$^{209}_{84}\mathrm{Po}_{125}$

1 Decay Scheme

Po-209 disintegrates by alpha emissions (99,546 (7) %) to excited levels and to the ground state level in Pb-205 and by electron capture (0,454 (7) %) to the excited level of 896,3 keV in Bi-209.
Le polonium 209 se désintègre par émission alpha (99,546 (7) %) vers des niveaux excités et le niveau fondamental du plomb 205 et par capture électronique (0,454 (7) %) vers le premier niveau excité du bismuth 209.

2 Nuclear Data

$T_{1/2}(^{209}\mathrm{Po})$	:	115	(13)	a
$T_{1/2}(^{209}\mathrm{Bi})$	:	1,9	(2)	10^{19} a
$T_{1/2}(^{205}\mathrm{Pb})$	:	17,3	(7)	10^{6} a
$Q^{\alpha}(^{209}\mathrm{Po})$	:	4979,2	(14)	keV
$Q^{+}(^{209}\mathrm{Po})$	:	1892,5	(16)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,2}$	4716,4 (14)	0,548 (7)	4,5
$\alpha_{0,1}$	4976,9 (14)	79,2 (32)	1,3
$\alpha_{0,0}$	4979,2 (14)	19,8 (32)	6

2.2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,1}$	996,2 (16)	0,454 (7)	Unique 2nd Forbidden	14,36	0,70796 (22)	0,21518 (16)	0,07686 (7)

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Pb)	2,328 (7)	79,6 (32)					
$\gamma_{2,1}$(Pb)	260,50 (5)	0,411 (6)	M1+E2	0,503 (12)	0,0874 (14)	0,0205 (3)	0,617 (13)
$\gamma_{2,0}$(Pb)	262,80 (5)	0,1370 (33)	M1 + 0,25 % E2	0,500 (9)	0,0857 (13)	0,0201 (3)	0,612 (10)
$\gamma_{1,0}$(Bi)	896,28 (6)	0,454 (7)	M1 + 27,8 % E2	0,0170 (5)	0,00292 (7)	0,000687 (16)	0,0208 (6)

3 Atomic Data

3.1 Bi

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

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	Kα_2	74,8157		59,77
	Kα_1	77,1088		100
	Kβ_3	86,835	}	
	Kβ_1	87,344	}	
	Kβ_5''	87,862	}	34,25
	Kβ_2	89,732	}	
	Kβ_4	90,074	}	10,48
	K$O_{2,3}$	90,421	}	

		Energy keV	Relative probability
X_L			
	Lℓ	9,4207	
	Lα	10,7308 – 10,8387	
	Lη	11,7127	
	Lβ	12,4814 – 13,8066	
	Lγ	14,7735 – 15,7084	

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	57,491 – 63,419	100
KLX	70,025 – 77,105	56
KXY	82,53 – 90,52	7,84
Auger L	5,42 – 16,34	

3.2 Pb

ω_K : 0,963 (4)
$\bar{\omega}_L$: 0,379 (15)
n_{KL} : 0,811 (5)

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	Kα_2	72,8049		59,5
	Kα_1	74,97		100
	Kβ_3	84,451	}	
	Kβ_1	84,937	}	
	Kβ_5''	85,47	}	34,2
	Kβ_2	87,238	}	
	Kβ_4	87,58	}	10,3
	$KO_{2,3}$	87,911	}	
X_L				
	Lℓ	9,186		
	Lα	10,4495 – 10,5512		
	Lη	11,3495		
	Lβ	12,1443 – 12,7953		
	Lγ	14,3078 – 15,2169		

3.2.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	56,028 – 61,669	100
KLX	68,181 – 74,969	55,8
KXY	80,3 – 88,0	7,78
Auger L	5,33 – 15,82	

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,2}$	4622 (5)	0,548 (7)
$\alpha_{0,1}$	4883 (2)	79,2 (32)
$\alpha_{0,0}$	4885 (2)	19,8 (32)

5 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Bi)	5,42 - 16,34	0,2240 (27)
e_{AK}	(Bi)		0,0118 (14)
	KLL	57,491 - 63,419	}
	KLX	70,025 - 77,105	}
	KXY	82,53 - 90,52	}
e_{AL}	(Pb)	5,33 - 15,82	0,1044 (14)
e_{AK}	(Pb)		0,0063 (7)
	KLL	56,028 - 61,669	}
	KLX	68,181 - 74,969	}
	KXY	80,3 - 88,0	}
$ec_{2,1\ K}$	(Pb)	172,5 (1)	0,1278 (34)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Bi)	9,4207 — 15,7084		0,1411 (24)	
XKα_2	(Bi)	74,8157		0,0927 (16)	} Kα
XKα_1	(Bi)	77,1088		0,1551 (25)	}
XKβ_3	(Bi)	86,835	}		
XKβ_1	(Bi)	87,344	}	0,0531 (12)	K$'\beta_1$
XKβ''_5	(Bi)	87,862	}		
XKβ_2	(Bi)	89,732	}		
XKβ_4	(Bi)	90,074	}	0,0163 (5)	K$'\beta_2$
XKO$_{2,3}$	(Bi)	90,421	}		
XL	(Pb)	9,186 — 15,2169		0,0631 (13)	
XKα_2	(Pb)	72,8049		0,0478 (11)	} Kα
XKα_1	(Pb)	74,97		0,0804 (18)	}
XKβ_3	(Pb)	84,451	}		
XKβ_1	(Pb)	84,937	}	0,0275 (8)	K$'\beta_1$
XKβ''_5	(Pb)	85,47	}		
XKβ_2	(Pb)	87,238	}		
XKβ_4	(Pb)	87,58	}	0,00830 (26)	K$'\beta_2$
XKO$_{2,3}$	(Pb)	87,911	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{2,1}$(Pb)	260,50 (5)	0,254 (3)
$\gamma_{2,0}$(Pb)	262,80 (5)	0,085 (2)
$\gamma_{1,0}$(Bi)	896,28 (6)	0,445 (7)

7 Main Production Modes

Bi − 209(d,2n)Po − 209
Bi − 209(p,n)Po − 209
Possible impurities : Po − 208

8 References

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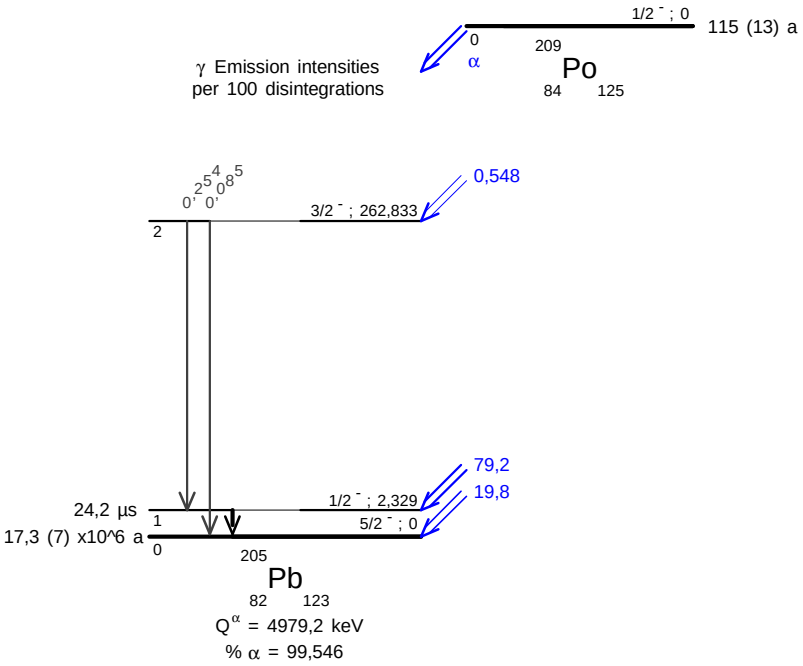
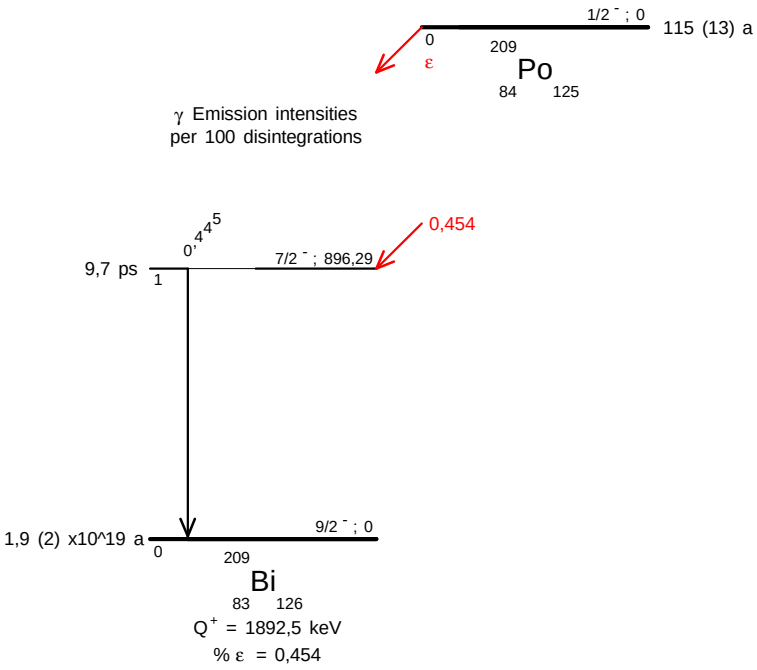

1/2 - ; 0
115 (13) a
0
α
209
Po
84
125
γ Emission intensities
per 100 disintegrations
0,548
3/2 - ; 262,833
2
79,2
19,8
1/2 - ; 2,329
24,2 µs
1
5/2 - ; 0
17,3 (7) x10^6 a
0
205
Pb
82
123
Q^α = 4979,2 keV
% α = 99,546


1/2 - ; 0
115 (13) a
0
ε
209
Po
84
125
γ Emission intensities
per 100 disintegrations
0,454
0+
4
4
5
9,7 ps
1
7/2 - ; 896,29
1,9 (2) x10^19 a
0
9/2 - ; 0
209
Bi
83
126
Q+ = 1892,5 keV
% ε = 0,454