$^{63}_{30}$Zn $_{33}$

1 Decay Scheme

Zn-63 (half-life of 38.33 min) decays by 100% electron capture/beta plus to various excited levels and the ground state of Cu-63 (stable).

Le zinc 63 (38,33 min) se désintègre à 100 % par capture électronique/émission bêta plus vers plusieurs niveaux excités et le niveau fondamental du cuivre 63 (stable).

2 Nuclear Data

$T_{1/2}$(^{63}Zn)	:	38,33	(10)	min
Q^{+}(^{63}Zn)	:	3366,2	(15)	keV

2.1 Electron Capture Transitions

	Energy (keV)	Probability (%)	Nature	lg ft	P_K	P_L	P_{M+}
$\epsilon_{0,22}$	264,8 (16)	0,0007 (2)	allowed	6,89	0,8802 (16)	0,1020 (13)	0,0168 (5)
$\epsilon_{0,21}$	323,6 (15)	0,0048 (8)	(allowed)	6,24	0,8814 (16)	0,1010 (13)	0,0166 (5)
$\epsilon_{0,20}$	477,3 (16)	0,0104 (14)	allowed	6,24	0,8831 (16)	0,0996 (13)	0,0163 (5)
$\epsilon_{0,19}$	508,3 (15)	0,0069 (12)	(allowed)	6,48	0,8833 (16)	0,0994 (13)	0,0163 (5)
$\epsilon_{0,18}$	558,1 (15)	0,0052 (10)	allowed	6,68	0,8836 (16)	0,0992 (13)	0,0162 (5)
$\epsilon_{0,17}$	586,0 (15)	0,0298 (21)	(allowed)	5,97	0,8837 (16)	0,0991 (13)	0,0162 (5)
$\epsilon_{0,16}$	649,7 (15)	0,082 (7)	allowed	5,62	0,8840 (16)	0,0988 (13)	0,0162 (5)
$\epsilon_{0,15}$	669,5 (15)	0,122 (6)	allowed	5,47	0,8841 (16)	0,0988 (13)	0,0161 (5)
$\epsilon_{0,14}$	830,4 (15)	0,261 (14)	(allowed)	5,33	0,8846 (16)	0,0984 (13)	0,0161 (5)
$\epsilon_{0,13}$	855,1 (15)	0,011 (2)	[allowed]	6,73	0,8846 (16)	0,0983 (13)	0,0161 (5)
$\epsilon_{0,12}$	869,0 (15)	0,0247 (20)	(allowed)	6,40	0,8846 (16)	0,0983 (13)	0,0161 (5)
$\epsilon_{0,11}$	1029,7 (15)	0,141 (9)	allowed	5,79	0,8849 (16)	0,0980 (13)	0,0160 (5)
$\epsilon_{0,9}$	1284,9 (15)	0,035 (7)	(allowed)	6,59	0,8853 (16)	0,0978 (13)	0,0160 (5)
$\epsilon_{0,8}$	1303,8 (15)	0,153 (13)	(allowed)	5,96	0,8853 (16)	0,0978 (13)	0,0160 (5)
$\epsilon_{0,7}$	1353,3 (15)	0,0130 (3)	allowed	7,06	0,8853 (16)	0,0977 (13)	0,0160 (5)
$\epsilon_{0,5}$	1819,2 (15)	0,060 (7)	allowed	6,65	0,8856 (16)	0,0975 (13)	0,0159 (5)
$\epsilon_{0,4}$	1954,0 (15)	0,42 (2)	allowed	5,87	0,8857 (16)	0,0974 (13)	0,0159 (5)

	Energy (keV)	Probability (%)	Nature	lg ft	P_K	P_L	P_{M+}
$\epsilon_{0,2}$	2404,2 (15)	1,19 (3)	allowed	5,60	0,8858 (16)	0,0973 (13)	0,0159 (5)
$\epsilon_{0,1}$	2696,3 (15)	0,92 (1)	allowed	5,81	0,8859 (16)	0,0972 (13)	0,0159 (5)
$\epsilon_{0,0}$	3366,2 (15)	3,75 (5)	allowed	5,40	0,8860 (16)	0,0971 (13)	0,0158 (5)

2.2 β^+ Transitions

	Energy (keV)	Probability (%)	Nature	lg ft
$\beta^+_{0,9}$	262,9 (15)	0,00043 (9)	(allowed)	6,59
$\beta^+_{0,8}$	281,8 (15)	0,0025 (2)	(allowed)	5,96
$\beta^+_{0,7}$	331,3 (15)	0,00039 (2)	allowed	7,06
$\beta^+_{0,5}$	797,2 (15)	0,042 (4)	allowed	6,65
$\beta^+_{0,4}$	932,0 (15)	0,49 (2)	allowed	5,87
$\beta^+_{0,2}$	1382,2 (15)	4,96 (13)	allowed	5,60
$\beta^+_{0,1}$	1674,3 (15)	7,00 (2)	allowed	5,81
$\beta^+_{0,0}$	2344,2 (15)	80,3 (6)	allowed	5,40

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy (keV)	$P_{\gamma+ce}$ (%)	Multipolarity	α_K	α_L	α_T
$\gamma_{17,14}$(Cu)	244,40 (22)	0,0054 (8)	(E2)	0,0190 (3)	0,00198 (3)	0,0213 (3)
$\gamma_{3,2}$(Cu)	364,74 (6)	0,0115 (25)	M1+0,36%E2	0,00184 (3)	0,000184 (3)	0,00205 (3)
$\gamma_{14,10}$(Cu)	443,70 (12)	0,013 (4)	(M1+50%E2)	0,00177 (14)	0,000179 (14)	0,00198 (16)
$\gamma_{4,2}$(Cu)	450,14 (5)	0,229 (16)	M1+1,3%E2	0,00114 (4)	0,000113 (5)	0,00127 (5)
$\gamma_{11,6}$(Cu)	475,91 (13)	0,006 (3)	M1+E2			
$\gamma_{8,5}$(Cu)	515,45 (9)	0,021 (8)	(M1+E2)			
$\gamma_{9,5}$(Cu)	534,32 (23)	0,005 (2)	(M1+E2)			
$\gamma_{5,2}$(Cu)	584,98 (6)	0,033 (4)	M1+E2			
$\gamma_{16,10}$(Cu)	624,34 (13)	0,011 (4)	(E2)			
$\gamma_{1,0}$(Cu)	669,93 (4)	8,19 (32)	M1+1,2%E2	0,000466 (7)	0,0000462 (7)	0,000519 (8)
$\gamma_{14,6}$(Cu)	675,20 (9)	0,015 (3)	(M1+E2)			
$\gamma_{15,7}$(Cu)	683,74 (17)	0,004 (2)	M1+E2			
$\gamma_{4,1}$(Cu)	742,23 (6)	0,067 (8)	E2	0,000512 (8)	0,0000511 (8)	0,000571 (8)
$\gamma_{9,3}$(Cu)	754,56 (23)	0,016 (6)	M1+E2			
$\gamma_{10,3}$(Cu)	765,37 (11)	0,007 (3)	M1+E2			
$\gamma_{5,1}$(Cu)	877,07 (6)	0,003 (2)	M1+E2			
$\gamma_{6,2}$(Cu)	898,61 (7)	0,009 (3)	M1+E2			
$\gamma_{11,4}$(Cu)	924,38 (13)	0,0099 (20)	M1+E2			
$\gamma_{2,0}$(Cu)	962,02 (3)	6,50 (16)	M1+18,7%E2	0,000226 (4)	0,0000223 (4)	0,000251 (4)
$\gamma_{14,5}$(Cu)	988,83 (9)	0,0038 (11)	(M1+E2)			
$\gamma_{7,2}$(Cu)	1050,90 (11)	0,0044 (11)	M1+E2			
$\gamma_{14,4}$(Cu)	1123,67 (8)	0,112 (11)	M1+50%E2	0,000171 (4)	0,0000169 (4)	0,000192 (4)
$\gamma_{10,2}$(Cu)	1130,11 (10)	0,013 (2)	M1+E2			
$\gamma_{15,5}$(Cu)	1149,66 (14)	0,019 (2)	M1+E2			
$\gamma_{16,5}$(Cu)	1169,47 (10)	0,0077 (16)	M1+E2			
$\gamma_{14,3}$(Cu)	1209,07 (9)	0,014 (3)	(M1+E2)			
$\gamma_{17,5}$(Cu)	1233,23 (22)	0,0025 (8)	M1+E2			

	Energy (keV)	$P_{\gamma+ce}$ (%)	Multipolarity	α_K	α_L	α_T
$\gamma_{3,0}$(Cu)	1326,76 (5)	0,069 (4)	E2	0,0001268 (18)	0,00001251 (18)	0,0001757 (25)
$\gamma_{7,1}$(Cu)	1342,99 (12)	0,0025 (8)	M1+E2			
$\gamma_{11,2}$(Cu)	1374,52 (12)	0,034 (2)	M1+E2			
$\gamma_{16,3}$(Cu)	1389,71 (10)	0,043 (6)	(E2)			
$\gamma_{8,1}$(Cu)	1392,52 (9)	0,10 (1)	(M1+50%E2)	0,0001098 (19)	0,00001080 (19)	0,000167 (4)
$\gamma_{4,0}$(Cu)	1412,16 (4)	0,74 (3)	M1+36,6%E2	0,0001055 (16)	0,00001038 (15)	0,000166 (3)
$\gamma_{19,4}$(Cu)	1445,7 (3)	0,0025 (8)	(E2)			
$\gamma_{18,3}$(Cu)	1481,34 (9)	0,0016 (8)	E2			
$\gamma_{5,0}$(Cu)	1547,00 (5)	0,124 (5)	M1+13,2%E2	0,0000870 (13)	0,00000854 (13)	0,000181 (3)
$\gamma_{14,2}$(Cu)	1573,81 (8)	0,016 (2)	(M1+E2)			
$\gamma_{11,1}$(Cu)	1666,61 (13)	0,0014 (6)	E2			
$\gamma_{(-1,1)}$(Cu)	1696,6 (10)	0,002 (1)				
$\gamma_{16,2}$(Cu)	1754,45 (9)	0,0043 (11)	M1+E2			
$\gamma_{12,1}$(Cu)	1827,26 (10)	0,0042 (11)	(M1+E2)			
$\gamma_{6,0}$(Cu)	1860,63 (6)	0,011 (3)	E2	0,0000646 (9)	0,00000635 (9)	0,000316 (5)
$\gamma_{14,1}$(Cu)	1865,90 (8)	0,0200 (21)	(E2)	0,0000643 (9)	0,00000631 (9)	0,000319 (5)
$\gamma_{20,2}$(Cu)	1926,9 (4)	0,0053 (11)	(E2)			
$\gamma_{7,0}$(Cu)	2012,92 (11)	0,011 (2)	M1+E2			
$\gamma_{15,1}$(Cu)	2026,73 (14)	0,060 (4)	M1+E2			
$\gamma_{16,1}$(Cu)	2046,54 (10)	0,0035 (11)	M1+E2			
$\gamma_{8,0}$(Cu)	2062,45 (8)	0,034 (3)	(M1+E2)			
$\gamma_{9,0}$(Cu)	2081,32 (22)	0,015 (2)	(M1+E2)			
$\gamma_{10,0}$(Cu)	2092,13 (10)	0,005 (3)	E2			
$\gamma_{17,1}$(Cu)	2110,30 (21)	0,0065 (13)	M1+E2			
$\gamma_{(-1,2)}$(Cu)	2181,8 (7)	0.0013 (8)				
$\gamma_{19,1}$(Cu)	2188,0 (3)	0,0016 (8)	M1+E2			
$\gamma_{20,1}$(Cu)	2219,0 (4)	0,0029 (8)	M1+E2			
$\gamma_{11,0}$(Cu)	2336,54 (12)	0,077 (5)	M1+E2			
$\gamma_{12,0}$(Cu)	2497,19 (9)	0,020 (2)	(M1+E2)			
$\gamma_{13,0}$(Cu)	2511,06 (6)	0,011 (2)	[M1+E2]			
$\gamma_{14,0}$(Cu)	2535,83 (7)	0,067 (3)	(M1+E2)			
$\gamma_{15,0}$(Cu)	2696,66 (13)	0,039 (3)	M1+E2			
$\gamma_{16,0}$(Cu)	2716,47 (9)	0,012 (1)	M1+E2			
$\gamma_{17,0}$(Cu)	2780,23 (21)	0,0154 (12)	M1+E2			
$\gamma_{18,0}$(Cu)	2808,10 (8)	0,0036 (6)	M1+E2			
$\gamma_{19,0}$(Cu)	2857,9 (3)	0,0028 (5)	M1+E2			
$\gamma_{20,0}$(Cu)	2888,9 (4)	0,0021 (2)	M1+E2			
$\gamma_{21,0}$(Cu)	3042,59 (8)	0,0048 (8)	M1+E2			
$\gamma_{22,0}$(Cu)	3101,4 (4)	0,0007 (2)	M1+E2			

3 Atomic Data

3.1 Cu

ω_K	:	0,454	(4)
$\bar{\omega}_L$	:	0,0097	(4)
n_{KL}	:	1,357	(4)

3.1.1 X Radiations

		Energy (keV)	Relative probability
X_K			
	$K\alpha_2$	8,02792	51,3
	$K\alpha_1$	8,04787	100
	$K\beta_3$	8,90541	} 21,1
	$K\beta_1$	8,90539	}
	$K\beta_5''$	8,9771	}
X_L			
	$L\ell$	0,811	
	$L\alpha$	0,929 - 0,93	
	$L\eta$	0,831	
	$L\beta$	0,949 - 1,022	
	$L\gamma$	0,952	

3.1.2 Auger Electrons

	Energy (keV)	Relative probability
Auger K		
KLL	6,731 - 7,059	100
KLX	7,746 - 8,064	27,8
KXY	8,739 - 8,982	1,93
Auger L	0,68 - 0,80	346

4 Electron Emissions

		Energy (keV)		Electrons (per 100 disint.)
e_{AL}	(Cu)	0,68 - 0,80		9,30 (9)
e_{AK}	(Cu)			3,50 (5)
	KLL	6,731 - 7,059	}	
	KLX	7,746 - 8,064	}	
	KXY	8,739 - 8,982	}	
$\beta^+_{0,0}$	max:	2344,2	(15)	} 80,3 (6)
	avg:	1041,9	(7)	}
$\beta^+_{0,1}$	max:	1674,3	(15)	} 7,00 (2)
	avg:	732,0	(7)	}

		Energy (keV)		Electrons (per 100 disint.)
$\beta^+_{0,2}$	max:	1382,2	(15)	4,96 (13)
	avg:	599,5	(7)	
$\beta^+_{0,4}$	max:	932,0	(15)	0,49 (2)
	avg:	399,7	(7)	
$\beta^+_{0,5}$	max:	797,2	(15)	0,042 (4)
	avg:	341,0	(7)	
$\beta^+_{0,7}$	max:	331,3	(15)	0,00039 (2)
	avg:	143,6	(6)	
$\beta^+_{0,8}$	max:	281,8	(15)	0,0025 (2)
	avg:	123,0	(6)	
$\beta^+_{0,9}$	max:	262,9	(15)	0,00043 (9)
	avg:	115,1	(6)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy (keV)	Photons (per 100 disint.)	
XL	(Cu)	0,811 - 1,022	0,0958 (16)	
XKα_2	(Cu)	8,02792	0,865 (12)	Kα
XKα_1	(Cu)	8,04787	1,686 (22)	
XKβ_3	(Cu)	8,90541	0,355 (6)	K$'\beta_1$
XKβ_1	(Cu)	8,90539		
XKβ_5''	(Cu)	8,9771		

5.2 Gamma Emissions

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{17,14}$(Cu)	244,40 (22)	0,0053 (8)
$\gamma_{3,2}$(Cu)	364,74 (6)	0,0115 (25)
$\gamma_{14,10}$(Cu)	443,70 (12)	0,013 (4)
$\gamma_{4,2}$(Cu)	450,14 (5)	0,229 (16)
$\gamma_{11,6}$(Cu)	475,91 (13)	0,006 (3)
$\gamma^{\pm}$	511	185,6 (9)
$\gamma_{8,5}$(Cu)	515,45 (9)	0,021 (8)
$\gamma_{9,5}$(Cu)	534,32 (23)	0,005 (2)
$\gamma_{5,2}$(Cu)	584,98 (6)	0,033 (4)
$\gamma_{16,10}$(Cu)	624,34 (13)	0,011 (4)

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{1,0}$(Cu)	669,93 (4)	8,19 (32)
$\gamma_{14,6}$(Cu)	675,20 (9)	0,015 (3)
$\gamma_{15,7}$(Cu)	683,74 (17)	0,004 (2)
$\gamma_{4,1}$(Cu)	742,23 (6)	0,067 (8)
$\gamma_{9,3}$(Cu)	754,56 (23)	0,016 (6)
$\gamma_{10,3}$(Cu)	765,37 (11)	0,007 (3)
$\gamma_{5,1}$(Cu)	877,06 (6)	0,003 (2)
$\gamma_{6,2}$(Cu)	898,60 (7)	0,009 (3)
$\gamma_{11,4}$(Cu)	924,37 (13)	0,0099 (20)
$\gamma_{2,0}$(Cu)	962,01 (3)	6,50 (16)
$\gamma_{14,5}$(Cu)	988,82 (9)	0,0038 (11)
$\gamma_{7,2}$(Cu)	1050,89 (11)	0,0044 (11)
$\gamma_{14,4}$(Cu)	1123,66 (8)	0,112 (11)
$\gamma_{10,2}$(Cu)	1130,10 (10)	0,013 (2)
$\gamma_{15,5}$(Cu)	1149,65 (14)	0,019 (2)
$\gamma_{16,5}$(Cu)	1169,46 (10)	0,0077 (16)
$\gamma_{14,3}$(Cu)	1209,06 (9)	0,014 (3)
$\gamma_{17,5}$(Cu)	1233,22 (22)	0,0025 (8)
$\gamma_{3,0}$(Cu)	1326,75 (5)	0,069 (4)
$\gamma_{7,1}$(Cu)	1342,97 (12)	0,0025 (8)
$\gamma_{11,2}$(Cu)	1374,50 (12)	0,034 (2)
$\gamma_{16,3}$(Cu)	1389,69 (10)	0,043 (6)
$\gamma_{8,1}$(Cu)	1392,50 (9)	0,10 (1)
$\gamma_{4,0}$(Cu)	1412,14 (4)	0,74 (3)
$\gamma_{19,4}$(Cu)	1445,7 (3)	0,0025 (8)
$\gamma_{18,3}$(Cu)	1481,32 (9)	0,0016 (8)
$\gamma_{5,0}$(Cu)	1546,98 (5)	0,124 (5)
$\gamma_{14,2}$(Cu)	1573,79 (8)	0,016 (2)
$\gamma_{11,1}$(Cu)	1666,59 (13)	0,0014 (6)
$\gamma_{(-1,1)}$(Cu)	1696,6 (10)	0,002 (1)
$\gamma_{16,2}$(Cu)	1754,42 (9)	0,0043 (11)
$\gamma_{12,1}$(Cu)	1827,23 (10)	0,0042 (11)
$\gamma_{6,0}$(Cu)	1860,60 (6)	0,011 (3)
$\gamma_{14,1}$(Cu)	1865,87 (8)	0,0200 (21)
$\gamma_{20,2}$(Cu)	1926,9 (4)	0,0053 (11)
$\gamma_{7,0}$(Cu)	2012,89 (11)	0,011 (2)
$\gamma_{15,1}$(Cu)	2026,70 (14)	0,060 (4)
$\gamma_{16,1}$(Cu)	2046,50 (10)	0,0035 (11)
$\gamma_{8,0}$(Cu)	2062,41 (8)	0,034 (3)
$\gamma_{9,0}$(Cu)	2081,28 (22)	0,015 (2)
$\gamma_{10,0}$(Cu)	2092,09 (10)	0,005 (3)
$\gamma_{17,1}$(Cu)	2110,26 (21)	0,0065 (13)
$\gamma_{(-1,2)}$(Cu)	2181,8 (7)	0,0013 (8)
$\gamma_{19,1}$(Cu)	2188,0 (3)	0,0016 (8)
$\gamma_{20,1}$(Cu)	2219,0 (4)	0,0029 (8)
$\gamma_{11,0}$(Cu)	2336,49 (12)	0,077 (5)
$\gamma_{12,0}$(Cu)	2497,14 (9)	0,020 (2)
$\gamma_{13,0}$(Cu)	2511,01 (6)	0,011 (2)

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{14,0}$(Cu)	2535,78 (7)	0,067 (3)
$\gamma_{15,0}$(Cu)	2696,60 (13)	0,039 (3)
$\gamma_{16,0}$(Cu)	2716,41 (9)	0,012 (1)
$\gamma_{17,0}$(Cu)	2780,16 (21)	0,0154 (12)
$\gamma_{18,0}$(Cu)	2808,03 (8)	0,0036 (6)
$\gamma_{19,0}$(Cu)	2857,8 (3)	0,0028 (5)
$\gamma_{20,0}$(Cu)	2888,8 (4)	0,0021 (2)
$\gamma_{21,0}$(Cu)	3042,51 (8)	0,0048 (8)
$\gamma_{22,0}$(Cu)	3101,3 (4)	0,0007 (2)

6 Main Production Modes

^{64}Zn(n,2n)^{63}Zn

^{63}Cu(p,n)^{63}Zn

^{63}Cu(d,2n)^{63}Zn

^{64}Zn(γ,n)^{63}Zn

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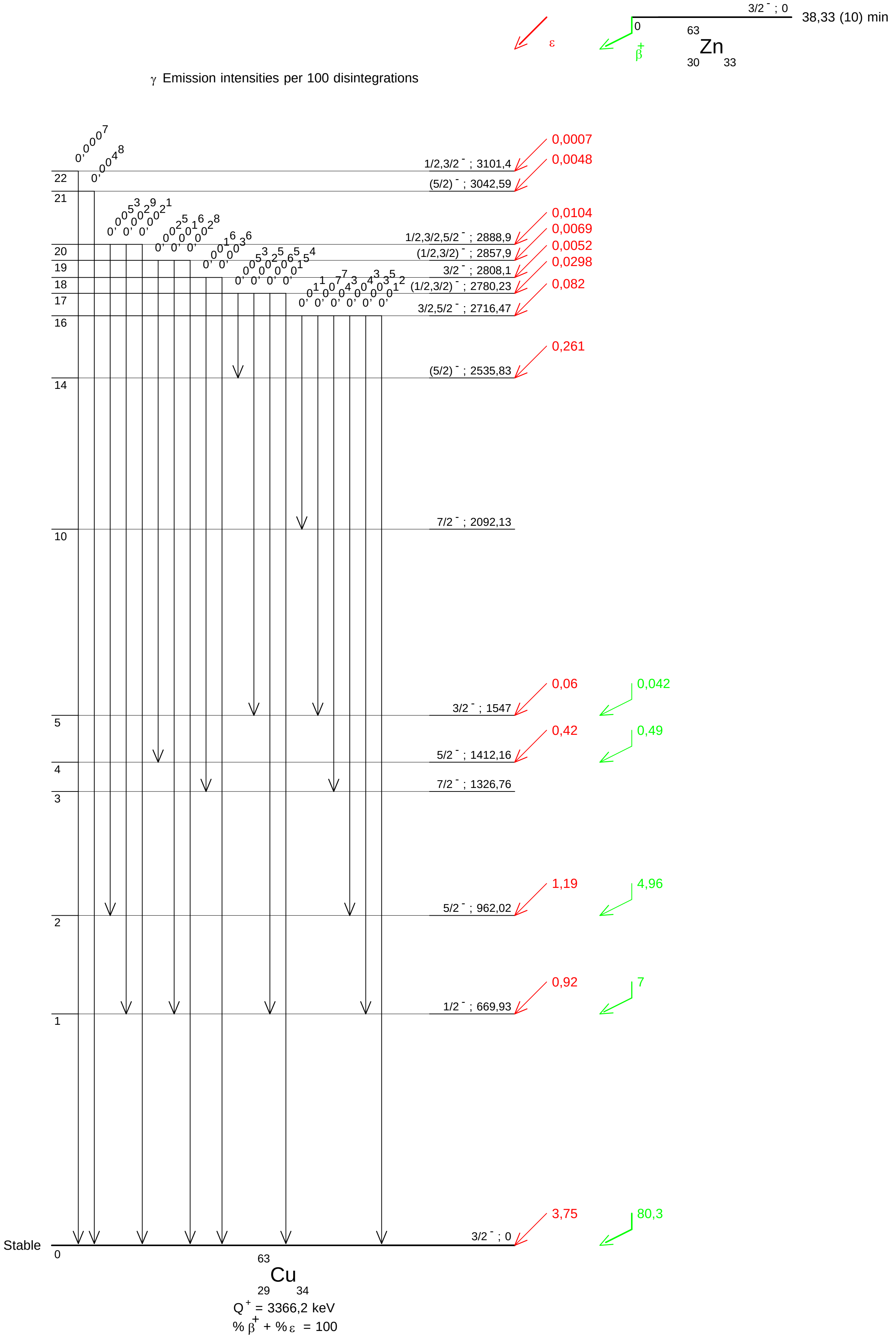
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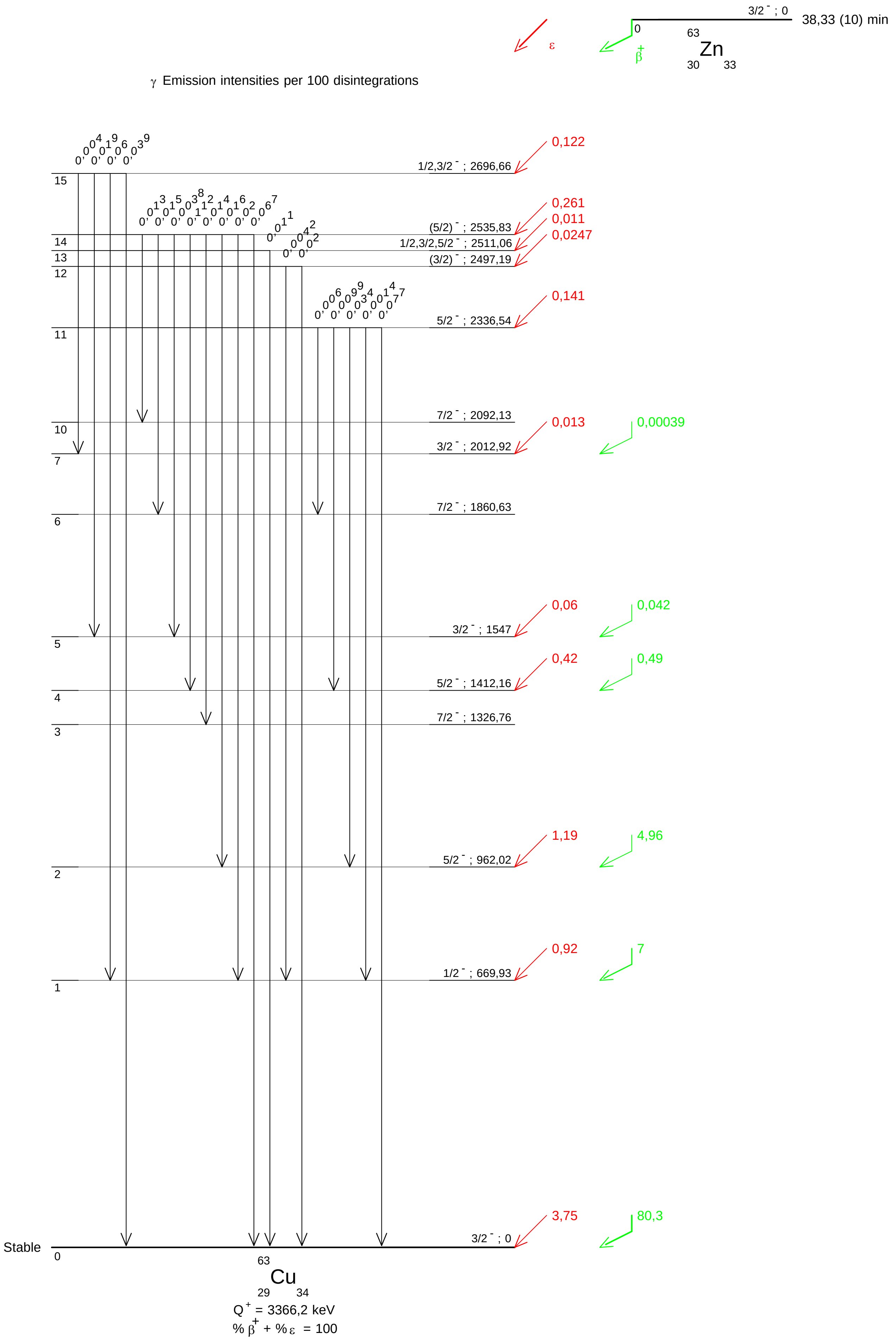
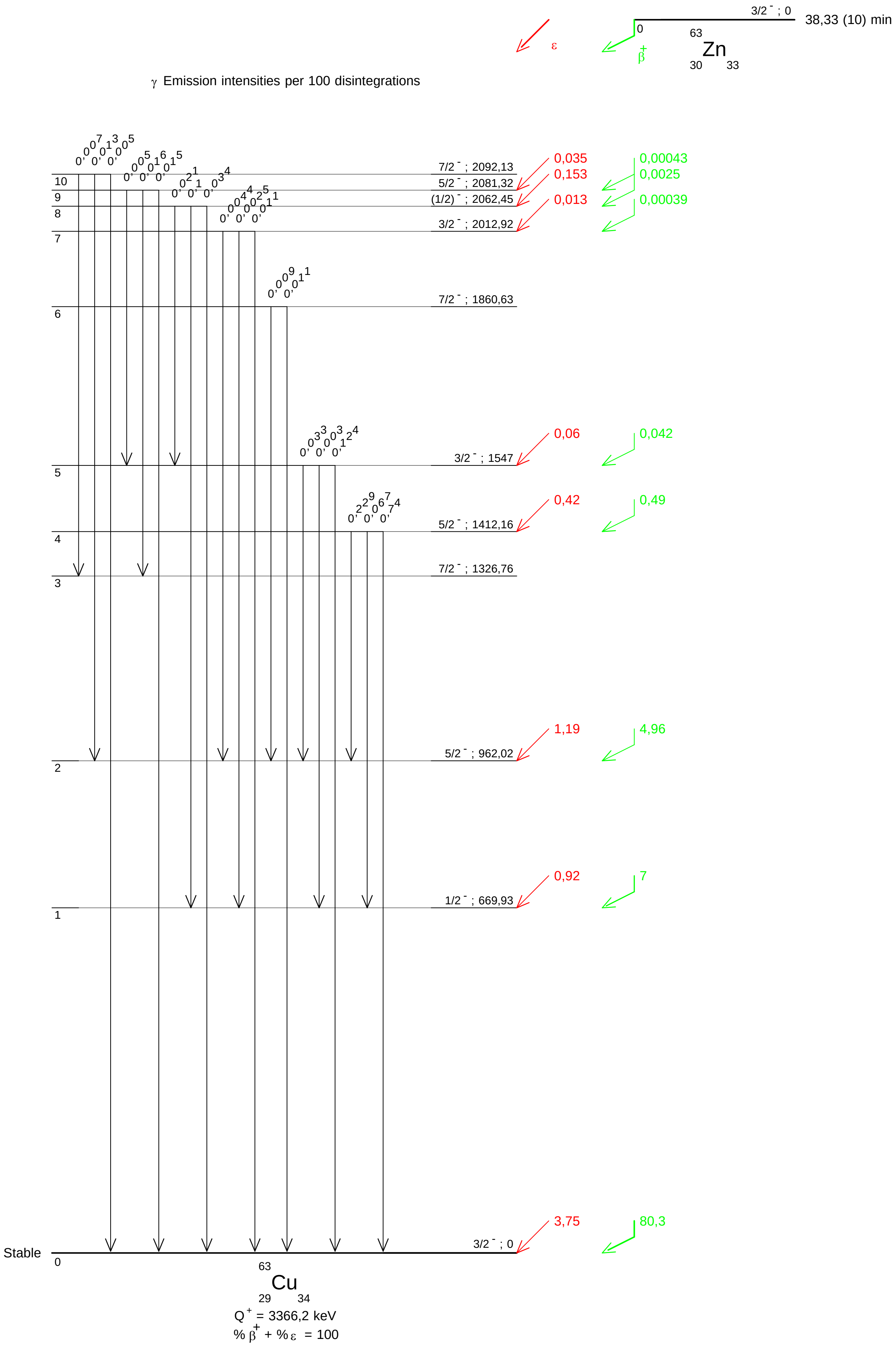
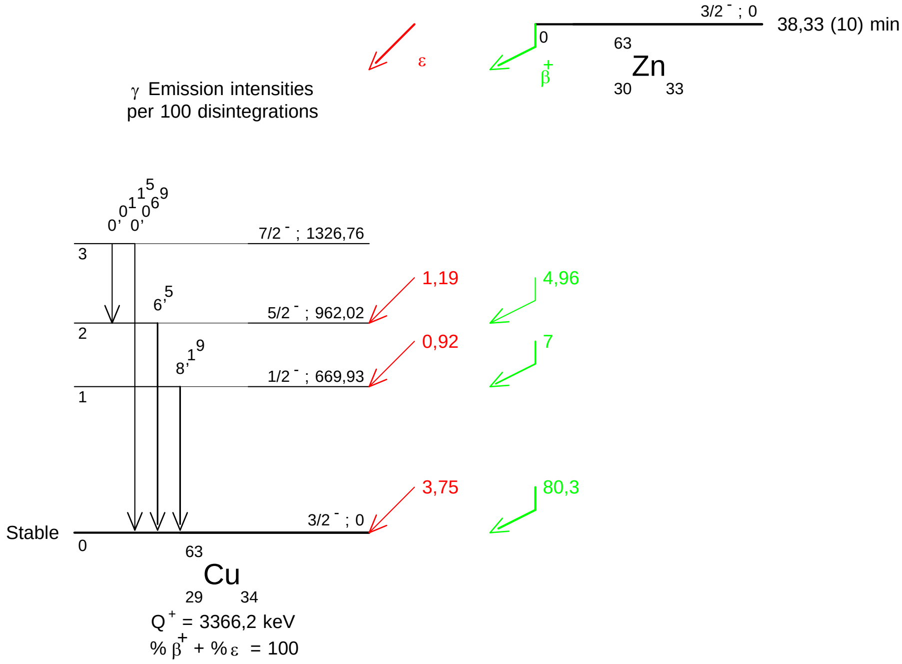
38,33 (10) min
ε
β+
γ Emission intensities per 100 disintegrations
1/2,3/2 - ; 3101,4
(5/2) - ; 3042,59
1/2,3/2,5/2 - ; 2888,9
(1/2,3/2) - ; 2857,9
3/2 - ; 2808,1
(1/2,3/2) - ; 2780,23
3/2,5/2 - ; 2716,47
(5/2) - ; 2535,83
7/2 - ; 2092,13
3/2 - ; 1547
5/2 - ; 1412,16
7/2 - ; 1326,76
5/2 - ; 962,02
1/2 - ; 669,93
3/2 - ; 0
0,0007
0,0048
0,0104
0,0069
0,0052
0,0298
0,082
0,261
0,06
0,042
0,42
0,49
1,19
4,96
0,92
7
3,75
80,3
Stable
Cu
Q+ = 3366,2 keV
% β+ + % ε = 100


3/2 - ; 0
38,33 (10) min
0
63
Zn
30 33
ε
β+
γ Emission intensities per 100 disintegrations
1/2,3/2 - ; 2696,66
0,122
(5/2) - ; 2535,83
0,261
1/2,3/2,5/2 - ; 2511,06
0,011
(3/2) - ; 2497,19
0,0247
5/2 - ; 2336,54
0,141
7/2 - ; 2092,13
3/2 - ; 2012,92
0,013
0,00039
7/2 - ; 1860,63
3/2 - ; 1547
0,06
0,042
5/2 - ; 1412,16
0,42
0,49
7/2 - ; 1326,76
5/2 - ; 962,02
1,19
4,96
1/2 - ; 669,93
0,92
7
3/2 - ; 0
3,75
80,3
Stable
15
14
13
12
11
10
7
6
5
4
3
2
1
0
63
Cu
29 34
Q+ = 3366,2 keV
% β+ + % ε = 100


3/2 - ; 0
38,33 (10) min
ε
β+
63 Zn 30 33
γ Emission intensities per 100 disintegrations
7/2 - ; 2092,13
5/2 - ; 2081,32
(1/2) - ; 2062,45
3/2 - ; 2012,92
7/2 - ; 1860,63
3/2 - ; 1547
5/2 - ; 1412,16
7/2 - ; 1326,76
5/2 - ; 962,02
1/2 - ; 669,93
3/2 - ; 0
0,035
0,153
0,013
0,06
0,42
1,19
0,92
3,75
0,00043
0,0025
0,00039
0,042
0,49
4,96
7
80,3
10
9
8
7
6
5
4
3
2
1
0
Stable
63 Cu 29 34
Q + = 3366,2 keV
% β+ + % ε = 100


3/2 - ; 0
38,33 (10) min
0
63
Zn
30 33
ε
β+
γ Emission intensities
per 100 disintegrations
7/2 - ; 1326,76
5/2 - ; 962,02
1/2 - ; 669,93
3/2 - ; 0
1,19
0,92
3,75
4,96
7
80,3
Stable
63
Cu
29 34
Q+ = 3366,2 keV
% β+ + % ε = 100