$^{142}_{59}\mathrm{Pr}_{83}$

1 Decay Scheme

Pr-142 (half-life of 19.14 h) undergoes 99.9836% beta decay (Q(beta) of 2161.6 (15) keV) via two excited levels and the ground state of Nd-142, and 0.0164% EC decay (Q(EC) of 744.5 (24) keV) via one excited level and the ground state of Ce-142.

Le praséodyme 142 (19,14 h) se désintègre à 99,9836 % par émission bêta moins vers les niveaux excités et le niveau fondamental du néodyme 142 et 0,0164 % par capture électronique vers un niveau excité et le niveau fondamental du cérium 142.

2 Nuclear Data

$T_{1/2}(^{142}\mathrm{Pr})$	:	19,14	(4)	h
$Q^-(^{142}\mathrm{Pr})$	:	2161,6	(15)	keV
$Q^+(^{142}\mathrm{Pr})$	:	744,5	(24)	keV

2.1 Electron Capture Transitions

	Energy (keV)	Probability (%)	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,1}$	103,2 (24)	0,0022 (8)	1st forbidden non-unique	7,9	0,7039 (60)	0,2270 (46)	0,0554 (15)
$\epsilon_{0,0}$	744,5 (24)	0,0142 (11)	1st forbidden unique	9,4	0,8398 (15)	0,1255 (11)	0,0280 (5)

2.2 β^- Transitions

	Energy (keV)	Probability (%)	Nature	lg ft
$\beta^-_{0,2}$	77,7 (15)	0,024 (3)	allowed	6,5
$\beta^-_{0,1}$	585,8 (15)	3,7 (4)	1st forbidden non-unique	7,1
$\beta^-_{0,0}$	2161,6 (15)	96,3 (4)	1st forbidden unique	8,90

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy (keV)	$P_{\gamma+ce}$ (%)	Multipolarity	α_K (10^{-3})	α_L (10^{-4})	α_M (10^{-4})	α_T (10^{-3})	α_π (10^{-4})
$\gamma_{2,1}$(Nd)	508,160 (22)	0,024 (3)	E1	3,26 (5)	4,24 (6)	0,892 (13)	3,80 (6)	
$\gamma_{1,0}$(Ce)	641,282 (9)	0,0022 (8)	E2	4,75 (7)	6,95 (10)	1,463 (21)	5,63 (8)	
$\gamma_{1,0}$(Nd)	1575,78 (1)	3,7 (4)	E2	0,772 (11)	1,005 (14)	0,212 (3)	1,003 (14)	1,037 (15)

3 Atomic Data

3.1 Ce

ω_K : 0,910 (4)
$\bar{\omega}_L$: 0,125 (5)
n_{KL} : 0,876 (4)

3.1.1 X Radiations

	Energy (keV)	Relative probability
X_K		
$K\alpha_2$	34,2793	55
$K\alpha_1$	34,72	100
$K\beta_3$	39,1705	30
$K\beta_1$	39,2578	
$K\beta_5''$	39,549	
$K\beta_2$	40,233	7,7
$K\beta_4$	40,337	
$KO_{2,3}$	40,423	
X_L		
$L\ell$	4,289	
$L\alpha$	4,822 - 4,84	
$L\eta$	4,73	
$L\beta$	5,263 - 5,613	
$L\gamma$	6,054 - 6,342	

3.1.2 Auger Electrons

	Energy (keV)	Relative probability
Auger K		
KLL	27,190 - 28,828	100
KLX	32,392 - 34,700	48,7
KXY	37,57 - 40,40	6,03
Auger L	2,81 - 4,72	1577

3.2 Nd

ω_K : 0,918 (4)
$\bar{\omega}_L$: 0,140 (6)
n_{KL} : 0,866 (4)

3.2.1 X Radiations

		Energy (keV)	Relative probability
X_K			
	$K\alpha_2$	36,8478	55
	$K\alpha_1$	37,3614	100
	$K\beta_3$	42,167	30,9
	$K\beta_1$	42,2717	
	$K\beta_5''$	42,58	
	$K\beta_2$	43,335	7,9
	$K\beta_4$	43,451	
	$KO_{2,3}$	43,548	
X_L			
	$L\ell$	4,633	
	$L\alpha$	5,208 - 5,23	
	$L\eta$	5,146	
	$L\beta$	5,722 - 6,09	
	$L\gamma$	6,604 - 6,901	

3.2.2 Auger Electrons

	Energy (keV)	Relative probability
Auger K		
KLL	29,154 - 30,978	100
KLX	34,798 - 37,340	50
KXY	40,42 - 43,53	6,23
Auger L	3,01 - 5,10	1630

4 Electron Emissions

		Energy (keV)	Electrons (per 100 disint.)
e_{AL}	(Ce)	2,81 - 4,72	0,0123 (7)
e_{AK}	(Ce)		
	KLL	27,190 - 28,828	0,00121 (12)
	KLX	32,392 - 34,700	
	KXY	37,57 - 40,40	
e_{AL}	(Nd)	3,01 - 5,10	0,00251 (17)
e_{AK}	(Nd)		
	KLL	29,154 - 30,978	0,00024 (3)
	KLX	34,798 - 37,340	
	KXY	40,42 - 43,53	
$\beta^-_{0,2}$	max:	77,7 (15)	0,024 (3)
	avg:	20,1 (4)	
$\beta^-_{0,1}$	max:	585,8 (15)	3,7 (4)
	avg:	182,5 (6)	
$\beta^-_{0,0}$	max:	2161,6 (15)	96,3 (4)
	avg:	833,9 (7)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy (keV)	Photons (per 100 disint.)	
XL	(Ce)	4,289 - 6,342	0,00179 (9)	
$XK\alpha_2$	(Ce)	34,2793	0,0035 (3)	$K\alpha$
$XK\alpha_1$	(Ce)	34,72	0,0064 (6)	
$XK\beta_3$	(Ce)	39,1705	0,00192 (16)	$K'\beta_1$
$XK\beta_1$	(Ce)	39,2578		
$XK\beta''_5$	(Ce)	39,549		
$XK\beta_2$	(Ce)	40,233	0,00049 (4)	$K'\beta_2$
$XK\beta_4$	(Ce)	40,337		
$XKO_{2,3}$	(Ce)	40,423		

		Energy (keV)	Photons (per 100 disint.)	
XL	(Nd)	4,633 - 6,901	0,00042 (3)	
$XK\alpha_2$	(Nd)	36,8478	0,00076 (9)	$K\alpha$
$XK\alpha_1$	(Nd)	37,3614	0,00139 (15)	$K\alpha$
$XK\beta_3$	(Nd)	42,167	0,00043 (5)	$K'\beta_1$
$XK\beta_1$	(Nd)	42,2717	0,00043 (5)	$K'\beta_1$
$XK\beta_5''$	(Nd)	42,58	0,00043 (5)	$K'\beta_1$
$XK\beta_2$	(Nd)	43,335	0,000110 (12)	$K'\beta_2$
$XK\beta_4$	(Nd)	43,451	0,000110 (12)	$K'\beta_2$
$XKO_{2,3}$	(Nd)	43,548	0,000110 (12)	$K'\beta_2$

5.2 Gamma Emissions

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{2,1}$(Nd)	508,159 (22)	0,024 (3)
$\gamma_{1,0}$(Ce)	641,280 (9)	0,0022 (8)
$\gamma_{1,0}$(Nd)	1575,771 (10)	3,7 (4)

6 Main Production Modes

$Pr - 141(n,\gamma)Pr - 142$

$Pr - 141(d,p)Pr - 142$

$Ce - 142(p,n)Pr - 142$

$Ce - 142(d,2n)Pr - 142$

$La - 139(\alpha,n)Pr - 142$

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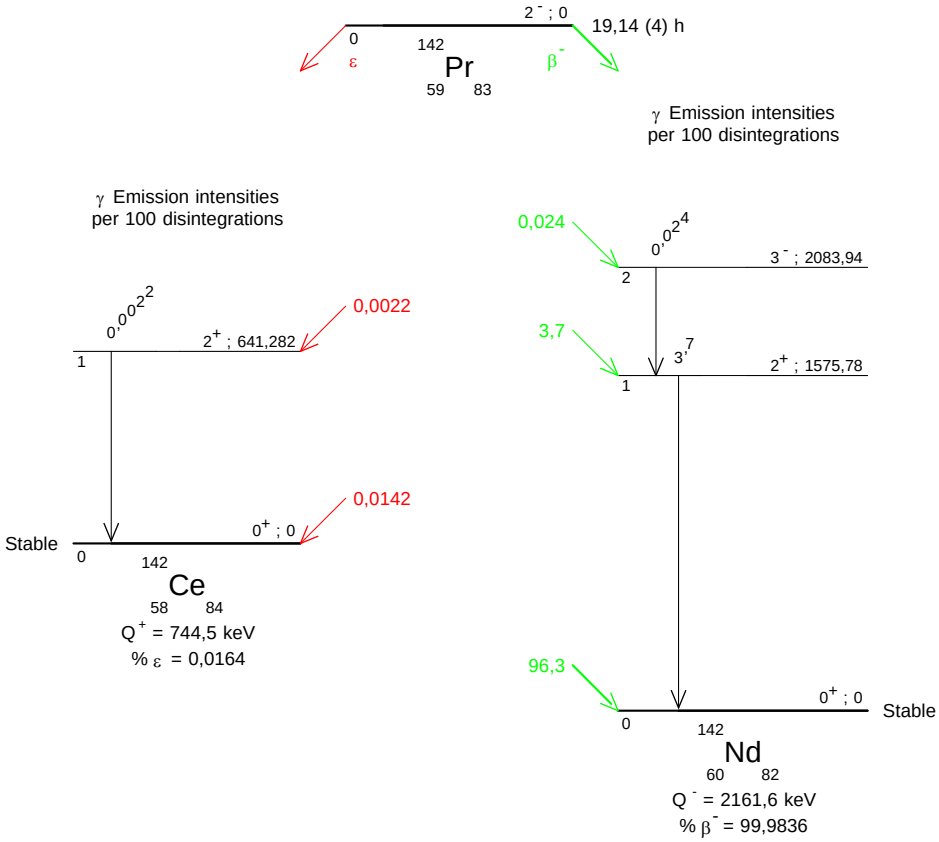
2⁻ ; 0
19,14 (4) h
0
142
ε
Pr
59 83
β⁻
γ Emission intensities
per 100 disintegrations
γ Emission intensities
per 100 disintegrations
0,024
0,0022
3,7
0,0142
96,3
Stable
Stable
2⁺ ; 641,282
3⁻ ; 2083,94
2⁺ ; 1575,78
0⁺ ; 0
0⁺ ; 0
Ce
58 84
Q⁺ = 744,5 keV
% ε = 0,0164
Nd
60 82
Q⁻ = 2161,6 keV
% β⁻ = 99,9836