1 Half-life, Q-value and Decay mode

$T_{1/2}$	:	21.772	(3)	y
Q_α	:	5042.19	(14)	keV
Q_{β^-}	:	44.8	(8)	keV
β^-	:	98.620	(4)	%
α	:	1.380	(4)	%

2 β^- Transitions

	Energy keV	Probability × 100	Nature	log ft
$\beta^-_{0,3}$	6.9 (8)	0.3	Allowed	6.9
$\beta^-_{0,2}$	20.5 (8)	10	1st forbidden	6.8
$\beta^-_{0,1}$	35.5 (8)	35	1st forbidden	7
$\beta^-_{0,0}$	44.8 (8)	53	1st forbidden	7.1

3 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,24}$	4362.83 (15)	0.00004
$\alpha_{0,23}$	4422.03 (28)	0.00008
$\alpha_{0,22}$	4447.12 (26)	0.0007
$\alpha_{0,21}$	4459 (7)	0.00007
$\alpha_{0,20}$	4512 (5)	0.00004
$\alpha_{0,19}$	4581 (7)	0.00004
$\alpha_{0,18}$	4594.21 (17)	0.0003
$\alpha_{0,16}$	4712.89 (20)	
$\alpha_{0,15}$	4713.68 (19)	
$\alpha_{0,14}$	4714.88 (15)	0.006 (3)
$\alpha_{0,13}$	4734.41 (17)	
$\alpha_{0,12}$	4737.50 (16)	0.0012
$\alpha_{0,11}$	4767.47 (15)	
$\alpha_{0,10}$	4769.35 (17)	0.025 (7)
$\alpha_{0,9}$	4784.19 (15)	0.0011
$\alpha_{0,8}$	4795.58 (15)	0.014 (7)
$\alpha_{0,6}$	4821.09 (15)	0.001
$\alpha_{0,5}$	4854.01 (15)	
$\alpha_{0,4}$	4855.36 (15)	0.08 (1)
$\alpha_{0,3}$	4872.55 (15)	0.087 (7)
$\alpha_{0,2}$	4899.23 (15)	0.0015
$\alpha_{0,1}$	4940.57 (15)	0.546 (17)
$\alpha_{0,0}$	4953.23 (14)	0.658 (14)

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4 Electron Emissions

		Energy keV	Electrons per 100 disint.	Energy keV
e_{AL}	(Th)	5.8 - 20.3	3.9	
e_{AL}	(Fr)	5.73 - 18.52	0.097 (10)	
e_{AK}	(Fr)		0.00050 (15)	
	KLL	63.576 - 70.787	}	
	KLX	77.720 - 86.101	}	
	KXY	91.84 - 101.12	}	
$ec_{2,0}$ L	(Th)	3.9 - 8.0	7.1	
$ec_{1,0}$ M	(Th)	4.1 - 6.0	27	
$ec_{3,1}$ L	(Th)	8.1 - 12.3	0.1016 (21)	
$ec_{2,1}$ M	(Th)	10.0 - 11.9	0.11	
$ec_{3,0}$ L	(Th)	17.4 - 21.6	0.0568 (15)	
$ec_{2,0}$ M	(Th)	19.2 - 21.0	1.8	
$ec_{3,1}$ M	(Th)	23.39 - 25.24	0.0259 (5)	
$ec_{3,0}$ M	(Th)	32.7 - 34.6	0.01411 (29)	
$ec_{1,0}$ M	(Fr)	8.3 - 9.9	0.528 (11)	
$ec_{4,2}$ L	(Fr)	26.1 - 29.7	0.018 (17)	
$ec_{3,1}$ L	(Fr)	50.65 - 54.26	0.053 (10)	
$ec_{3,0}$ L	(Fr)	63.6 - 67.2	0.0135 (16)	
$ec_{3,1}$ M	(Fr)	64.64 - 66.29	0.0140 (27)	
$ec_{4,1}$ L	(Fr)	68.1 - 71.7	0.022 (14)	
$ec_{4,0}$ L	(Fr)	81.0 - 84.6	0.022 (12)	
$\beta^-_{0,3}$	max:	6.9 (8)	0.3	avg: 1.7 (3)
$\beta^-_{0,2}$	max:	20.5 (8)	10	avg: 5.1 (3)
$\beta^-_{0,1}$	max:	35.5 (8)	35	avg: 9.0 (3)
$\beta^-_{0,0}$	max:	44.8 (8)	53	avg: 11.4 (3)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Th)	11.118 — 19.599	2.64	
XL	(Fr)	10.381 — 17.839	0.074 (8)	
XKα_2	(Fr)	83.23	0.0043 (12)	} Kα
XKα_1	(Fr)	86.1	0.0070 (19)	}
XKβ_3	(Fr)	96.815	}	
XKβ_1	(Fr)	97.474	} 0.0024 (7)	Kβ'_1
XKβ''_5	(Fr)	98.069	}	

		Energy keV		Photons per 100 disint.	
$XK\beta_2$	(Fr)	100.16	}		
$XK\beta_4$	(Fr)	100.548	}	0.00079 (22)	$K\beta'_2$
$XKO_{2,3}$	(Fr)	100.972	}		

5.2 Gamma Transitions and Emissions

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{1,0}$(Th)	9.3	36	E2	326000	0.00011
$\gamma_{1,0}$(Fr)	12.9 (1)	0.698	(E2)	49860 (1000)	0.000014
$\gamma_{2,1}$(Th)	15.2 (1)	0.15	M1	238 (5)	0.00063
$\gamma_{2,0}$(Th)	24.33 (5)	9.5	M1+E2	340 (11)	0.028
$\gamma_{8,6}$(Fr)	25.95	0.00000055			0.00000055
$\gamma_{3,1}$(Th)	28.57 (5)	0.18	E1	3.24 (7)	0.042
$\gamma_{6,5}$(Fr)	33.5 (1)	0.00033 (9)	[E1]	1.99 (4)	0.00011 (3)
$\gamma_{6,4}$(Fr)	35.0 (2)	0.000078 (28)	[E1]	1.77 (4)	0.000028 (10)
$\gamma_{3,0}$(Th)	37.90 (3)	0.12	E1	1.54 (3)	0.049
$\gamma_{4,2}$(Fr)	44.7 (1)	0.025 (23)	[M1+E2]	223 (200)	0.00011 (3)
$\gamma_{13,9}$(Fr)	51.06	0.00000028			0.00000028
$\gamma_{10,6}$(Fr)	52.32	0.0000014			0.0000014
$\gamma_{14,11}$(Fr)	53.7 (2)	0.000064 (16)	[E1]	0.563 (11)	0.000041 (10)
$\gamma_{2,0}$(Fr)	55.0 (1)	0.0077 (14)	M1+E2	16.4 (8)	0.00044 (8)
$\gamma_{16,11}$(Fr)	55.80 (5)	0.0000039			0.0000039
$\gamma_{16,10}$(Fr)	57.56 (5)	0.0000032			0.0000032
$\gamma_{8,5}$(Fr)	59.4 (2)	0.000059 (14)	[E1]	0.430 (9)	0.000041 (10)
$\gamma_{8,4}$(Fr)	60.6 (3)	0.000058 (14)	[E1]	0.408 (9)	0.000041 (10)
$\gamma_{3,1}$(Fr)	69.28 (8)	0.076 (14)	M1+E2	18.4 (19)	0.0039 (6)
$\gamma_{14,10}$(Fr)	70.6 (2)	0.0023 (18)	[M1+E2]	27 (19)	0.000083 (30)
$\gamma_{16,9}$(Fr)	72.5 (2)	0.000086 (38)	[E1]	0.252 (5)	0.000069 (30)
$\gamma_{9,4}$(Fr)	72.5 (2)	0.000086 (38)	[E1]	0.252 (5)	0.000069 (30)
$\gamma_{6,2}$(Fr)	79.54 (8)	0.00132 (12)	E1	0.197 (4)	0.0011 (1)
$\gamma_{3,0}$(Fr)	82.2 (1)	0.0192 (23)	E2	22.1 (5)	0.00083 (10)
$\gamma_{15,8}$(Fr)	83.0 (1)	0.0000014			0.0000014
$\gamma_{12,6}$(Fr)	85.0 (5)	0.000011			0.000011
$\gamma_{10,5}$(Fr)	86.1 (1)	0.00047			0.00047
$\gamma_{4,1}$(Fr)	86.7 (2)	0.034 (20)	[M1+E2]	11 (7)	0.0028 (4)
$\gamma_{5,1}$(Fr)	88.1 (1)	0.0076 (43)	[M1+E2]	10 (6)	0.00069 (10)
$\gamma_{11,5}$(Fr)	88.1 (1)	0.0076 (43)	[M1+E2]	10 (6)	0.00069 (10)
$\gamma_{13,6}$(Fr)	88.5 (6)	0.00000097			0.00000097
$\gamma_{9,3}$(Fr)	90.0 (1)	0.00021 (8)	[E1]	0.142 (3)	0.00018 (7)
$\gamma_{4,0}$(Fr)	99.6 (1)	0.036 (16)	M1+E2	6 (3)	0.0051 (7)
$\gamma_{5,0}$(Fr)	101.0 (1)	0.0048 (29)	[M1+E2]	6 (3)	0.00069 (30)
$\gamma_{10,3}$(Fr)	105.0 (2)	0.0046 (16)	M1	12.4 (25)	0.00034 (10)
$\gamma_{11,3}$(Fr)	106.85 (10)	0.0110 (34)	M(+E2)	9 (3)	0.0011 (1)
$\gamma_{14,6}$(Fr)	108.0 (3)	0.00041 (16)	[M1+E2]	9 (3)	0.000041 (10)
$\gamma_{12,5}$(Fr)	118.7 (4)	0.000054 (13)	[E1]	0.312 (6)	0.000041 (10)
$\gamma_{18,15}$(Fr)	121.6 (1)	0.00155 (39)	[E1]	0.295 (6)	0.0012 (3)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_T	P_γ × 100
$\gamma_{6,1}$(Fr)	121.6 (1)	0.00155 (39)	[E1]	0.295 (6)	0.0012 (3)
$\gamma_{6,0}$(Fr)	134.5 (1)	0.00068 (12)	E1	0.230 (5)	0.00055 (10)
$\gamma_{12,3}$(Fr)	137.4 (1)	0.00050 (12)	[E1]	0.220 (5)	0.00041 (10)
$\gamma_{13,3}$(Fr)	140.9 (1)	0.00025 (7)	[E1]	0.206 (4)	0.00021 (6)
$\gamma_{14,4}$(Fr)	143.0 (1)	0.00034 (7)	[E1]	0.198 (4)	0.00028 (6)
$\gamma_{18,13}$(Fr)	143.0 (1)	0.0013 (6)	[M1+E2]	3.6 (18)	0.00028 (6)
$\gamma_{16,5}$(Fr)	143.65 (5)	0.00015886	M1	5.11 (11)	0.000026
$\gamma_{18,12}$(Fr)	146.0 (2)	0.0000088			0.0000088
$\gamma_{8,1}$(Fr)	147.61 (8)	0.00296 (36)	E1	0.184 (4)	0.0025 (3)
$\gamma_{7,0}$(Fr)	149.3 (3)	0.000014			0.000014
$\gamma_{9,1}$(Fr)	159.2 (1)	0.00063 (12)	[E1]	0.153 (3)	0.00055 (10)
$\gamma_{8,0}$(Fr)	160.49 (10)	0.00506 (46)	E1	0.150 (3)	0.0044 (4)
$\gamma_{15,3}$(Fr)	161.4 (4)	0.00049 (23)	[M1+E2]	2.5 (13)	0.00014 (4)
$\gamma_{16,3}$(Fr)	162.6 (2)	0.00019 (12)	M1,E2	2.4 (13)	0.000055 (30)
$\gamma_{9,0}$(Fr)	172.0 (1)	0.00109 (11)	E1	0.127 (3)	0.00097 (10)
$\gamma_{10,1}$(Fr)	174.3 (1)	0.00081 (35)	[M1+E2]	1.9 (11)	0.00028 (6)
$\gamma_{18,11}$(Fr)	176.1 (1)	0.000370 (45)	[E1]	0.120 (3)	0.00033 (4)
$\gamma_{11,1}$(Fr)	176.1 (1)	0.00096 (40)	M1,E2	1.9 (11)	0.00033 (6)
$\gamma_{12,1}$(Fr)	206.8 (1)	0.00105 (11)	E1	0.0814 (17)	0.00097 (10)
$\gamma_{17,1}$(Fr)	216.6 (3)	0.00011 (7)	[M1+E2]	1.0 (7)	0.000055 (30)
$\gamma_{-1,1}$(Fr)	219.2 (4)	0.0000140 (4)			0.0000140 (4)
$\gamma_{14,1}$(Fr)	229.7 (1)	0.00044 (7)	[E1]	0.0634 (13)	0.00041 (7)
$\gamma_{15,1}$(Fr)	230.9 (5)	0.0000252	[M1+E2]	0.8 (5)	0.000014
$\gamma_{16,1}$(Fr)	231.79 (5)	0.0000072			0.0000072
$\gamma_{14,0}$(Fr)	242.6 (2)	0.00030 (7)	[E1]	0.0558 (12)	0.00028 (7)
$\gamma_{15,0}$(Fr)	243.9 (4)	0.0000358 (10)	[E2]	0.279 (6)	0.0000280 (8)
$\gamma_{18,3}$(Fr)	283.4 (3)	0.000057 (31)	[E1]	0.0389 (8)	0.000055 (30)
$\gamma_{23,11}$(Fr)	351.7 (3)	0.000056 (31)	[E1]	0.0240 (5)	0.000055 (30)
$\gamma_{22,4}$(Fr)	415.6 (3)	0.00024 (7)		0.16 (11)	0.00021 (6)
$\gamma_{23,5}$(Fr)	439.60 (5)	0.000034 (1)			0.000034 (1)
$\gamma_{23,4}$(Fr)	441.0 (4)	0.000056 (30)	[E1]	0.0148 (3)	0.000055 (30)
$\gamma_{22,2}$(Fr)	460.2 (3)	0.00024 (7)	M1+E2	0.12 (9)	0.00021 (6)
$\gamma_{23,1}$(Fr)	527.6 (1)	0.000029			0.000029
$\gamma_{23,0}$(Fr)	540.40 (5)	0.00007			0.00007

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