$^{212}_{83}\mathrm{Bi}_{129}$

1 Decay Scheme

Bi-212 undergoes beta decay to Po-212 (64.07(7)%), and alpha decay to Tl-208 (35.93(7)%). 0.014(1)% of the beta branch undergoes prompt long-range alpha decay to Pb-208.
Le bismuth 212 se désintègre à 64,07 (7) % par émission β^- vers le polonium 212 et à 35,93 (7) % par émission α vers le thallium 208. Il existe une faible émission d'alpha de long parcours vers le plomb 208.

2 Nuclear Data

$T_{1/2}(^{212}\mathrm{Bi})$	:	60,54	(6)	min
$T_{1/2}(^{212}\mathrm{Po})$	:	300	(2)	10^{-9} s
$T_{1/2}(^{208}\mathrm{Tl})$	:	3,058	(6)	min
$Q^-(^{212}\mathrm{Bi})$	:	2252,1	(17)	keV
$Q^\alpha(^{212}\mathrm{Bi})$	:	6207,26	(3)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,8}$	5404 (2)	0,000040 (4)	20300
$\alpha_{0,7}$	5447 (2)	0,00036 (3)	3770
$\alpha_{0,6}$	5586,9 (3)	0,0050 (4)	1380
$\alpha_{0,4}$	5714,42 (5)	0,43 (3)	67
$\alpha_{0,3}$	5733,9 (4)	0,060 (3)	595
$\alpha_{0,2}$	5879,22 (6)	0,61 (3)	279
$\alpha_{0,1}$	6167,40 (3)	25,1 (1)	126
$\alpha_{0,0}$	6207,26 (3)	9,7 (1)	481
$^*\alpha_{1,0}$	9681,45 (11)	0,0024 (2)	
$^*\alpha_{4,0}$	10633,57 (11)	0,0010 (1)	
$^*\alpha_{5,0}$	10755,0 (2)	0,0106 (7)	

* Long range α transition.

2.2 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,6}$	446,1 (17)	0,68 (4)	1st forbidden non-unique	6,67
$\beta^-_{0,5}$	451,2 (17)	0,032 (4)	1st forbidden non-unique	8,03
$\beta^-_{0,4}$	572,7 (17)	0,21 (4)	1st forbidden non-unique	7,55
$\beta^-_{0,3}$	631,4 (17)	1,90 (3)	1st forbidden non-unique	6,74
$\beta^-_{0,2}$	739,4 (17)	1,44 (1)	1st forbidden non-unique	7,094
$\beta^-_{0,1}$	1524,8 (17)	4,50 (6)	1st forbidden non-unique	7,718
$\beta^-_{0,0}$	2252,1 (17)	55,31 (9)	1st forbidden non-unique	7,267

2.3 Gamma Transitions and Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T	α_π (10^{-4})
$\gamma_{1,0}$(Tl)	39,858 (4)	26,0 (3)	[M1]		17,81 (25)	4,17 (6)	23,3 (4)	
$\gamma_{4,2}$(Tl)	164,80 (6)	0,010 (1)	(E2)	0,263 (4)	0,413 (6)	0,1078 (16)	0,816 (12)	
$\gamma_{5,3}$(Po)	180,2 (2)	0,0095 (40)	M1	1,692 (25)	0,298 (5)	0,0704 (10)	2,08 (3)	
$\gamma_{2,1}$(Tl)	288,18 (5)	0,46 (3)	M1+0,64%E2	0,357 (5)	0,0605 (9)	0,01411 (20)	0,436 (7)	
$\gamma_{2,0}$(Tl)	328,04 (5)	0,158 (4)	[M1]	0,252 (4)	0,0425 (6)	0,00991 (14)	0,308 (5)	
$\gamma_{3,1}$(Tl)	433,5 (4)	0,013 (1)	[M1]	0,1193 (17)	0,0199 (3)	0,00465 (7)	0,1453 (21)	
$\gamma_{4,1}$(Tl)	452,98 (4)	0,38 (3)	(M1)	0,1061 (15)	0,01772 (25)	0,00413 (6)	0,1293 (18)	
$\gamma_{3,0}$(Tl)	473,4 (4)	0,047 (3)	[M1+E2]	0,059 (8)	0,0115 (10)	0,00273 (21)	0,074 (10)	
$\gamma_{4,0}$(Tl)	492,84 (4)	0,04 (1)	E2	0,0207 (3)	0,00633 (9)	0,001567 (22)	0,0291 (4)	
$\gamma_{6,1}$(Tl)	580,5 (3)	0,0011 (2)	E2	0,01470 (21)	0,00388 (6)	0,000950 (14)	0,0198 (3)	
$\gamma_{6,0}$(Tl)	620,4 (3)	0,0039 (4)	[M1+E2]	0,030 (4)	0,0054 (5)	0,00129 (12)	0,037 (5)	
$\gamma_{1,0}$(Po)	727,33 (1)	6,74 (4)	E2	0,01054 (15)	0,00257 (4)	0,000628 (9)	0,01393 (20)	
$\gamma_{2,1}$(Po)	785,37 (9)	1,15 (1)	M1+0,8%E2	0,0316 (5)	0,00539 (8)	0,001266 (18)	0,0387 (6)	
$\gamma_{3,1}$(Po)	893,41 (2)	0,39 (1)	M1+0,2%E2	0,0227 (4)	0,00386 (6)	0,000906 (13)	0,0278 (4)	
$\gamma_{4,1}$(Po)	952,12 (2)	0,14 (4)	M1+30%E2	0,01548 (22)	0,00269 (4)	0,000634 (9)	0,0190 (3)	
$\gamma_{5,1}$(Po)	1073,6 (2)	0,0155 (6)	E2	0,00510 (8)	0,001002 (14)	0,000240 (4)	0,00642 (9)	
$\gamma_{6,1}$(Po)	1078,63 (10)	0,559 (20)	M1+1,8%E2	0,01386 (20)	0,00234 (4)	0,000549 (8)	0,01692 (24)	
$\gamma_{2,0}$(Po)	1512,70 (8)	0,291 (10)	E2	0,00274 (4)	0,000483 (7)	0,0001139 (16)	0,00344 (5)	0,663 (10)
$\gamma_{3,0}$(Po)	1620,738 (10)	1,52 (3)	[M1]	0,00494 (7)	0,000824 (12)	0,000193 (3)	0,00620 (9)	1,85 (3)
$\gamma_{4,0}$(Po)	1679,450 (14)	0,07 (1)	E2	0,00227 (4)	0,000391 (6)	0,0000920 (13)	0,00291 (4)	1,252 (18)
$\gamma_{5,0}$(Po)	1800,9 (2)	0,0041 (4)	E0					
$\gamma_{6,0}$(Po)	1805,96 (10)	0,12 (3)	E2	0,00200 (3)	0,000338 (5)	0,0000794 (12)	0,00261 (4)	1,758 (25)

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
	$K\alpha_1$	79,293		100
	$K\beta_3$	89,256	}	
	$K\beta_1$	89,807	}	
	$K\beta_5''$	90,363	}	34,5
	$K\beta_2$	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	57
KXY	84,8 – 93,1	7,9
Auger L	5,434 – 10,934	2870

3.2 Tl

ω_K	:	0,963	(4)
$\bar{\omega}_L$	:	0,367	(15)
n_{KL}	:	0,812	(5)

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	70,8325		59
	$K\alpha_1$	72,8725		100
	$K\beta_3$	82,118	}	
	$K\beta_1$	82,577	}	
	$K\beta_5''$	83,115	}	33,8
	$K\beta_2$	84,838	}	
	$K\beta_4$	85,134	}	10
	$KO_{2,3}$	85,444	}	
X_L				
	$L\ell$	8,953		
	$L\alpha$	10,172 – 10,268		
	$L\eta$	10,994		
	$L\beta$	11,812 – 12,643		
	$L\gamma$	14,291 – 14,738		

3.2.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	54,587 – 59,954	100
KLX	66,37 – 72,86	57
KXY	78,12 – 85,50	7,9
Auger L	5,182 – 10,132	290500

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,8}$	5302 (2)	0,000040 (4)
$\alpha_{0,7}$	5344 (2)	0,00036 (3)
$\alpha_{0,6}$	5481,4 (3)	0,0050 (4)
$\alpha_{0,4}$	5606,60 (5)	0,43 (3)
$\alpha_{0,3}$	5625,7 (4)	0,060 (3)
$\alpha_{0,2}$	5768,29 (6)	0,61 (3)
$\alpha_{0,1}$	6051,04 (3)	25,1 (1)
$\alpha_{0,0}$	6090,14 (3)	9,7 (1)
$^*\alpha_{1,0}$	9498,78 (11)	0,0024 (2)
$^*\alpha_{4,0}$	10432,94 (11)	0,0010 (1)
$^*\alpha_{5,0}$	10552,1 (2)	0,0106 (7)

* Long range α emission.

5 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Po)	5,434 - 10,934	0,0833 (25)
e_{AK}	(Po)		0,0048 (6)
	KLL	58,978 - 65,205	}
	KLX	71,902 - 79,289	}
	KXY	84,8 - 93,1	}
e_{AL}	(Tl)	5,182 - 10,132	12,2 (4)
e_{AK}	(Tl)		0,0069 (8)
	KLL	54,587 - 59,954	}
	KLX	66,37 - 72,86	}
	KXY	78,12 - 85,50	}
$ec_{1,0\ L}$	(Tl)	24,511 - 27,200	19,06 (23)
$ec_{1,0\ M}$	(Tl)	36,154 - 39,469	4,46 (5)
$\beta^-_{0,6}$	max:	446,1 (17)	0,68 (4)
$\beta^-_{0,6}$	avg:	130,1 (6)	
$\beta^-_{0,5}$	max:	451,2 (17)	0,032 (4)
$\beta^-_{0,5}$	avg:	131,7 (6)	
$\beta^-_{0,4}$	max:	572,7 (17)	0,21 (4)
$\beta^-_{0,4}$	avg:	172,4 (6)	

		Energy keV		Electrons per 100 disint.
$\beta^-_{0,3}$	max:	631,4	(17)	1,90 (3)
$\beta^-_{0,3}$	avg:	192,7	(6)	
$\beta^-_{0,2}$	max:	739,4	(17)	1,44 (1)
$\beta^-_{0,2}$	avg:	230,8	(6)	
$\beta^-_{0,1}$	max:	1524,8	(17)	4,50 (6)
$\beta^-_{0,1}$	avg:	533,1	(7)	
$\beta^-_{0,0}$	max:	2252,1	(17)	55,31 (9)
$\beta^-_{0,0}$	avg:	834,2	(7)	

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9,658 — 16,213		0,0563 (24)	
XKα_2	(Po)	76,864		0,0388 (8)	} Kα
XKα_1	(Po)	79,293		0,0647 (13)	}
XKβ_3	(Po)	89,256	}		
XKβ_1	(Po)	89,807	}	0,0223 (6)	K$'\beta_1$
XKβ''_5	(Po)	90,363	}		
XKβ_2	(Po)	92,263	}		
XKβ_4	(Po)	92,618	}	0,00693 (20)	K$'\beta_2$
XKO$_{2,3}$	(Po)	92,983	}		
XL	(Tl)	8,953 — 14,738		7,1 (3)	
XKα_2	(Tl)	70,8325		0,0525 (23)	} Kα
XKα_1	(Tl)	72,8725		0,089 (4)	}
XKβ_3	(Tl)	82,118	}		
XKβ_1	(Tl)	82,577	}	0,0301 (14)	K$'\beta_1$
XKβ''_5	(Tl)	83,115	}		
XKβ_2	(Tl)	84,838	}		
XKβ_4	(Tl)	85,134	}	0,0089 (5)	K$'\beta_2$
XKO$_{2,3}$	(Tl)	85,444	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Tl)	39,858 (4)	1,07 (1)
$\gamma_{4,2}$(Tl)	164,80 (6)	0,0055 (6)
$\gamma_{5,3}$(Po)	180,2 (2)	0,0031 (12)
$\gamma_{2,1}$(Tl)	288,18 (5)	0,32 (2)
$\gamma_{2,0}$(Tl)	328,04 (5)	0,121 (3)
$\gamma_{3,1}$(Tl)	433,5 (4)	0,011 (1)
$\gamma_{4,1}$(Tl)	452,98 (4)	0,34 (3)
$\gamma_{3,0}$(Tl)	473,4 (4)	0,044 (3)
$\gamma_{4,0}$(Tl)	492,84 (4)	0,039 (10)
$\gamma_{6,1}$(Tl)	580,5 (3)	0,0011 (2)
$\gamma_{6,0}$(Tl)	620,4 (3)	0,0038 (4)
$\gamma_{1,0}$(Po)	727,330 (9)	6,65 (4)
$\gamma_{2,1}$(Po)	785,37 (9)	1,11 (1)
$\gamma_{3,1}$(Po)	893,408 (14)	0,38 (1)
$\gamma_{4,1}$(Po)	952,12 (2)	0,14 (4)
$\gamma_{5,1}$(Po)	1073,6 (2)	0,0154 (6)
$\gamma_{6,1}$(Po)	1078,63 (10)	0,55 (2)
$\gamma_{2,0}$(Po)	1512,70 (8)	0,29 (1)
$\gamma_{3,0}$(Po)	1620,738 (10)	1,51 (3)
$\gamma_{4,0}$(Po)	1679,450 (14)	0,07 (1)
$\gamma_{6,0}$(Po)	1805,96 (10)	0,12 (3)

7 Main Production Modes

Pb – 212(β^-)Bi – 212

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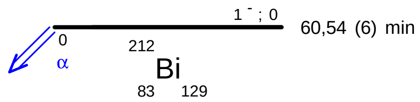
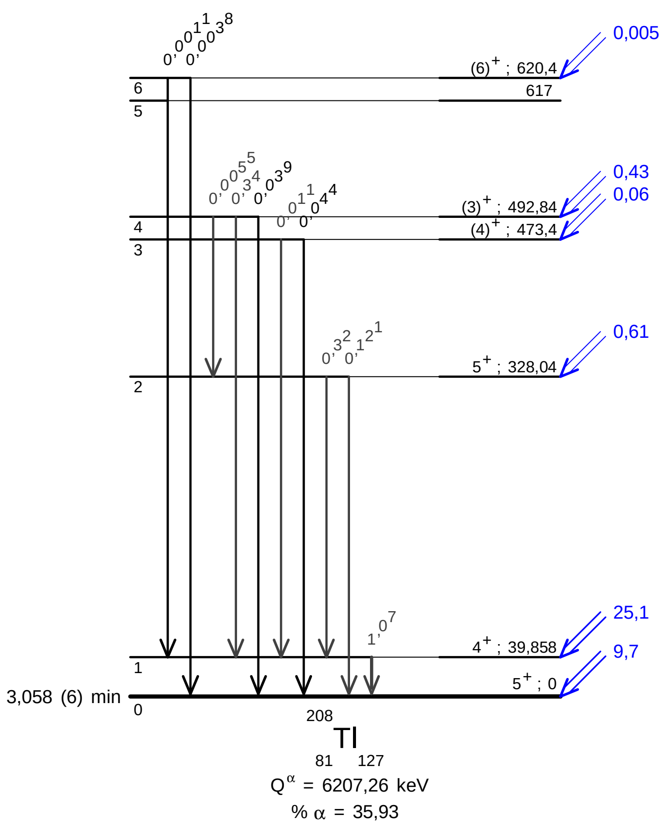
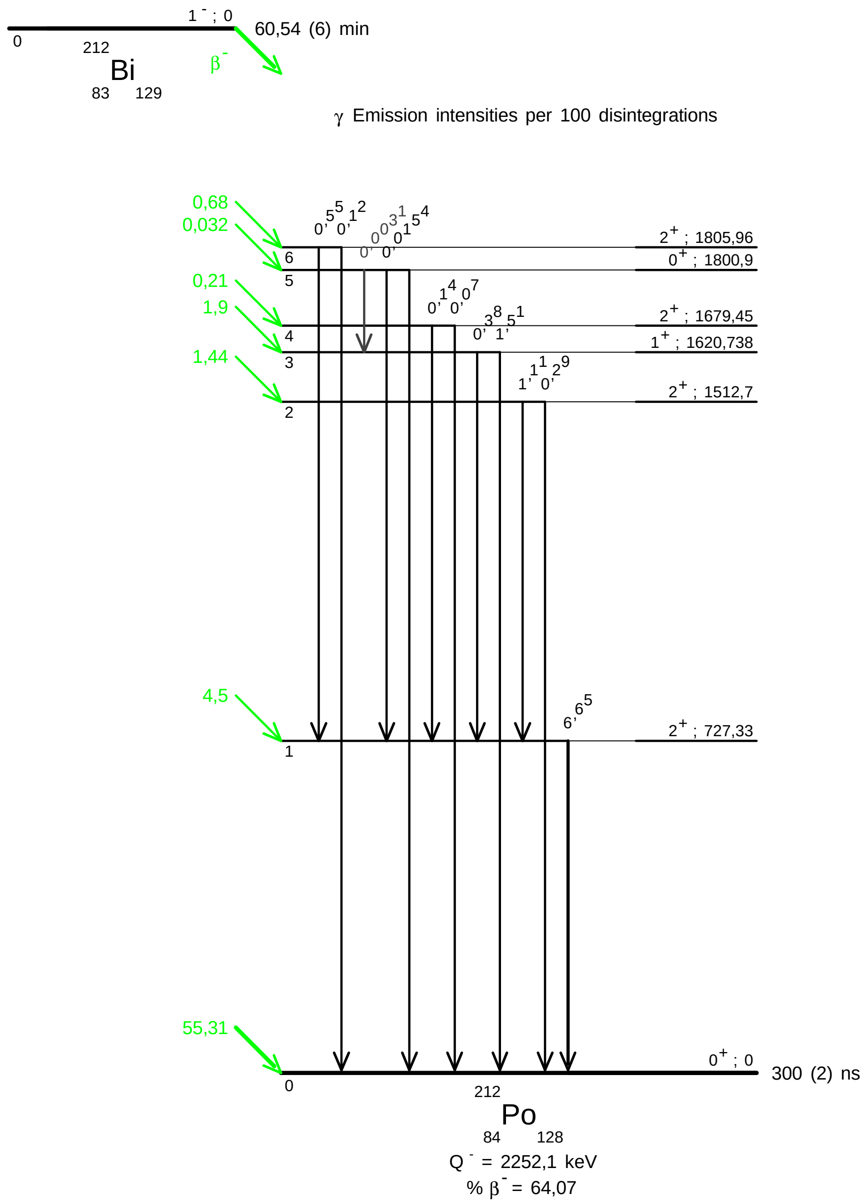

1 - ; 0
60,54 (6) min
0
α
212
Bi
83 129


γ Emission intensities per 100 disintegrations
0,005
0,43
0,06
0,61
25,1
9,7
(6)+ ; 620,4
617
(3)+ ; 492,84
(4)+ ; 473,4
5+ ; 328,04
4+ ; 39,858
5+ ; 0
3,058 (6) min
208
Tl
81 127
Qα = 6207,26 keV
% α = 35,93


1 - ; 0
60,54 (6) min
212
Bi
83 129
β-
γ Emission intensities per 100 disintegrations
0,68
0,032
0,21
1,9
1,44
4,5
55,31
2+ ; 1805,96
0+ ; 1800,9
2+ ; 1679,45
1+ ; 1620,738
2+ ; 1512,7
2+ ; 727,33
0+ ; 0
300 (2) ns
212
Po
84 128
Q - = 2252,1 keV
% β- = 64,07