



1    Decay Scheme

Ra-224 mainly decays by alpha emission to the fundamental and the 241 keV levels of Rn-220.  
*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

$T_{1/2} (^{224}\text{Ra})$  : 3,627 (7) d  
 $T_{1/2} (^{220}\text{Rn})$  : 55,8 (3) s  
 $Q^{\alpha} (^{224}\text{Ra})$  : 5788,87 (15) keV

2.1     $\alpha$  Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,4}$	5125,84 (25)	0,0030 (5)	7,42
$\alpha_{0,3}$	5143,43 (24)	0,0076 (14)	3,73
$\alpha_{0,2}$	5255,18 (25)	0,0074 (8)	17,4
$\alpha_{0,1}$	5547,88 (16)	5,26 (7)	1,03
$\alpha_{0,0}$	5788,87 (15)	94,72 (7)	1

2.2    Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	$\alpha_K$	$\alpha_L$	$\alpha_{M+}$	$\alpha_T$
$\gamma_{1,0}(\text{Rn})$	240,986 (6)	5,27 (7)	E2	0,111 (2)	0,124 (3)	0,045 (1)	0,280 (6)
$\gamma_{2,1}(\text{Rn})$	292,70 (11)	0,0073 (8)	E2	0,0730 (15)	0,057 (1)	0,0210 (4)	0,151 (3)
$\gamma_{3,1}(\text{Rn})$	404,5 (1)	0,0022 (5)	E1	0,0141 (3)	0,00240 (5)	0,00080 (2)	0,0173 (4)
$\gamma_{4,1}(\text{Rn})$	422,04 (11)	0,0030 (5)	[E1]	0,0129 (3)	0,00220 (4)	0,00070 (1)	0,0158 (3)
$\gamma_{3,0}(\text{Rn})$	645,44 (9)	0,0054 (9)	E1	0,0055 (1)	0,00090 (2)	0,00030 (1)	0,0067 (1)

3 Atomic Data

3.1 Rn

$\omega_K$

:

0,967

(4)

$\bar{\omega}_L$

:

0,428

(17)

$n_{KL}$

:

0,804

(5)

3.1.1 X Radiations

		Energy keV	Relative probability		
X <sub>K</sub>	K $\alpha_2$	81,07		60,5	
	K $\alpha_1$	83,78		100	
	K $\beta_3$	94,247	}	34,68	
	K $\beta_1$	94,868			}
	K $\beta_5''$	95,449			}
	K $\beta_2$	97,48	}	11	
	K $\beta_4$	97,853			}
	KO <sub>2,3</sub>	98,357			}
X <sub>L</sub>	L $\ell$	10,137			
	L $\alpha$	11,598 – 11,726			
	L $\eta$	12,855			
	L $\beta$	14,565 – 13,52			
	L $\gamma$	16,77 – 17,28			

3.1.2 Auger Electrons

		Energy keV	Relative probability
Auger K			
	KLL	62,02 – 68,89	100
	KLX	75,74 – 83,79	56
	KXY	89,45 – 98,39	8
Auger L		5,58 – 11,48	5840

## 4 $\alpha$ Emissions

	Energy keV	Probability $\times 100$
$\alpha_{0,4}$	5034,31 (25)	0,0030 (5)
$\alpha_{0,3}$	5051,58 (24)	0,0076 (14)
$\alpha_{0,2}$	5161,34 (25)	0,0074 (8)
$\alpha_{0,1}$	5448,81 (16)	5,26 (7)
$\alpha_{0,0}$	5685,50 (15)	94,72 (7)

## 5 Electron Emissions

		Energy keV	Electrons per 100 disint.
e <sub>AL</sub>	(Rn)	5,58 - 11,48	0,537 (9)
e <sub>AK</sub>	(Rn)		0,0151 (19)
	KLL	62,02 - 68,89	}
	KLX	75,74 - 83,79	}
	KXY	89,45 - 98,39	}
ec <sub>1,0</sub> K	(Rn)	142,590 (12)	0,46 (2)
ec <sub>1,0</sub> L	(Rn)	222,94 - 226,38	0,51 (2)
ec <sub>1,0</sub> M	(Rn)	236,51 - 240,76	0,18 (1)

## 6 Photon Emissions

### 6.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Rn)	10,137 — 17,28	0,387 (8)	
XK $\alpha_2$	(Rn)	81,07	0,130 (4)	} K $\alpha$
XK $\alpha_1$	(Rn)	83,78	0,215 (7)	
XK $\beta_3$	(Rn)	94,247	}	K' $\beta_1$
XK $\beta_1$	(Rn)	94,868	}	
XK $\beta_5''$	(Rn)	95,449	}	
XK $\beta_2$	(Rn)	97,48	}	
XK $\beta_4$	(Rn)	97,853	}	K' $\beta_2$
XKO <sub>2,3</sub>	(Rn)	98,357	}	

## 6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}(\text{Rn})$	240,986 (6)	4,12 (4)
$\gamma_{2,1}(\text{Rn})$	292,70 (11)	0,0063 (7)
$\gamma_{3,1}(\text{Rn})$	404,5 (1)	0,0022 (5)
$\gamma_{4,1}(\text{Rn})$	422,04 (11)	0,0030 (5)
$\gamma_{3,0}(\text{Rn})$	645,44 (9)	0,0054 (9)

## 7 Main Production Modes

Ra –  $^{226}\text{Ra}(\text{p,t})^{224}\text{Ra}$   
 Th –  $^{228}\text{Th}$   $\alpha$  decays

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