$^{211}_{85}$At $_{126}$

1 Decay Scheme

At-211 undergoes alpha decay to Bi-207 (41.78(8)%) and EC decay to Po-211 (58.22(8)%).
L'astate 211 se désintègre par capture électronique essentiellement vers le niveau fondamental du polonium 211 et par émissions alpha principalement vers le niveau fondamental du bismuth 207.

2 Nuclear Data

$T_{1/2}(^{211}\mathrm{At})$	:	7,216	(7)	h
$T_{1/2}(^{211}\mathrm{Po})$	:	0,516	(3)	s
$T_{1/2}(^{207}\mathrm{Bi})$	:	32,9	(14)	a
$Q^{\alpha}(^{211}\mathrm{At})$	:	5982,4	(13)	keV
$Q^{+}(^{211}\mathrm{At})$	:	785,4	(25)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,5}$	4990,0 (13)	< 0,00004	> 9,6
$\alpha_{0,3}$	5089,9 (13)	~ 0,0004	~ 3,8
$\alpha_{0,2}$	5239,7 (13)	0,0011 (2)	10,1
$\alpha_{0,1}$	5312,6 (13)	0,0039 (3)	7,3
$\alpha_{0,0}$	5982,4 (13)	41,78 (8)	1,59

2.2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_{M+}
$\epsilon_{0,1}$	98,2 (26)	0,258 (13)	1st Forbidden non-unique	5,77	0,015 (17)	0,684 (10)	0,301 (7)
$\epsilon_{0,0}$	785,4 (25)	57,96 (8)	1st forbidden non-unique	5,97	0,7731 (2)	0,1693 (1)	0,05758 (4)

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{3,2}$(Bi)	149,72 (10)	~ 0,0002	M1+13,8%E2	2,3 (3)	0,50 (4)	0,120 (12)	3,0 (3)
$\gamma_{3,1}$(Bi)	222,69 (10)	~ 0,00008	M1+13,8%E2	0,76 (5)	0,1473 (23)	0,0351 (5)	0,95 (5)
$\gamma_{1,0}$(Bi)	669,77 (7)	0,0040 (3)	[M1+5,9%E2]	0,0426 (8)	0,00725 (12)	0,00170 (3)	0,0520 (9)
$\gamma_{1,0}$(Po)	687,2 (7)	0,258 (13)	(M1+3,85%E2]	0,0437 (7)	0,00752 (12)	0,00177 (3)	0,0536 (9)
$\gamma_{2,0}$(Bi)	742,74 (7)	0,0013 (2)	[M1+8,3%E2]	0,0320 (6)	0,00544 (10)	0,001276 (22)	0,0391 (7)
$\gamma_{3,0}$(Bi)	892,46 (7)	~ 0,00014	[M1+66,2%E2]	0,0117 (11)	0,00215 (16)	0,00051 (4)	0,0145 (13)

3 Atomic Data

3.1 Po

ω_K : 0,965 (4)
$\bar{\omega}_L$: 0,403 (16)
n_{KL} : 0,807 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	76,864		60,1
	$K\alpha_1$	79,293		100
	$K\beta_3$	89,256	}	
	$K\beta_1$	89,807	}	
	$K\beta_5''$	90,363	}	34,4
	$K\beta_2$	92,263	}	
	$K\beta_4$	92,618	}	10,7
	$KO_{2,3}$	92,983	}	
X_L				
	$L\ell$	9,658		
	$L\alpha$	11,016 – 11,13		
	$L\eta$	12,085		
	$L\beta$	12,823 – 13,778		
	$L\gamma$	15,742 – 16,213		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	58,978 – 65,205	100
KLX	71,902 – 79,289	54,5
KXY	84,8 – 93,1	8
Auger L	5,434 – 10,934	2905

3.2 Bi

ω_K : 0,964 (4)
$\bar{\omega}_L$: 0,391 (16)
n_{KL} : 0,809 (5)

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	74,8157		59,8
	$K\alpha_1$	77,1088		100
	$K\beta_3$	86,835	}	
	$K\beta_1$	87,344	}	
	$K\beta_5''$	87,862	}	34,1
	$K\beta_2$	89,732	}	
	$K\beta_4$	90,074	}	10,4
	$KO_{2,3}$	90,421	}	
X_L				
	$L\ell$	9,42		
	$L\alpha$	10,731 – 10,839		
	$L\eta$	11,712		
	$L\beta$	12,48 – 13,393		
	$L\gamma$	15,248 – 15,709		

3.2.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	57,491 – 63,419	100
KLX	70,025 – 77,105	55,8
KXY	82,53 – 90,52	7,8
Auger L	5,35 – 10,66	2740

4 α Emissions

	Energy keV	alpha per 100 disint.
$\alpha_{0,5}$	4895,4 (13)	$<$ 0,00004
$\alpha_{0,3}$	4993,4 (13)	$\sim$ 0,0004
$\alpha_{0,2}$	5140,3 (13)	0,0011 (2)
$\alpha_{0,1}$	5211,9 (13)	0,0039 (3)
$\alpha_{0,0}$	5869,0 (13)	41,78 (8)

5 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Po)	5,434 - 10,934		27,6 (8)
e_{AK}	(Po)			1,57 (18)
	KLL	58,978 - 65,205	}	
	KLX	71,902 - 79,289	}	
	KXY	84,8 - 93,1	}	
e_{AL}	(Bi)	5,35 - 10,66		0,000211 (20)
e_{AK}	(Bi)			0,0000126 (24)
	KLL	57,491 - 63,419	}	
	KLX	70,025 - 77,105	}	
	KXY	82,53 - 90,52	}	

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9,658 — 16,213		18,6 (8)	
$XK\alpha_2$	(Po)	76,864		12,66 (9)	} $K\alpha$
$XK\alpha_1$	(Po)	79,293		21,08 (12)	}
$XK\beta_3$	(Po)	89,256	}		
$XK\beta_1$	(Po)	89,807	}	7,26 (12)	$K'\beta_1$
$XK\beta_5''$	(Po)	90,363	}		
$XK\beta_2$	(Po)	92,263	}		
$XK\beta_4$	(Po)	92,618	}	2,26 (5)	$K'\beta_2$
$XKO_{2,3}$	(Po)	92,983	}		
XL	(Bi)	9,42 — 15,709		0,000136 (14)	
$XK\alpha_2$	(Bi)	74,8157		0,000098 (15)	} $K\alpha$
$XK\alpha_1$	(Bi)	77,1088		0,000164 (25)	}
$XK\beta_3$	(Bi)	86,835	}		
$XK\beta_1$	(Bi)	87,344	}	0,000056 (9)	$K'\beta_1$
$XK\beta_5''$	(Bi)	87,862	}		
$XK\beta_2$	(Bi)	89,732	}		
$XK\beta_4$	(Bi)	90,074	}	0,000017 (3)	$K'\beta_2$
$XKO_{2,3}$	(Bi)	90,421	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{3,2}$(Bi)	149,72 (10)	~ 0,00005
$\gamma_{3,1}$(Bi)	222,69 (10)	~ 0,00004
$\gamma_{1,0}$(Bi)	669,77 (7)	0,0038 (3)
$\gamma_{1,0}$(Po)	687,2 (7)	0,245 (12)
$\gamma_{2,0}$(Bi)	742,74 (7)	0,00125 (19)
$\gamma_{3,0}$(Bi)	892,46 (7)	~ 0,00014

7 Main Production Modes

Bi – 209(α, 2n)At – 211

Bi – 209(He – 3, n)At – 211

$\left\{\begin{array}{l}\text{Bi} - 209(\text{Li} - 7,\ 5\text{n})\text{Rn} - 211 \\ \text{Rn} - 211(\text{EC})\text{At} - 211\end{array}\right.$

$\left\{\begin{array}{l}\text{Th} - 234(\text{p},\ \text{x})\text{Rn} - 211 \\ \text{Rn} - 211(\text{EC})\text{At} - 211\end{array}\right.$

Natural U(p, x)At – 211

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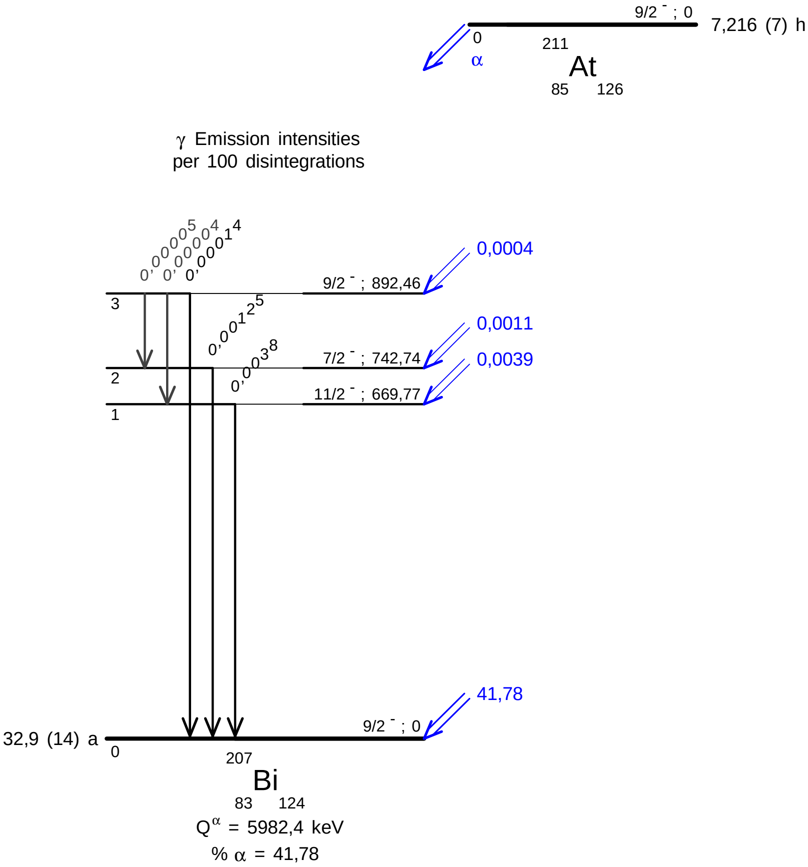
9/2 - ; 0
7,216 (7) h
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α
211
At
85 126
γ Emission intensities
per 100 disintegrations
0,00005
0,00004
0,00014
0,00125
0,0038
3
2
1
9/2 - ; 892,46
7/2 - ; 742,74
11/2 - ; 669,77
0,0004
0,0011
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9/2 - ; 0
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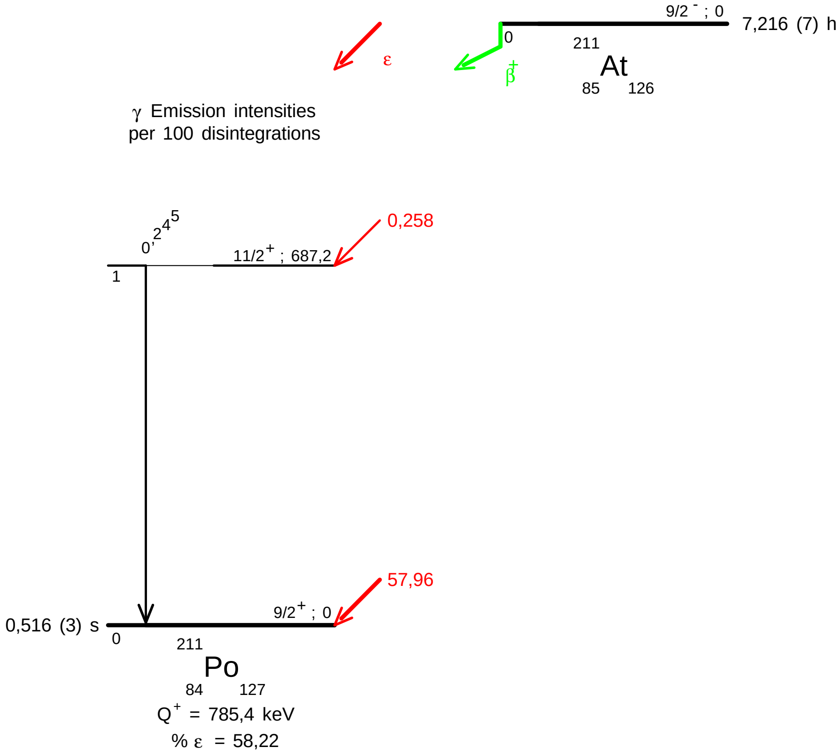
207
Bi
83 124
Q^α = 5982,4 keV
% α = 41,78


9/2 - ; 0
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γ Emission intensities
per 100 disintegrations
0,258
11/2+ ; 687,2
57,96
9/2+ ; 0
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84 127
Q+ = 785,4 keV
% ε = 58,22