$^{224}_{88}\mathrm{Ra}_{136}$

1 Decay Scheme

Ra-224 decays mainly by alpha emission to the ground and 240.986-keV nuclear levels of Rn-220. A small C-14 cluster decay branch of 5E-9% has also been observed.
Le radium 224 se désintègre par émission alpha principalement vers le niveau fondamental et le niveau excité de 241 keV du radon 220.

2 Nuclear Data

$T_{1/2}(^{224}\mathrm{Ra})$	:	3,631	(2)	d
$T_{1/2}(^{220}\mathrm{Rn})$	:	55,8	(3)	s
$Q^{\alpha}(^{224}\mathrm{Ra})$	:	5788,85	(15)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,4}$	5125,82 (18)	0,0030 (5)	6,4
$\alpha_{0,3}$	5143,41 (17)	0,0076 (10)	3,7
$\alpha_{0,2}$	5255,16 (18)	0,0072 (8)	17,9
$\alpha_{0,1}$	5547,86 (15)	5,25 (5)	1,04
$\alpha_{0,0}$	5788,85 (15)	94,73 (5)	1

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Rn)	240,986 (6)	5,26 (5)	E2	0,1109 (16)	0,1220 (17)	0,0324 (5)	0,276 (4)
$\gamma_{2,1}$(Rn)	292,7 (1)	0,0072 (8)	E2	0,0727 (11)	0,0564 (8)	0,01484 (21)	0,1487 (21)
$\gamma_{3,1}$(Rn)	404,45 (9)	0,0022 (5)	E1	0,01401 (20)	0,00241 (4)	0,000568 (8)	0,01717 (24)
$\gamma_{4,1}$(Rn)	422,04 (10)	0,0030 (5)	[E1]	0,01280 (18)	0,00219 (3)	0,000516 (8)	0,01567 (22)
$\gamma_{3,0}$(Rn)	645,44 (9)	0,0054 (9)	E1	0,00546 (8)	0,000894 (13)	0,000210 (3)	0,00663 (10)

3 Atomic Data

3.1 Rn

ω_K : 0,967 (4)
$\bar{\omega}_L$: 0,428 (17)
n_{KL} : 0,804 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	81,07		60,75
	$K\alpha_1$	83,78		100
	$K\beta_3$	94,247	}	
	$K\beta_1$	94,868	}	
	$K\beta_5''$	95,449	}	34,72
	$K\beta_2$	97,48	}	
	$K\beta_4$	97,853	}	11,12
	$KO_{2,3}$	98,357	}	
X_L				
	$L\ell$	10,137		
	$L\alpha$	11,598 – 11,726		
	$L\eta$	12,855		
	$L\beta$	13,52 – 14,565		
	$L\gamma$	16,77 – 17,28		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	62,017 – 68,885	100
KLX	75,744 – 83,785	57
KXY	89,45 – 98,39	8
Auger L	5,58 – 11,48	5470

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,4}$	5034,29 (18)	0,0030 (5)
$\alpha_{0,3}$	5051,56 (17)	0,0076 (10)
$\alpha_{0,2}$	5161,32 (18)	0,0072 (8)
$\alpha_{0,1}$	5448,80 (15)	5,25 (5)
$\alpha_{0,0}$	5685,48 (15)	94,73 (5)

5 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Rn)	5,58 - 11,48	0,498 (16)
e_{AK}	(Rn)		0,0151 (19)
	KLL	62,017 - 68,885	}
	KLX	75,744 - 83,785	}
	KXY	89,45 - 98,39	}
$ec_{1,0\ K}$	(Rn)	142,590 (6)	0,46 (2)
$ec_{1,0\ L}$	(Rn)	222,938 - 226,376	0,50 (3)
$ec_{1,0\ M}$	(Rn)	236,51 - 240,98	0,18 (1)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Rn)	10,137 — 17,28		0,373 (16)	
$XK\alpha_2$	(Rn)	81,07		0,130 (3)	} Kα
$XK\alpha_1$	(Rn)	83,78		0,214 (4)	}
$XK\beta_3$	(Rn)	94,247	}		
$XK\beta_1$	(Rn)	94,868	}	0,0743 (18)	$K'\beta_1$
$XK\beta_5''$	(Rn)	95,449	}		
$XK\beta_2$	(Rn)	97,48	}		
$XK\beta_4$	(Rn)	97,853	}	0,0238 (7)	$K'\beta_2$
$XKO_{2,3}$	(Rn)	98,357	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Rn)	240,986 (6)	4,12 (4)
$\gamma_{2,1}$(Rn)	292,7 (1)	0,0063 (7)
$\gamma_{3,1}$(Rn)	404,45 (9)	0,0022 (5)
$\gamma_{4,1}$(Rn)	422,04 (10)	0,0030 (5)
$\gamma_{3,0}$(Rn)	645,44 (9)	0,0054 (9)

7 Main Production Modes

Ra − 226(p,t)Ra − 224
Th − 228(α)Ra − 224

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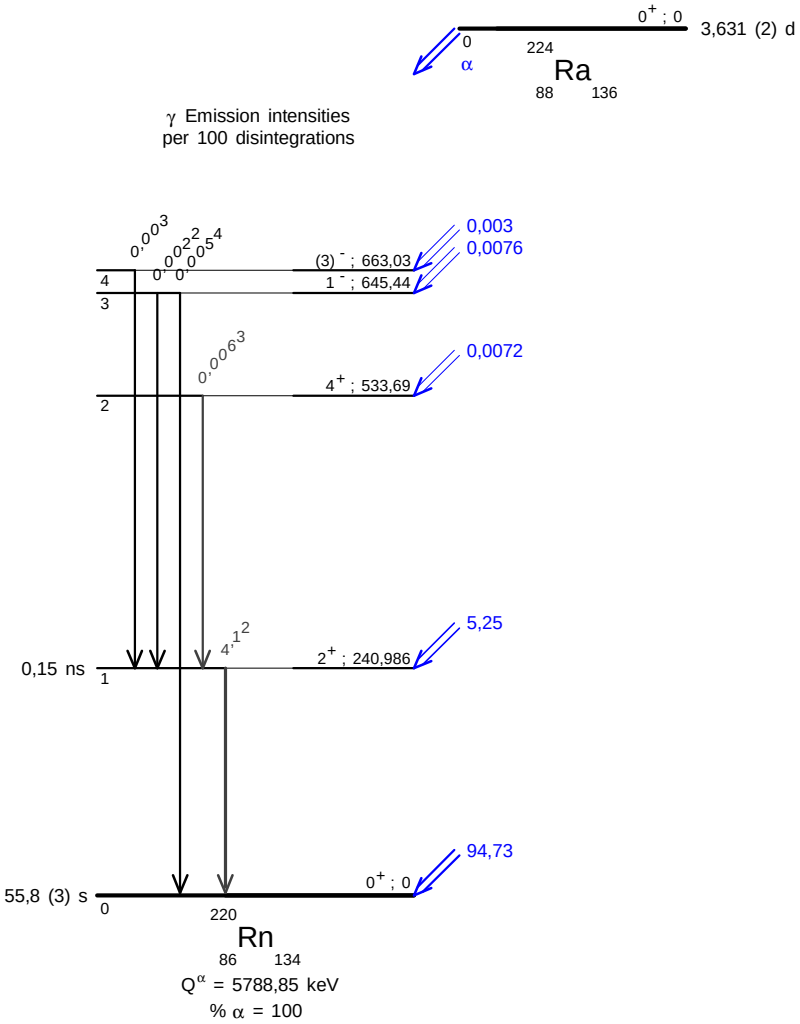
0+ ; 0
3,631 (2) d
0
α
224
Ra
88
136
γ Emission intensities
per 100 disintegrations
0,003
0,0076
(3)- ; 663,03
1- ; 645,44
4
3
0,0072
4+ ; 533,69
2
5,25
0,15 ns
2+ ; 240,986
1
94,73
55,8 (3) s
0+ ; 0
0
220
Rn
86
134
Qα = 5788,85 keV
% α = 100