 ⁻	1229.61	13/2 ⁺	E1		0.001475 2I	$\alpha=0.001475$ 2I; $\alpha(\text{K})=0.001270$ 18; $\alpha(\text{L})=0.0001622$ 23;

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$^{142}\text{Ce}(\alpha, 3n\gamma)$ 1977Ha04 (continued)									
$\gamma(^{143}\text{Nd})$ (continued)									
E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [#]	δ	$\alpha^\dagger$	Comments
									$\alpha(\text{M})=3.41\times 10^{-5}$ 5; $\alpha(\text{N}+..)=8.84\times 10^{-6}$ $\alpha(\text{N})=7.61\times 10^{-6}$ 11; $\alpha(\text{O})=1.154\times 10^{-6}$ 17; $\alpha(\text{P})=7.48\times 10^{-8}$ 11 Mult.: $A_2=-0.31$ 2, $A_2=+0.18$ 2 (1977Ha04); $A_2=-0.23$ 9, $\alpha(\text{K})_{\text{exp}}=3\times 10^{-3}$ 1 (1977BeZl). $\alpha=0.001287$ 18; $\alpha(\text{K})=0.001108$ 16; $\alpha(\text{L})=0.0001411$ 20; $\alpha(\text{M})=2.96\times 10^{-5}$ 5; $\alpha(\text{N}+..)=7.69\times 10^{-6}$ $\alpha(\text{N})=6.62\times 10^{-6}$ 10; $\alpha(\text{O})=1.004\times 10^{-6}$ 14; $\alpha(\text{P})=6.54\times 10^{-8}$ 10 Mult.: $A_2=-0.27$ 4, $A_4=+0.17$ 5. Coin also with 534.1 γ , 420.7 γ , 409.1 γ , 372.4 γ .
847.0 2	8.5 16	2076.6	11/2 ⁻	1229.61	13/2 ⁺	E1		0.001287 18	
859.1	3.3 4	4317.5?		3458.4	25/2 ⁺				
^x 979.7	1.5 3								
^x 992.0	1.4 3								
^x 1073.2	1.3 3								
^x 1081.0	1.2 3								
1131.2 2	3.0 5	2360.8	15/2 ⁺	1229.61	13/2 ⁺				
(1140.6 @)		4226.9	27/2 ⁺	3086.0	23/2 ⁺	Q			E_γ : from $^{130}\text{Te}(^{18}\text{O}, 5n\gamma)$.
1178.1 @	2.4 5	4636.2	29/2 ⁺	3458.4	25/2 ⁺	E2		0.001598 23	$\alpha=0.001598$ 23; $\alpha(\text{K})=0.001362$ 19; $\alpha(\text{L})=0.000183$ 3; $\alpha(\text{M})=3.87\times 10^{-5}$ 6; $\alpha(\text{N}+..)=1.377\times 10^{-5}$ 2 $\alpha(\text{N})=8.63\times 10^{-6}$ 12; $\alpha(\text{O})=1.305\times 10^{-6}$ 19; $\alpha(\text{P})=8.26\times 10^{-8}$ 12; $\alpha(\text{IPF})=3.75\times 10^{-6}$ 6 B(E3)(W.u.)=34.66 11 $\alpha=0.00293$ 4; $\alpha(\text{K})=0.00246$ 4; $\alpha(\text{L})=0.000364$ 5; $\alpha(\text{M})=7.78\times 10^{-5}$ 11; $\alpha(\text{N}+..)=2.27\times 10^{-5}$ 4 $\alpha(\text{N})=1.735\times 10^{-5}$ 25; $\alpha(\text{O})=2.60\times 10^{-6}$ 4; $\alpha(\text{P})=1.547\times 10^{-7}$ 22; $\alpha(\text{IPF})=2.59\times 10^{-6}$ 4 Mult.: $A_2=+0.41$ 2, $A_4=+0.15$ 4; from Adopted Gammas.
1229.6 2	100 5	1229.61	13/2 ⁺	0.0	7/2 ⁻	E3		0.00293 4	
1251.0	2.7 5	3742.6?		2491.5	19/2 ⁻				E_γ : placed from 4707 level in ($^{18}\text{O}, 5n\gamma$).
^x 1256.1 2	5.2 7								Mult.: $A_2=+0.38$ 9, $A_4=-0.05$ 15; $\Delta J=2$ (Q) or 0 (Q+D).
1407.9	3.8 6	1407.9	9/2 ⁻	0.0	7/2 ⁻	M1+E2	0.65	0.001460 21	$\alpha=0.001460$ 21; $\alpha(\text{K})=0.001212$ 17; $\alpha(\text{L})=0.0001572$ 22; $\alpha(\text{M})=3.31\times 10^{-5}$ 5; $\alpha(\text{N}+..)=5.73\times 10^{-5}$ $\alpha(\text{N})=7.42\times 10^{-6}$ 11;

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$^{142}\text{Ce}(\alpha, 3\text{n}\gamma)$ **1977Ha04 (continued)** $\gamma(^{143}\text{Nd})$ (continued)

<u>E_γ[‡]</u>	<u>I_γ</u>	<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.[#]</u>	<u>Comments</u>
							$\alpha(\text{O})=1.132\times 10^{-6}$ 16; $\alpha(\text{P})=7.53\times 10^{-8}$ 11; $\alpha(\text{IPF})=4.87\times 10^{-5}$ 7
							Mult.: $A_2=+0.26$ 6, $A_4=+0.05$ 10.
							Mult.: $A_2=+0.19$ 6, $A_4=-0.07$ 9.
1432.0 2	6.4 8	1432.01	11/2 ⁻	0.0	7/2 ⁻	Q	
^x 1437.5	1.1 3						
^x 1689.3	0.9 3						
^x 1742.6	0.8 3						
^x 1983.7	1.8 4						
^x 2064.0	0.6 3						
^x 2095.7	0.7 3						

[†] [Additional information 1.](#)

[‡] $\Delta E=0.2$ keV for stronger lines.

[#] From Adopted Gammas.

@ Level scheme placement given in [1990Az01](#).

& Placement from [1994Te05](#).

^x γ ray not placed in level scheme.

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Level Scheme

Intensities: Relative I_γ

Legend

- $\longrightarrow$ $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
 $\longrightarrow$ $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
 $\longrightarrow$ $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
 $-\cdots-\cdots\longrightarrow$ γ Decay (Uncertain)

