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TABLE OF LOG FT VALUES: OCTOBER 1952

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TABLE OF LOG FT VALUES· OCTOBER 1952

R. W. King, N. M. Dismuke, K. Way*

INTRODUCTION

An important quantity for the characterization of β transitions is the comparative half-life, or ft value in the Fermi theory of β decay. For an allowed transition

$$ft = \frac{2\pi^3 h \ln 2}{G^2 mc^2 \Sigma_f |(f|M|i)|^2}$$

where f is the integral of the Fermi function, t is the "partial half-life," G is the Fermi constant, and $\Sigma_f |(f|M|i)|^2$ indicates the absolute values squared of the matrix elements involved in the β transition summed over the magnetic substates of the daughter nucleus. The use of the ft value in the classification of β transitions and the resulting information about nuclear structures have been discussed by several authors.[1–6]

In 1951, A. M. Feingold[7] published a list of values of log ft based on data available in the literature up to June 1950. The large amount of new data which has appeared since that time and the growing recognition of the importance of the log ft value in the interpretation of decay schemes seemed to the present authors to justify a revision and extension of Feingold's work. The present list is based on data in the files of the nuclear data group of the National Bureau of Standards in October 1952. In cases where the present data are identical with those used by Feingold, the ft values have been recomputed in order to provide an independent check. The graphs of f published by Feenberg and Trigg[3] have greatly simplified the calculation of comparative half-lives and were used in the present computations.

EXPLANATION OF TABLE

In column 1 the nuclei undergoing decay are listed. Column 2 shows the type of decay and column 3 the observed half-life. Column 4 gives the maximum energy of the emitted particles in Mev. The method of measuring the energy is indicated in column 5. The abbreviations used there stand for:

a	absorption
a$\beta\gamma$	absorption of β's in coincidence with γ's
cc	cloud chamber
pc	proportional counter
s	magnetic spectrometer
scin	scintillation spectrometer

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Column 6 gives the experimentally determined branching percentages of the indicated modes of decay.

In the case of decay by K capture and positron emission, a ratio of the relative intensity of these two modes of decay can be calculated from theory for a given decay energy. Such ratios, together with experimental information on relative positron intensities can be used to calculate absolute branching percentages and the total amount of K capture. Results of such calculations are listed in column 7. When the agreement between these calculated values and the experimental values of column 6 seemed reasonable, or when no experimental values were available for a check, these calculated branching percentages were used in the computation of log t. When the agreement turned out to be very poor, it was concluded that decay to levels other than those indicated in the energy column takes place, the value of log f_+ was then determined and the value of log t computed from the given positron percentage In such cases log f and log ft are designated with a superscript $^+$. Column 8 gives the log to the base 10 of the "partial half-life" of the transition as determined from the half-life in column 3 and the branching percentages The log to the base 10 of the required allowed f function, whether f_-, f_+, or $f_+ + f_K$ is given in column 9.

Column 10 gives the sum of columns 8 and 9 or the log of ft, the comparative half-life of the disintegration as defined in the introduction. In a few cases two values are given for a single transition, the first being the value just mentioned. Whenever the β spectrum is known to exhibit a unique first forbidden shape indicative of a $\Delta I = 2$, yes transition a second value is given marked with superscript ^{1} which is the log of the comparative half-life calculated by means of the first forbidden f function.[8] In cases where the unique shape has not been observed, possibly because of experimental difficulties, but where the nuclear shell model suggests a $\Delta I = 2$, yes transition, this first forbidden log ft value is again listed and marked with a superscript ^{1*}.

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Table of Log Values October 1952

Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
n	β^-	13^m	0 782	s	100		0 24	2 89	3 13
H^3	β^-	$12\ 4^y$	0 0194	s	100		−5 56	8 59	3 03
He^6	β^-	$0\ 823^s$	3 50	s	100		3 02	−0 08	2 94
Li^8	β^-	$0\ 88^s$	~13	s	~90		5 67	~−0 01	~5 66
			~6		~10		4 07	~0 94	~5 01
Be^7	K	54^d	0 860		88		−3 35	6 72	3 37
			0 382		12		−4 06	7 59	3 53
Be^{10}	β^-	$2\ 7 \times 10^{6y}$	0 555	s	100		−0 29	13 93	13 64
B^8	β^+	$0\ 65^s$	13 7	a	100	~100	5 73	−0 19	5 54
	K					$<10^{-3}$			
B^{12}	β^-	$0\ 027^s$	13 43	s	96		5 72	−1 55	4 17
			8 9	a$\beta\gamma$	4		4 92	−0 17	4 75
C^{10}	β^+	$19\ 1^s$	2 2	a	~98	>97 86	2 03	1 29	3 32
	K					<0 14			
C^{11}	β^+	$20\ 35^m$	0 970	s	100*	>98	0 51	3 09	3 60
	K					<2			
C^{14}	β^-	5580^y	0 155	s	100		−2 29	11 24	8 95
$C^{15?}$	β^-	$2\ 4^s$	8 8	a	100?		4 88	≥0 38	≥5 26
N^{12}	β^+	$12\ 5 \times 10^{-3s}$	16 6	a	<100	~100	6 20	>−1 90	>4 30
	K					$<10^{-3}$			
N^{13}	β^+	$10\ 1^m$	1 202	s	100*	>99	0 89	2 78	3 67
	K					<1			
N^{16}	β^-	$7\ 35^s$	10 5	a,cc	~18		5 26	~1 61	~6 87
									8 23[1*]
			4 6	cc	~2		3 61	~2 56	~6 17
			4 3	a$\beta\gamma$	~40		3 47	~1 26	~4 73
			3 8	a$\beta\gamma$	~40		3 21	~1 26	~4 47
N^{17}	β^-	$4\ 2^s$	3 7	a	100		3 18	0 62	3 80
O^{14}	β^+	$76\ 5^s$	1 8	a	100*	>99 7	1 62	1 88	3 50
	K					< 3			
O^{15}	β^+	$2\ 12^m$	1 683	s	100*	>99 7	1 49	2 10	3 59
	K					< 3			
O^{19}	β^-	$29\ 4^s$	4 5	a	30		3 58	1 99	5 57
			2 9	a	70		2 72	1 62	4 34
F^{17}	β^+	70^s	1 72	s	100*	>99 7	1 52	1 84	3 36
	K					< 3			
F^{18}	β^+	$1\ 87^h$	0 649	s	100*	>97 8	−0 21	3 83	3 62
	K					<2 2			
F^{20}	β^-	12^s	6 74	s	3 5		4 38	2 54	6 92
			5 33	s	96 5		3 91	1 09	5 00
Ne^{19}	β^+	$18\ 5^s$	2 18	s	100*	>99 8	1 96	1 27	3 23
	K					< 2			
Ne^{23}	β^-	$40\ 2^s$	4 21	s	93		3 45	1 64	5 09
			1 18	s	7		1 07	2 76	3 83
Na^{21}	β^+	$22\ 8^s$	2 53	s, scin	100*	99 9	2 25	1 36	3 61
	K					1			
Na^{22}	β^+	$2\ 6^y$	1 8	cc	$\sim 4 \times 10^{-3}$	~ 003	1 58	~12 31	~13 89
	K					~ 000008			
	β^+		0 542	s	~100*	~90 85	−0 53	~7 91	~7 38
	K					~9 15			
Na^{24}	β^-	$15\ 06^h$	4 17	s	0 003		3 44	9 26	12 70
			1 390	s	~100		1 38	4 73	6 11
Na^{25}	β^-	$62\ 5^s$	3 7	a	55		3 22	2 06	5 28
			2 7	a	45		2 62	2 14	4 76
Mg^{23}	β^+	$12\ 3^s$	2 99	scin	100*	99 93	2 55	1 09	3 64
	K					0 07			
Mg^{27}	β^-	$9\ 58^m$	1 80	s	80		1 85	2 86	4 71
			0 79	s	20		0 47	3 46	3 93
Al^{26}	β^+	$6\ 5^s$	2 8	a		fk/f+ = 0 00115	2 45	≥0 81	≥3 26
Al^{28}	β^-	$2\ 30^m$	2 865	s	>98		2 76	<2 15	<4 91
Al^{29}	β^-	$6\ 56^m$	2 5	a$\beta\gamma$	~75		2 53	~2 72	~5 25
			1 4	a$\beta\gamma$	~25		1 41	~3 20	~4 61
Si^{27}	β^+	$5\ 4^s$	3 48	scin		fk/f+ = 0 0007	2 83	≥0 73	≥3 56
Si^{31}	β^-	$2\ 65^h$	1 471	s	100		1 53	3 98	5 51
P^{29}	β^+	$4\ 6^s$	3 6	cc		fk/f+ = 0 0008	2 88	≥0 66	≥3 54
P^{30}	β^+	$2\ 18^m$	3 5	s		fk/f+ = 0 0009	2 84	≥2 12	≥4 96
P^{32}	β^-	$14\ 30^d$	1 70	s	100		1 80	6 09	7 89

* There is experimental evidence that all the decay is to one level only of the daughter nucleus

Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
P^{33}	β^-	25^d	0 26	s	100		−1 28	6 33	5 05
P^{34}	β^-	$12\ 4^s$	5 1	a	75		3 89	1 22	5 11
			3 2	a	25		2 96	1 70	4 66
S^{31}	β^+	$3\ 2^s$	4 1	scin		fk/f+ = 0 0007	3 00	≥0 50	≥3 50
S^{35}	β^-	87.1^d	0 167	s	100		−1 90	6 88	4 98
S^{37}	β^-	$5\ 04^m$	4 3	a	10		3 59	3 48	7 07
									$7\ 68^{1*}$
			1 6	a	90		1 70	2 53	4 23
Cl^{33}	β^+	$1\ 8^s$	4 4	scin		fk/f+ = 0 0007	3 28	≥0 26	≥3 54
Cl^{34}	β^+	$33\ 2^m$	4 45	s	46	45 59	3 29	3 64	6 93
	K					033			
	β^+		2 58	s	28	27 76	2 23	3 85	6 08
	K					097			
	β^+		1 3	s	26	25 77	0 94	3 88	4 82
	K					0 75			
Cl^{36}	β^-	$4\ 4 \times 10^5{}^y$	0 716	s	100		0 37	13 14	13 51
Cl^{38}	β^-	$37\ 29^m$	4 81	s	53		3 79	3 63	7 42
									$8\ 13^1$
			2 77	s	16		2 76	4 15	6 91
			1 11	s	31		1 08	3 86	4 94
Cl^{39}	β^-	$55\ 5^m$	2 96	a	≥7		2 88	≤4 68	≤7 56
									$\leq 7\ 86^{1*}$
			1 65	a	≤93		1 76	≥3 55	≥5 31
A^{35}	β^+	$1\ 84^s$	4 4	cc		fk/f+ = 0 0009	3 27	≥0 26	≥3 53
A^{39}	β^-	235^y	0 565	s	100		−0 02	9 87	9 85
									$8\ 74^1$
A^{41}	β^-	$1\ 78^h$	2 55	a	0 7		2 60	5 96	8 56
									$8\ 72^{1*}$
			1 25	s	99		1 29	3 81	5 10
K^{37}	β^+	$1\ 2^s$	4 57	scin		fk/f+ = 0 001	3 32	≥0 08	≥3 40
K^{38}	β^+	$7\ 7^m$	2 8	s	<100	fk/f+ = 0 004	2 38	>2 66	>5 04
K^{40}	β^-	$\tau_\beta = 13\ 2 \times 10^8{}^y$	1 36	s			1 44	≥16 62	≥18 06
K^{42}	β^-	$12\ 44^h$	3 58	s	~75		3 27	~4 78	~8 05
									$8\ 50^1$
			2 05	s	~25		2 20	~5 25	~7 45
K^{43}	β^-	$22\ 4^h$	0 81	s	~80		0 59	~5 00	~5 59
			0 24	s	~20		−1 30	~5 61	~4 31
Ca^{39}	β^+	$1\ 1^s$	5 2	scin		fk/f+ = 0 008	3 56	≥0 04	≥3 60
Ca^{45}	β^-	152^d	0 255	scin	100		−1 18	7 12	5 94
$Ca^{47?}$	β^-	$5\ 8^d$	1 1		?		1 12	5 70	≥6 82
Ca^{49}	β^-	$8\ 5^m$	2 7	a	?		2 74	2 71	≥5 45
Sc^{41}	β^+	$0\ 87^s$	4 94	cc		fk/f+ = 0 001	3 45	≥−0 06	≥3 39
Sc^{43}	β^+	$3\ 92^h$	1 1	s		fk/f+ = 0 126	0 62	≥4 15	≥4 77
			0 4	a		fk/f+ = 3 55	−0 59	≥4 15	≥3 56
Sc^{44}	β^+	$4\ 0^h$	1 463	s	100?	95 43	1 11	4 16	5 27
	K					4 57			
Sc^{46}	β^-	84^d	1 2	s	<0 5		1 26	>9 16	>10 42
			0 36	s	~99 5		−0 67	~6 86	~6 19
Sc^{47}	β^-	$3\ 43^d$	0 61	a	?		0 17	≥5 47	≥5 64
Sc^{48}	β^-	$1\ 86^d$	0 64	a	100		0 23	5 20	5 43
Sc^{49}	β^-	57^m	2 4	a	100		2 52	3 53	6 05
Ti^{45}	β^+	$3\ 09^h$	1 02	s	>96	>78 36	0 51	<4 08	<4 59
	K					>14 26			
	β^+		0 57	s	<4	<3 26	−0 25	>5 18	>4 93
	K					<4 11			
Ti^{51}	β^-	6^m	1 6	a	?		1 78	≥2 56	≥4 34
V^{47}	β^+	33^m	1 65	a		fk/f+ = 0 045	1 34	≥3 30	≥4 64
	K								
V^{48}	β^+	$16\ 0^d$	0 716	s	58*	59 10	0 02	6 14	6 16
	K				42	40 90			
V^{52}	β^-	$2\ 6^m$?	~2 6	a	100		~2 71	2 19	~4 90
Cr^{49}	β^+	$41\ 9^m$	1 45	a		fk/f+ = 0 089	1 10	≥3 40	≥4 50
Mn^{51}	β^+	$44\ 3^m$	2 4	a		fk/f+ = 0 021	2 02	≥3 42	≥5 44
Mn^{52}	β^+	$21\ 3^m$	2 66	s	99 95	98 61	2 21	3 11	5 32
	K					1 39			
	β^+	$6\ 2^d$	0 582	s	35*	34 96	−0 14	5 73	5 59
	K				65	65 04			
Mn^{54}	β^-	310^d	1 0	cc	< 1		1 02	>10 43	>11 45

* There is experimental evidence that all the decay is to one level only of the daughter nucleus

Nucleus	Decay	τ	E_β	Method	Experimental % Branching	% Branching	log f_0	log t	log ft
Mn^{56}	β^-	2 586^h	2 86	s	60		2 91	4 19	7 10
			1 05	s	25		1 11	4 57	5 68
			0 73	s	15		0 41	4 79	5 20
Fe^{52}	β^+	7 8^h	0 640	a	40*	38 76	−0 03	4 45	4 42
	K				60	61 24			
Fe^{53}	β^+	8 9^m	2 6	scin		fk/f+ = 0 018	2 16	≥2 73	≥4 89
Fe^{59}	β^-	45 1^d	0 46		50		−0 18	6 90	6 72
			0 26	s	50		−1 03	6 90	5 87
Co^{55}	β^+	18 2^h	1 50	s	~30	fk/f+ = 0 11	1 10$^+$	5 34	6 44$^+$
			1 01	s	~30	fk/f+ = 0 41	0 37$^+$	5 34	5 71$^+$
Co^{56}	β^+	80^d	1 50	s	25	fk/f+ = 0 11	1 10$^+$	7 44	8 54$^+$
	K				75				
Co^{57}	β^+	270^d	0 26	a	100*	1 87	−0 43	7 37	6 94
	K					98 13			
Co^{58}	β^+	72^d	0 47	s	14 5*	13 14	−0 14	6 79	6 65
	K				85 5	86 86			
Co^{60}	β^-	10 7^m	1 56	s	0 28		1 81	5 36	7 17
	⊗	5 26^y	0 319	s	100		−0 73	8 22	7 49
Co^{61}	β^-	99 0^m	1 42	a	55		1 64	4 03	5 67
			1 00	a	45		1 07	4 12	5 19
Co^{62}	β^-	13 9^m	2 3	a	100		2 56	2 92	5 48
Ni^{57}	β^+	36 4^h	0 835	s	~30	fk/f+ = 0 91	0 02$^+$	~5 64	~5 66$^+$
	K				~70				
Ni^{63}	β^-	85^y	0 067	pc	100		−2 87	9 43	6 56
Ni^{65}	β^-	2 564^h	2 1	s	57		2 35	4 21	6 56
			1 01	s	14		1 11	4 82	5 93
			0 60	s	29		0 28	4 50	4 78
Cu^{60}	β^+	24 6^m	~3 3	a	<5	<4 61	~2 62	>4 50	>7 12
	K					< 07			
	β^+		~1 8	a	>95	>87 68	~1 47	<3 19	<4 66
	K					>7 64			
Cu^{61}	β^+	3 33^h	0 190	s	(β^+ + k) 0 7	64 17	0 79	4 15	4 94
	K					20 28			
	β^+		0 550	s	2 7	2 51	−0 03	4 96	4 93
	K					10 71			
	β^+		0 190	s(β^+ + k)	0 7	0 003	−0 36	6 27	5 91
	K					65			
	β^+		0 266	s	0 03	0 03	−0 30	5 83	5 53
	K					1 76			
	Total K				28	33 36			
Cu^{64}	β^+	12 80^h	0 657	s	19	18 15	0 12	4 86	4 98
	K				43	45 55			
	β^-		0 571	s	38	36 30	0 22	5 10	5 32
Cu^{66}	β^-	5 17^m	2 63	s	91		2 80	2 53	5 33
			1 6	s	9		1 88	3 54	5 42
Cu^{67}	β^-	58 5h	0 54	a	100?		0 13	≥5 32	≥5 45
Zn^{62}	β^+	9 33^h	0 66	s	10*	27 55	0 14	4 53	4 67
	K				90	72 45			
Zn^{63}	β^+	38 3^m	2 36	s	85	79 54	1 96	3 44	5 40
	K					3 31			
	β^+		1 40	s	7	6 55	1 02	4 45	5 47
	K					1 51			
	β^+		0 47	s	1	0 94	−0 09	4 40	4 31
	K					8 15			
	Total K				7	12 97			
Zn^{65}	β^+	250^d	0 325	s	2 5	fk/f+ = 33 8	−0 24	7 58	7 34
	K				54				
	K		0 237		43 5		−1 77	7 70	5 93
Zn^{69}	β^-	52^m	0 86	a	100		0 88	3 49	4 37
Zn^{71}	β^-	2 2^m	2 1				2 39	≥2.12	≥4 51
Zn^{72}	β^-	49^h	1 6	a	5		1 90	6 55	8 45
			0 3	a	95		−0 71	5 27	4 56
Ga^{66}	β^+	9 45^h	4 144	s	57	58 98	3 04	4 76	7 80
	K					0 56			
	β^+		1 44	s	3	3 10	1 07	5 95	7 02
	K					0 74			
	β^+		0 878	s	4 5	4 66	0 40	5 52	5 92
	K					5 59			
	β^+		0 403	s	1 3	1 35	−0 10	5 11	5 01
	K					25 02			
	Total K				34	31 91			

* There is experimental evidence that all the decay is to one level only of the daughter nucleus

Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
Ga^{68}	β^+	68^m	1 88	s		fk/f+ = 0 01	1 55	>3 61	>5 16
	β^+		0 8	s		fk/f+ = 1 59	0 30	>3 61	>3 91
Ga^{70}	β^-	$20\ 3^m$	1 65	s			1 95	≥3 09	≥5 04
Ga^{72}	β^-	$14\ 1^h$	3 15	s	9 5		3 16	5 73	8 89
			2 52	s	8 0		2 78	5 80	8 58
			1 48	s	10 5		1 80	5 68	7 48
			0 96	s	32 0		1 07	5 20	6 27
			0 64	s	40 0		0 43	5 10	5 53
Ga^{73}	β^-	$5\ 0^h$	1 4	a	100		1 67	4 26	5 93
Ge^{69}	β^+	$39\ 6^h$	1 215	s	30	12 81	0 82	5 88	6 70
	K					5 93			
	β^+		0 610	s	3	1 28	0 13	6 28	6 41
	K					6 14			
	β^+		0 222	s	0 7	0 30	−0 20	5 29	5 09
	K					73 54			
	Total K				66	85 61			
Ge^{71}	β^+	$11\ 4^d$	0 65			fk/f+ = 3 64	0 18	≥5 99	≥6 17
Ge^{75}	β^-	79^m	1 3	a			1 56	≥3 68	≥5 24
Ge^{77}	β^-	57^s	2 8	a			2 97	>1 76	>4 73
		12^h	2 20	s	42		2 54	5 01	7 55
			1 38	s	35		1 67	5 09	6 76
			71	s	23		0 60	5 27	5 87
Ge^{78}	β^-	$2\ 1^h$	~0 9	a			~0 97	≥3 88	≥4 85
As^{71}	β^+	50^h	0 6	a	~33	15 38	0 13	5 26	5 39
	K				67	84 62			
As^{72}	β^+	26^h	3 38	s	6	4 99	2 62	6 26	8 88
	K					0 11			9 28[1]
	β^+		2 50	s	21	17 46	2 06	5 71	7 77
	K					0 92			
	β^+		1 84	s	4	3 32	1 51	6 39	7 90
	K					0 53			
	β^+		0 66	s	1 7	1 41	0 19	6 13	6 32
	K					5 50			
	β^+		0 27	s	0 7	58	−0 16	5 15	4 99
	K					65 18			
	Total K				67	72 24			
As^{74}	β^+	$17\ 5^d$	1 53	s	5	3 19	1 20	7 58	8 78
									8 57[1]
	K					0 80			
	β^+		0 92	s	42	26 80	0 50	6 39	6 89
	K				(K/β^+ = 1 5)	35 38			
	β^-		1 36	s	27	17 24	1 69	6 94	8 63
									8 32[1]
			0 69	s	26	16 59	0 59	6 96	7 55
As^{76}	β^-	$27\ 6^h$	3 12	s	54		3 20	5 26	8 46
									8 80[1]*
			2 56	s	21		2 82	5 68	8 50
			1 4	s	19		1 70	5 72	7 42
			0 4	s	7		−0 25	6 15	5 90
$As^{77?}$	β^-	40^h	0 70	s	100		0 60	5 16	5 76
As^{78}	β^-	90^m	4 1	a	70		3 71	3 89	7 60
			1 4	a	30		1 70	4 26	5 96
$As^{79?}$	β^-	9^m	2 1	a	100		2 41	2 73	5 14
Se^{73}	β^+	$7\ 08^h$	1 680	s	<1 2	0 41	1 36	>6 72	>8 08
	K					0 08			
	β^+		1 318	s	<87 4	29 59	0 96	>4 77	>5 73
	K					13 83			
Se^{79}	β^-	$6\ 5 \times 10^4 y$	0 160	a	100		−1 55	12 31	10 76
Se^{81}	β^-	17^m	1 38	s	100		1 71	3 01	4 72
Se^{83}	β^-	69^s	3 4	a	≤100		3 38	≥1 84	≥5 22
		26^m	1 5	a	100?		1 85	3 19	5 04
Br^{75}	β^+	$1\ 6^h$	1 70	s	8 7	1 95	1 38	5 38	6 76
	K					0 44			
	β^+		0 80	s	3 8	0 85	0 42	5 27	5 69
	K					2 24			
	β^+		0 60	s	2 9	0 65	0 23	5 05	5 28
	K					4 49			
	β^+		0 30	s	3 6	0 81	0	3 81	3 81
	K					88 57			
	Total K				~81	95 74			

Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
Br^{76}	β^+	$16\ 5^h$	3 57	s	20	16 63	2 72	5 54	8 26
	K					0 37			
	β^+		1 7	s	4	3 33	1 38	6 16	7 54
	K					0 75			
	β^+		1 1	s	5	4 16	0 73	5 86	6 59
	K					3 97			
	β^+		0 8	s	6	4 99	0 42	5 52	5 94
	K					13 12			
	β^+		0 6	s	8	6 65	0 23	5 05	5 28
	K					46 03			
	Total K				57	64 24			
Br^{77}	β^+	$57\ 2^h$	0 336	s		fk/f+ = 66 1	0 04	≥5 32	≥5 36
Br^{78}	β^+	$6\ 4^m$	2 3	a		fk/f+ = 0 083	1 90	≥2 58	≥4 48
Br^{80}	β^+	$18\ 5^h$	0 868	s	3 4	3 36	0 50	4 04	4 54
	K				5 3	6 85			
	β^-		1 97	s	73	72 05	2 35	3 19	5 54
			1 1	s	10	9 87	1 35	4 04	5 39
			0 7	s	8	7 89	0 62	4 14	4 76
Br^{82}	β^-	$35\ 9^h$	0 465	s	100		0 01	5 11	5 12
Br^{83}	β^-	$2\ 4^h$	0 94	s	100		1 10	3 94	5 04
Br^{84}	β^-	32^m	4 68	s	40		3 96	3 68	7 64
			3 56	s	9		3 48	4 33	7 81
			2 53	s	16		2 85	4 08	6 93
			1 72	s	35		2 11	3 74	5 85
Br^{85}	β^-	$3\ 00^m$	2 5	a	100		2 84	2 26	5 10
Br^{87}	β^-	$55\ 6^s$	8 0	a	30		5 03	2 27	7 30
			2 6	a	70		2 89	1 90	4 79
Kr^{77}	β^+	$1\ 1^h$	1 7	a	~30	fk/f+ = 0 26	$1\ 28^+$	4 12	$5\ 40^+$
	K				70**				
Kr^{79}	β^+	$34\ 5^h$	0 595	s	10*	10 95	0 29	5 10	5 39
	K				90	89 05			
Kr^{85}	β^-	$4\ 36^h$	0 817	s	84		0 90	4 27	5 17
		$\sim 10^y$	0 695	s	99 3		~0 53	8 50	~9 03
									$8\ 24^1$
			0 15	a$\beta\gamma$	0 7		~−1 60	10 65	~9 05
Kr^{87}	β^-	78^m	3 2	a			3 28	≥3 67	≥6 95
Kr^{88}	β^-	$2\ 77^h$	2 4	a	?		2 75	>4 00	>6 75
									$>7\ 58^{1*}$†
			~0 5	a	?		~0 14	>4 00	>4 14
Kr^{89}	β^-	$3\ 18^m$	4 0		~65		3 72	~2 47	~6 19
			2 0		~35		2 39	~2 74	~5 13
Kr^{90}	β^-	33^s	3 2	a	<100		3 30	>1 52	>4 82
Kr^{91}	β^-	10^s	3 6	a	<100		3 51	>1 00	>4 51
Rb^{81}	β^+	$4\ 7^h$	0 990	s	6	fk/f+ = 1 66	$0\ 25^+$	5 45	$5\ 70^+$
	K				94**				
Rb^{82}	β^+	$6\ 3^h$	0 67	s	~7	16 00	0 38	4 36	4 74
	K				93	84 00			
Rb^{84}	β^+	34^d	1 53	s	7	fk/f+ = 0 41	$1\ 04^+$	7 62	$8\ 66^+$
	K				93**				
Rb^{86}	β^-	$19\ 5^d$	1 760	s	80		2 18	6 32	8 50
									$8\ 38^1$
			0 670	s	20		0 60	6 93	7 53
Rb^{87}	β^-	$6\ 2 \times 10^{10y}$	0 275	scin	100		−0 73	18 29	17 56
Rb^{88}	β^-	$17\ 8^m$	5 13	s	66		4 18	3 21	7 39
									$8\ 14^1$
			3 29	s	19		3 35	3 75	7 10
			2 04	s	15		2 43	3 85	6 28
Rb^{89}	β^-	$15\ 4^m$	4 5	a			3 92	≥2 97	≥6 89
Rb^{90}	β^-	$2\ 74^m$	5 7	a	<100		4 38	>2 22	>6 60
Rb^{91}	β^-	100^s	4 6	a	<100		3 96	>2 00	>5 96
		14^m	3 0	a	<100		3 20	>2 92	>6 12
$Rb^{92?}$	β^+	$<5^m$	3 15			fk/f+ = 0 041	2 49	≥2 48	≥4 97
Sr^{83}	β^+	38^h	1 15			fk/f+ = 1 51	0 85	≥5 14	≥5 99
Sr^{89}	β^-	53^d	1 50	s	100		1 90	6 66	8 56
									$8\ 33^1$
Sr^{90}	β^-	$19\ 9^y$	0 535		100		0 28	8 80	9 08
									$8\ 82^1$†

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** There is experimental evidence that there is more than one level of the daughter nucleus

† Statistical $(2I_f + 1)$ is included

Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
Sr^{91}	β^-	9 7^h	2 66	s	28		2 93	5 10	8 03
									8 24[1*]
			2 10	s	6		2 49	5 76	8 25
			1 36	s	32		1 72	5 04	6 76
			1 07	s	27		1 35	5 11	6 46
			0 62	s	7		0 49	5 70	6 19
Y^{84}	β^+	3 7^h	2 0	a		fk/f+ = 0 21	1 65	≥4 12	≥5 77
Y^{86}	β^+	14 6^h	1 8	s	50	25 87	1 48	5 19	6 67
	K					8 17			
	β^+		1 1	s	50	25 87	0 80	4 90	5 70
	K					40 09			
Y^{87}	β^+	80 0^h	0 7	s	0 3	fk/f+ = 6 61	−0 42[+]	7 98	7 56[+]
	K								
Y^{88}	β^+	105^d	0 83		0 19	0 19	0 57	9 02	9 59
	K					0 67			
	β^+	2 0^h	1 65	a		fk/f+ = 0 40	1 31	≥3 86	≥5 17
Y^{90}	β^-	61^h	2 18	s	100		2 63	5 34	7 97
									8 02[1]
Y^{91}	β^-	57^d	1 54	s	100		1 98	6 69	8 67
									8 51[1]
Y^{92}	β^-	3 5^h	3 5	a			3 51	≥4 10	≥7 61
									≥8 04[1*]
Y^{93}	β^-	10 0^h	3 1	a			3 28	≥4 56	≥7 84
									≥8 17[1*]
Y^{94}	β^-	16 5^m	5 4	a			4 32	≥3 00	≥7 32
									≥8 11[1*]
Zr^{87}	β^+	1 6^h	2 10	s	100*	83 33	1 73	3 76	5 49
	K					16 67			
Zr^{89}	β^+	4 4^m	~2 5	s	0 36	0 36	~2 03	4 82	~6 85
	K					0 04			
	β^+	79 3^h	0 905	s	25*	24 04	0 68	5 46	6 14
	K				75	75 96			
Zr^{93}	β^-	5×10^6 y	0 065	scin	100		−2 62	14 20	11 58
Zr^{95}	β^-	65^d	0 887	s	2		1 10	8 45	9 55
									8 93[1*]
			0 400	s	98		−0 13	6 76	6 63
Zr^{97}	β^-	17 0^h	1 91	s	100		2 39	4 79	7 18
Nb^{90}	β^+	15^h	1 2		100*	41 51	0 90	4 73	5 63
	K					58 49			
Nb^{94}	β^-	6 6^m	1 3		~0 1		1 73	~5 60	~7 33
Nb^{95}	β^-	35^d	0 16	s	100		−1 40	6 48	5 08
Nb^{96}	β^-	23^h	0 75	s	92		0 85	4 95	5 80
			0 37	s	8		−0 20	6 02	5 82
Nb^{97}	β^-	74^m	1 267	s	100		1 70	3 65	5 35
Nb^{99}	β^-	2 5^m	3 2	a			3 36	≥2 18	≥5 54
Mo^{91}	β^+	15 5^m	3 7	a	100*	95 90	2 75	2 97	5 72
	K					4 10			
	β^+	75^s	2 6	a	100*	88 57	2 11	1 88	3 99
	K					11 43			
Mo^{99}	β^-	68 3^h	1 225	s	87		1 65	5 45	7 10
			0 5	s	13		0 25	6 28	6 53
Mo^{101}	β^-	14 6^m	2 1	s			2 58	>2 94	>5 52
			1 2	s			1 62	>2 94	>4 56
Tc^{92}	β^+	4 5^m	3 5	a	80*	94 68	2 67	2 43	5 10
	K				20	5 32			
Tc^{93}	β^+	2 7^h	0 800	s	7*	13 40	0 65	3 99	4 64
	K				93	86 60			
Tc^{94}	β^+	52 5^m	2 41	s	73	65 42	1 98	3 61	5 59
	K				13	12 17			
	β^+		0 56	s	~1	0 90	0 50	4 15	4 65
	K				~13	21 51			
Tc^{95}	β^+	60^d	0 65	s	~0 4**	fk/f+ = 13 5	−0 60[+]	9 11	8 51[+]
									7 84[1*]
Tc^{99}	β^-	$2 1 \times 10^5$ y	0 293	s	100		−0 55	12 82	12 27
Tc^{100}	β^-	17^s	2 4	a			2 92	≥1 23	≥4 15
Tc^{101}	β^-	15 0m	1 20	s	>95		1 64	<2 98	<4 62
Tc^{102}	β^-	<25^s	3 7	a			3 66	≥1 40	≥5 06
Ru^{95}	β^+	1 65^h	1 1			fk/f+ = 2 63	0 92	≥3 77	≥4 69
Ru^{103}	β^-	39 8^d	0 68	s	6		0 74	7 76	8 50
			0 22	s	94		−0 89	6 56	5 67

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Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
Ru^{105}	β^-	4 4^h	1 15	s	100		1 60	4 20	5 80
Ru^{106}	β^-	1 0^y	0 039	s	100		−3 25	7 50	4 25
Ru^{107}	β^-	4^m	~4	a	100		~3 82	2 38	~6 20
Rh^{99}	β^+	4 5^h	0 74	s	100*	8 20	0 69	4 21	4 90
	K					91 80			
Rh^{100}	β^+	19 4^h	3 0	s	5	5 00	2 38	6 10	8 48
									$8\ 77^{1*}$
	K					0 58			
Rh^{102}	β^+	210^d	1 3	a		19 69	1 10	7 38	8 48
									$8\ 16^{1*}$
	K					56 69			
	β^-		1 0	a		23 62	1 40	7 88	9 28
									$8\ 76^{1*}$
Rh^{104}	β^-	44^s	2 6	s	100		3 03	1 64	4 67
Rh^{105}	β^-	36 2^h	0 570	s	95		0 50	5 14	5 64
			0 25	s	~5		−0 68	~6 42	~5 74
Rh^{106}	β^-	30^s	3 53	s	68		3 62	1 64	5 26
			3 1	s	11		3 38	2 44	5 82
			2 4	s	12		2 95	2 40	5 35
			2 0	s	3		2 55	3 00	5 55
Rh^{107}	β^-	25^m	1 2	a			1 67	≥3 18	≥4 85
Pd^{101}	β^+	9^h	2 3	s	10*	fk/f+ = 0 28	$1\ 82^+$	5 51	$7\ 33^+$
	K				90				
Pd^{107}	β^-	7×10^{6y}	~0 035	a	100		~−3 40	14 34	~10 94
									$8\ 54^{1*}$
Pd^{109}	β^-	13 4^h	0 95	s	100		1 32	4 68	6 00
Pd^{111}	β^-	22^m	2 15	s	~60		2 67	~3 34	~6 01
Pd^{112}	β^-	21^h	0 2	a	100		−0 95	4 88	3 93
Ag^{106}	β^+	24 5^m	1 94	s	$(K + \beta^+)$~70	fk/f+ = 0 525	1 65	~3 32	~4 97
	β^+		1 43	s	$(K + \beta^+)$~30	fk/f+ = 1 55	1 26	~3 69	~4 95
	β^-		0 45?		~2		0 19	~4 87	~5 06
Ag^{108}	β^-	2 4^m	1 49	scin	~67		2 09	~2 33	~4 42
Ag^{110}	β^-	270^d	0 53	s	~35		0 42	~7 82	~8 24
			0 087	s	~58		−2 14	~7 60	~5 46
		24 5^s	2 82	scin	35		3 21	1 84	5 05
			2 24	scin	65		2 81	1 58	4 39
Ag^{111}	β^-	7 5^d	1 04	s	91		1 49	5 85	7 34
			0 80	s	1		1 05	7 81	8 86
									$8\ 16^{1*}$
			0 70	s	8		0 85	6 91	7 76
Ag^{112}	β^-	3 2^h	3 6	scin	100		3 67	4 06	7 73
Ag^{113}	β^-	5 3^h	2 1	a, scin	100		2 67	4 28	6 95
Ag^{115}	β^-	20^m	~3	a	100		~3 32	3 08	~6 40
Cd^{105}	β^+	57^m	1 5	a	100?	39 22	1 31	3 53	4 84
	K					60 78			
Cd^{107}	β^+	6 7^h	0 32	s	0 31*	0 23	0 50	4 38	4 88
	K				99 3	99 77			
Cd^{113}	β^-	5^y	0 58	s	100		0 55	8 20	8 75
Cd^{115}	β^-	42 6^d	1 62	s	~98		2 21	~6 58	~8 79
			~0 66		~2		~0 77	~8 26	~9 04
			~0 32		<1		~−0 30	>8 57	>8 27
		2 33^d	1 12	s	60		1 60	5 53	7 13
			0 60	s	40		0 60	5 70	6 30
Cd^{117}	β^-	2 72^h	1 7	s			2 30	≥3 99	≥6 29
$In^{107?}$	β^+	33^m	2	s		fk/f+ = 0 576	1 69	≥3 30	≥4 99
	K								
In^{108}	β^+	50^m	2 31	s		fk/f+ = 0 363	1 91	≥3 48	≥5 39
	K								
In^{109}	β^+	4 2^h	0 75	a	~11*	6	0 85	≥4 18	≥5 03
	K				~88	94			
In^{110}	β^+	66^m	2 25	s	100*	71 07	1 87	3 60	5 47
	K					28 93			
In^{112}	β^-	10^m	1 7	a		fk/f+ = 1 12	1 50	>2 78	>4 28
	K								
	β^+		1 0	a			1 47	>2 78	>4 25
In^{114}	β^+	72^s	0 650		0 01	fk/f+ = 26 3	$-0\ 65^+$	5 86	$5\ 21^+$
	K				3				
	β^-		1 98	s	97		2 60	1 87	4 47
In^{115}	β^-	4 50^h	0 84	s	5 5		1 19	5 47	6 66
		6×10^{14y}	0 63	a	100		0 74	22 28	23 02

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Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
In^{116}	β^-	54 3^m	1 00	s	51		1 47	3 80	5 27
			0 87	s	28		1 23	4 07	5 30
			0 60	s	21		0 64	4 19	4 83
		13^s	2 95	a	100		3 34	1 11	4 45
In^{117}	β^-	1 9^h	1 73	s	100		2 35	3 84	6 18
In^{118}	β^-	4 5^m	1 5				2 12	≥2 43	≥4 55
In^{119}	β^-	17 5^m	2 7		100		3 18	3 02	6 20
Sn^{111}	β^+	35^m	1 51	s	29	33 90	1 37	3 32	4 69
	K				71	66 10			
Sn^{121}	β^-	>400^d	0 42	s	100		0 15	>7 54	>7 69
		27 5^h	0 383	s	100		0 00	5 00	5 00
Sn^{123}	β^-	130^d	1 42	s	100		2 05	7 05	9 10
									8 82[1]
		40^m	1 26	s	100		1 89	3 38	5 27
Sn^{125}	β^-	9 4^d	2 37	s	95		2 95	5 93	8 88
									9 00[1]*
			0 40	s	5		0 07	7 21	7 28
		9 5^m	2 04	s	?		2 67	>2 76	>5 43
			1 17	s	?		1 72	>2 76	>4 48
			0 51	s	1?		0 45	4 76	~5 21
Sb^{116}	β^+	60^m	~1 45	a		fk/f+ = 2 40	~1 34	≥3 56	≥4 90
	K								
Sb^{118}	β^+	3 3^m	3 1	a		fk/f+ = 0 186	2 42	≥2 30	≥4 72
	K								
Sb^{120}	β^+	16 4^m	1 70	s	35	fk/f+ = 1 38	1 18$^+$	3 45	4 63$^+$
	K								
Sb^{122}	β^-	2 8^d	2 01	s	26		2 62	5 99	8 61
									8 59[1]*
			1 45	s	69		2 11	5 55	7 66
			0 73	s	5		1 00	6 68	7 68
Sb^{124}	β^-	60^d	2 29	s	21		2 92	7 39	10 31
			1 69	s	7		2 35	7 87	10 22
			0 95	s	7		1 42	7 87	9 29
			0 65	s	~35		0 81	~7 17	~7 98
			0 48	s	~30		0 35	~7 24	~7 59
		1 3^m	3 2		<100		3 52	1 89	>5 41
Sb^{125}	β^-	2 7^y	0 62	s	18		0 75	8 67	9 42
									8 57[1]*
			0 30	s	49		−0 30	8 24	7 94
			0 128	s	33		−1 50	8 41	6 91
Sb^{126}	β^-	60^m	2 7		40		3 19	3 95	7 14
			0 7		60		0 93	3 78	4 71
	β^-	9^h	1	a	100?		1 50	≥4 51	≥6 01
Sb^{127}	β^-	93^h	1 2	a			1 80	≥5 52	≥7.32
$Sb^{(<127)??}$	β^-	28^d	1 86	a			2 52	≥6 38	≥8 90
Te^{127}	β^-	9 3^h	0 8	a	100		1 14	4 52	5 66
Te^{129}	β^-	72^m	1 8	s	100		2 48	3 64	6 12
Te^{131}	β^-	25^m	>2		100		>2 67	3 18	>5 85
Te^{132}	β^-	77 7^h	0 28	a	100		−0 38	5 45	5 07
Te^{133}	β^-	2^m	2 4		80		3 01	2 18	5.19
			1 2		20		1 82	2 78	4 60
$I^{120(?)}$	β^+	30^m	4 0			fk/f+ = 0,977	2,91	≥3,26	≥6,17
	K								
I^{121}	β^+	1 8^h	1 2			fk/f+ = 4,90	1 24	≥3 81	≥5 05
	K								
I^{122}	β^+	3 6^m	3,1	a		fk/f+ = 0 214	2 43	≥2 33	≥4 76
	K								
I^{124}	β^+	4^d	2 20	s	51	12 66	1 78	6 22	8 00
									8 01[1]
	K					8,18			
	β^+		1 50	s	44	10 92	1,41	6 00	7 41
	K					23 92			
	β^+		0 67	s	5	1 24	0 91	5 89	6 80
	K					43 08			
I^{126}	β^+	13 0^d	?		2			≥6 05	
	K								
	β^-		1 24	s	11		1 89	7 01	8 90
									8 51[1]
			0 85	s	29		1 27	6 59	7 86
I^{128}	β^-	24 99^m	2 02		87		2 70	3 24	5 94
			1 59		6 6		2 29	4 36	6 65
	K				6			4 40	

Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
I^{129}	β^-	1.72×10^7 y	0.13	pc	100		−1.45	14.73	13.28
I^{130}	β^-	12.5^h	1.03	s	60		1.59	4.88	6.47
			0.61	s	40		0.73	5.05	5.78
I^{131}	β^-	8.14^d	0.810	s	0.7		1.18	8.00	9.18
									8.50[1]*
			0.600	s	87.2		0.71	5.91	6.62
			0.335	s	9.3		−0.10	6.88	6.78
			0.250	s	2.8		−0.55	7.40	6.85
I^{132}	β^-	2.4^h	2.2	a	~50		2.87	~4.24	~7.11
			0.9	a	~50		1.35	~4.24	~5.59
I^{133}	β^-	22.4^h	1.5		1		2.19	6.91	9.10
									8.86[1]*
			1.25		~93		1.90	~4.94	~6.84
			0.4		~6		0.10	~6.13	~6.23
I^{134}	β^-	52.5^m	~3.9	a			~3.89	≥3.50	≥7.39
			~1.6	a			~2.29	≥3.50	≥5.79
I^{135}	β^-	6.68^h	1.4	s	25		2.08	4.98	7.06
			1.0	s	40		1.53	4.78	6.31
			0.47	s	35		0.39	4.84	5.23
I^{136}	β^-	86^s	6.5	a			4.88	≥1.93	≥6.81
Xe^{133}	β^-	5.27^d	0.345	s	<100		−0.08	>5.66	>5.58
Xe^{135}	β^-	9.2^h	0.90	s	100		1.39	4.52	5.91
Xe^{137}	β^-	3.9^m	~4	a			~3.96	≥2.37	≥6.33
Cs^{127}	β^+	5.5^h	~1.2	a	100*	15.11	~1.29	4.30	~5.59
	K					84.89			
Cs^{128}	β^+	3.1^m	3.1			fk/f+ = 0.257	2.45	≥2.27	≥4.72
	K								
Cs^{130}	β^+	30^m	1.97		$\beta^+/K = 3.3$	fk/f+ = 1.1	1.75	>3.26	5.01
	K								
	β^-		0.442		$\beta^+/\beta^- = 27.6$		0.28	>3.26	3.54
Cs^{134}	β^-	2.3^y	0.648		75		0.89	7.99	8.88
			0.092		25		−1.85	8.46	6.61
Cs^{135}	β^-	2.9×10^6 y	0.19		100		−0.85	13.96	13.11
Cs^{136}	β^-	13.7^d	0.3	a			−0.22	≥6.07	≥5.85
Cs^{137}	β^-	37^y	1.17	s	8		1.83	10.16	11.99
			0.52		92		0.55	9.10	9.65
									8.88[1]
Cs^{138}	β^-	33^m	2.68	s			3.26	≥3.30	≥6.56
Ba^{139}	β^-	85^m	2.27	s			2.96	≥3.71	≥6.67
Ba^{140}	β^-	12.8^d	1.02		60		1.64	6.27	7.91
			0.48		40		0.47	6.44	6.91
Ba^{141}	β^-	18^m	~2.8				~3.35	≥3.03	≥6.38
La^{131}	β^+	58^m	1.6	a		fk/f+ = 2.95	1.59	≥3.54	≥5.13
	K								
La^{132}	β^+	4.5^h	3.5	a		fk/f+ = 0.214	2.67	≥4.21	≥6.88
	K								
La^{133}	β^+	4.0^h	1.2	s		fk/f+ = 6.61	1.32	≥4.16	≥5.48
	K								
La^{134}	β^+	6.5^m	2.7	a	44	69.11	2.22	2.59	4.81
	K				56	30.89			
La^{136}	β^+	9.5^m	2.1	s	33	51.15	1.73	2.76	4.49
	K				67	48.85			
La^{140}	β^-	40.0^h	2.26	s	10		2.97	6.16	9.13
			1.67	s	20		2.45	5.86	8.31
			1.32	s	70		2.05	5.31	7.36
La^{141}	β^-	3.7^h	2.43	s	95		3.14	4.15	7.29
			0.9	s	5		1.45	5.43	6.88
La^{142}	β^-	74^m	~4.5				~4.23	≥3.65	≥7.88
Ce^{133}	β^+	6.3^h	1.3	a		fk/f+ = 5.62	1.43	≥4.36	≥5.79
	K								
Ce^{135}	β^+	22^h	0.8	a	<1	fk/f+ = 27.6	−0.30+	>6.90	>6.60+
	K				>99				
Ce^{141}	β^-	32.5^d	0.581	s	33		0.79	6.93	7.72
			0.442	s	66		0.38	6.63	7.01
Ce^{143}	β^-	33^h	1.37	s	~30		2.12	~5.60	~7.72
			1.09	s	~40		1.77	~5.47	~7.24
			0.37?	s	~30		0.10	~5.60	~5.70
Ce^{144}	β^-	290^d	0.304	s	70		−0.15	7.55	7.40
			0.170	s	<30		−0.95	≥7.92	≥6.97

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Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
Pr^{138}	β^+	2 0^h	1 4	a	11	16 95	1 50	≥3 86	≥5 36
	K				89	83 05			
Pr^{139}	β^+	4 5^h	1 0	a	6	6 62	1 30	≥4 21	≥5 51
	K				94	93 38			
Pr^{140}	β^+	3 5^m	2 23	s		fk/f+ = 1 00	1 98	≥2 32	≥4 30
	K								
Pr^{142}	β^-	19 1^h	2 15	s	96		2 94	4 86	7 80
									7 83[1]
			0 64	s	4		0 95	6 24	7 19
Pr^{143}	β^-	13 8^d	0 932	s	100		1 53	6 08	7 61
Pr^{144}	β^-	17 5^m	2 97	s	>98		3 52	<3 03	<6 55
Pr^{145}	β^-	4 5^h	3 2	a	100		3 66	4 21	7 87
Pr^{146}	β^-	24 6^m	~3	a			~3 55	≥3 17	≥6 72
Nd^{138}	β^+	22^m	2 4	a		fk/f+ = 0 851	2 10	≥3 12	≥5 22
Nd^{139}	β^+	5 5^h	3 1	a	~10	fk/f+ = 0 40	2 33+	5 30	7 63+
	K				~90				
Nd^{141}	β^+	2 42^h	0 7	a	~2	1 87	1 18	≥3 94	≥5 12
	K				~98	98 13			
Nd^{147}	β^-	11 1^d	0 825	s	~60		1 35	~6 20	~7 55
			0 600	s	~15		0 88	~6 81	~7 69
			0 38	s	~25		0 21	~6 58	~6 79
Nd^{149}	β^-	1 8^h	1 5	s			2 32	>3 81	>6 13
			1 1	s			1 82	>3 81	>5 63
			0 95	s			1 60	>3 81	>5 41
Nd^{151}	β^-	12^m	1 93	s	100		2 72	2 86	5 58
Pm^{141}	β^+	20^m	~2 6			fk/f+ = 0 776	~2 20	≥3 08	≥5 28
Pm^{143}	β^+	285^d	0 6	a		fk/f+ = 102	1 14	≥7 39	≥8 53
Pm^{146}	β^-	long	~0 7	a					
Pm^{147}	β^-	2 6^y	0 229	s	100		−0 49	7 91	7 42
Pm^{148}	β^-	5 3^d	~2 5	a			~3 25	≥5 66	≥8 91
		48^d	2 7	a	7		3 40	7 77	11 17
			0 6	a	93		0 90	6 65	7 55
Pm^{149}	β^-	50^h	1 05	s	100		1 79	5 26	7 05
Pm^{150}	β^-	2 7^h	3 00	s	86		3 59	4 05	7 64
			2 01	s	14		2 82	4 84	7 66
Pm^{151}	β^-	28^h	1 1	a	100		1 85	5 00	6 85
Sm^{151}	β^-	122^y	0 075	s	100		−2 00	9 58	7 58
Sm^{153}	β^-	47^h	0 820		33		1 40	5 71	7 11
			0 68		67		1 10	5 40	6 50
Sm^{155}	β^-	23 5^m	1 8	s	100		2 67	3 15	5 82
Sm^{156}	β^-	~10^h	~0 8	a			~1 35	≥4 56	≥5 91
$Eu^{144?}$	β^+	18^m	2 5			fk/f+ = 0 955	2 20	≥3 03	≥5 23
Eu^{150}	β^-	13 1^h	~0 85	s	<100		~1 46	>4 67	>6 13
	β^+		1 8	a	<100	fk/f+ = 3 39	1 83	>4 67	>6 50
Eu^{152}	β^-	9 2^h	1 88	s	~85		2 75	~4 59	~7 34
	K				15				
	β^-	5 3^y	1 7	a			2 60	≥8 22	≥10 82
Eu^{154}	β^-	5 4^y	1 88		22		2 75	8 89	11 64
			0 9		29		1 57	8 77	10 34
			0 6		49		0 92	8 54	9 46
Eu^{155}	β^-	1 7^y	0 243	s	20		−0 33	8 43	8 10
			0 154	s	80		−0 97	7 83	6 86
Eu^{156}	β^-	15 4^d	2 5	a	40		3 28	6 52	9 80
									9 93[1]
			~0 5	a	60		~0 66	6 35	~7 01
Eu^{157}	β^-	15 4^h	~1 7	a	25		~2 60	5 35	~7 95
			~1 0	a	75		~1 73	4 87	~6 60
Eu^{158}	β^-	60^m	~2 6	a			~3 35	≥3 56	≥6 91
Gd^{159}	β^-	18 0^h	0 95	a			1.66	≥4.81	≥6 47
Gd^{161}	β^-	3 6^m	1 5	a			2 40	≥2.33	≥4 73
Tb^{154}	β^+	17 2^h	2 6	s	0 4	fk/f+ = 1 02	1 97+	7 19	9 16+
	K				~99**				
Tb^{156}	β^+	5 0^h	1 3	a	~20	8 33	1 64	4 26	5 90
	K				~80	91 67			
Tb^{160}	β^-	71^d	0 860	s	43		1 50	7 15	8 65
			0 521	s	41		0 74	7 18	7 92
			0 396	s	16		0 35	7 58	7 93
Tb^{161}	β^-	6 8^d	0 50	a			0 70	≥5 77	≥6 47
Dy^{165}	β^-	2 42^h	1 25	s	~75		2 15	~4 06	~6 21
			0 88	s	<25		1 58	>4 54	>6 12
			0 42	s	<25		0 49	>4 54	>5 03

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Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
Dy^{166}	β^-	82^h	0 22	a			−0 40	≥5 47	≥5 07
Ho^{160}	β^+	$22\ 5^m$	~1 3	a	0 5	fk/f+ = 12 60	~0 56+	5 43	~5 99+
	K				~99**				
Ho^{162}	β^-	65^d	0 8	a	15		1 45	7 57	9 02
	K				85				
Ho^{164}	β^-	$41\ 5^m$	0 95	a			1 71	≥3 40	≥5 11
$Ho^{166?}$	β^-	$>30^y$	1 1	s	8		1 96	>10 07	>12 03
			0 28	s	46		−0 06	>9 31	>9 25
			0 18	s	46		−0 68	>9 31	>8 63
Ho^{166}	β^-	$27\ 3^h$	1 84	s	~90		2 80	~5 04	~7 84
			0 55	s	~10		0 89	~5 99	~6 88
Er^{169}	β^-	$9\ 4^d$	0 33	s	100		0 18	5 91	6 09
Er^{171}	β^-	$7\ 5^h$	1 49	s	6		2 46	5 65	8 11
									7 84[1*]
			1 05	s	72		1 91	4 57	6 48
			0 67	s	22		1 20	5 09	6 29
Tm^{166}	β^+	$7\ 7^h$	2 1	a	0 4	fk/f+ = 2 88	1 55+	6 84	8 39+
	K				99**				
	β^-?		~1		0 3		~1 87	7 97	~9 84
Tm^{168}	β^-?	85^d	0 5	a	~2		0 80	~8 56	~9 36
	K				~98				
Tm^{170}	β^-	127^d	0 968	s	76		1 81	7 16	8 97
			0 886	s	24		1 64	7 66	9 30
Tm^{171}	β^-	680^d	0 10	s	100		−1 41	7 77	8 36
Yb^{175}	β^-	$4\ 2^d$	0 50	a			0 84	>5 56	>6 40
			0 13	a			−1 05	>5 56	>4 51
Yb^{177}	β^-	$1\ 8^h$	1 3	a	100		2 31	3 81	6 12
Lu^{172}	β^+	$4\ 0^h$	1 2	a		fk/f+ = 22 4	1 76	≥4 16	≥5 92
Lu^{174}	β^-	165^d	0 6	a	~25		1 10	~7 76	~8 86
	K				~75				
Lu^{176}	β^-	$3\ 75^h$	1 2		~50		2 20	~4 43	~6 83
			1 1		~50		2 05	~4 43	~6 48
	β^-	$2\ 4 \times 10^{10y}$	0 40	a	33		0 51	18 36	18 87
	K				67				
Lu^{177}	β^-	$6\ 8^d$	0 475	s	65		0 79	5 96	6 75
			0 366	s	17		0 41	6 54	6 95
			0 169	s	18		−0 66	6 51	5 85
Hf^{170}	β^+	$1\ 9^h$	2 4	s	100*	28 49	2 31	3 84	6 15
	K					71 51			
Hf^{181}	β^-	45^d	0 410	s	100		0 58	6 59	7 17
Ta^{178}	β^+	$9\ 35^m$	1 06	a	~6*	2 45	1 75	2 75	4 50
	K				~94	97 55			
	β^+	$2\ 1^h$	~1	a	~3	2 04	~1 72	3 88	~5 60
	K				~97	97 96			
Ta^{180}	β^-	$8\ 1^h$	0 71	s	10		1 39	5 46	6 85
			0 61	s	11		1 15	5 42	6 57
	K				79				
Ta^{182}	β^-	115^d	0 52	s	<100		0 95	>7 00	>7 95
Ta^{183}	β^-	$6\ 0^d$	0 6	a			1 13	≥5 72	≥6 85
Ta^{185}	β^-	48^m	1 7	a	100		2 80	3 46	6 26
W^{176}	β^+	80^m	~2	a	~0 5	fk/f+ = 5 13	~1 41+	~5 98	~7 39+
	K				~99				
W^{185}	β^-	74^d	0 428	s	100		0 70	6 81	7 51
W^{187}	β^-	$24\ 1^h$	1 318	s	30		2 40	5 46	7 86
			0 627	s	70		1 24	5 09	6 33
Re^{186}	β^-	91^h	1 07	s	76		2 05	5 64	7 69
			0 93	s	19		1 85	6 24	8 09
			0 30	s	0 4		0 19	7 91	8 10
	K				4 6				
Re^{187}	β^-	4×10^{12y}	0 043	a	100		−2 45	20 10	17 65
Re^{188}	β^-	17^h	2 1	s			3 17	≥4 79	≥7 96
Os^{191}	β^-	16^d	0 143	s	100		−0 79	6 14	5 35
Os^{193}	β^-	31^h	1 10	s	100		2 17	5 05	7 22
Ir^{187}	β^+	$11\ 8^h$	2 2	s	0 3	fk/f+ = 4 79	1 60+	7 15	8 75+
	K				~100				
Ir^{188}	β^+	$41\ 5^h$	2 0	s	0 3	fk/f+ = 6 31	1 40+	7 70	9 10+
	K				~100				
Ir^{190}	β^+	$3\ 2^h$	1 7	s	?	fk/f+ = 11 2	2 17	≥4 06	≥6 23
Ir^{192}	β^-	$74\ 4^d$	0 65	s	<100		1 35	>6 81	>8 16
Ir^{194}	β^-	$19\ 0^h$	2 18	s	<100		3 30	>4 84	>8 14

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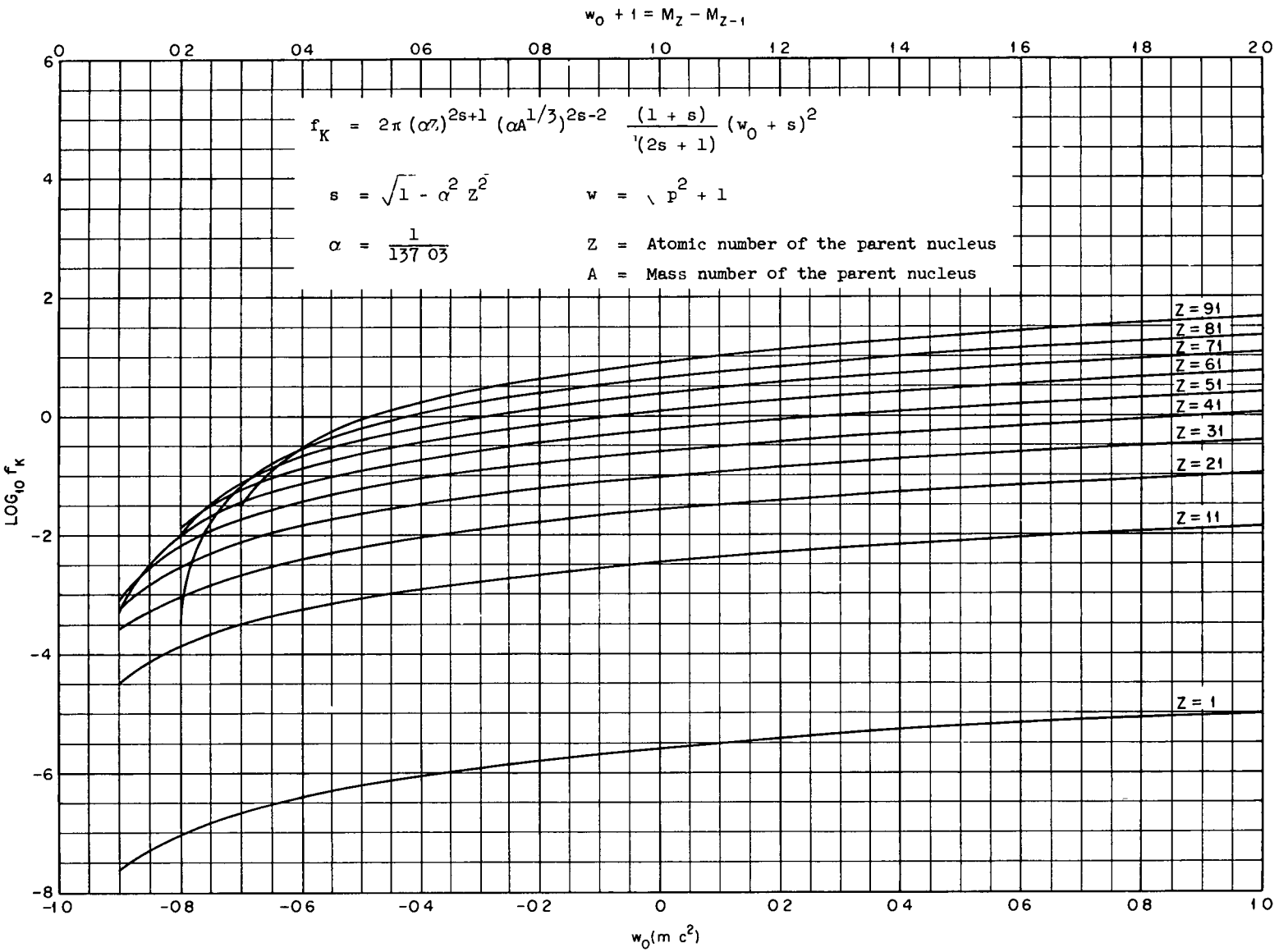
Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
Pt^{197}	β^-	18^h	0 67	s	98 5		1 40	4 82	6 22
			0 48	a$\beta\gamma$	0 5		0 91	7 14	8 05
Pt^{199}	β^-	29^m	1 8	a			2 97	≥3 24	≥6 21
Au^{192}	β^+	$4\ 0^h$	1 9	a	~1	fk/f+ = 8 71	1 30+	6 16	7 46+
	K				~99				
Au^{194}	β^+	$39\ 5^h$	1 8	a	~3	8 55	2 27	5 15	7 42
	K				~97	91 45			
Au^{196}	β^-	$5\ 55^d$	0 30		4 5		0 30	7 03	7 33
Au^{198}	β^-	$2\ 69^d$	1 38	scin	0 04		2 59	8 76	11 35
			0 96	scin	98		2 00	5 38	7 38
			0 29	s	1 8		0 27	7 11	7 38
Au^{199}	β^-	$3\ 15^d$	0 46	s	4		0 90	6 83	7 73
			0 30	s	74		0 30	5 57	5 87
			0 25	s	22		0 07	6 09	6 16
Au^{200}	β^-	48^m	2 5	a			3 60	≥3 46	≥7 06
Hg^{203}	β^-	$46\ 5^d$	0 208	s	100		−0 20	6 60	6 40
Hg^{205}	β^-	$5\ 6^m$	1 75	a	100		2 99	2 53	5 52
Tl^{204}	β^-	$3\ 9^y$	0 762	s	98 5		1 69	8 10	9 79
									9 05[1]
Tl^{206}	β^-	$4\ 23^m$	1 51	s	100		2 78	2 40	5 18
Tl^{207}	β^-	$4\ 79^m$	1 44	a	100		2 70	2 46	5 16
Tl^{208}	β^-	$3\ 1^m$	1 792	s	<100		3 04	>2 27	>5 31
Tl^{209}	β^-	$2\ 2^m$	1 9				3 12	≥2 12	≥5 24
Tl^{210}	β^-	$1\ 32^m$	1 8	cc, a			3 05	≥1 90	≥4 95
Pb^{209}	β^-	$3\ 32^h$	0 64	s	100		1 45	4 08	5 53
Pb^{210}	β^-	22^y	0 018	pc	100		−3 45	8 84	5 39
Pb^{211}	β^-	$36\ 1^m$	1 39		~80		2 65	~3 43	~6 08
			~0 5		~20		~1 11	~4 04	~5 15
Pb^{212}	β^-	$10\ 6^h$	0 589	s	~12		1 32	~5 50	~6 82
			0 355	s	~83		0 59	~4 66	~5 35
Pb^{214}	β^-	$26\ 8^m$	0 65				1 45	≥3 21	≥4 66
Bi^{210}	β^-	$5\ 02^d$	1 17	s	100		2 41	5 64	8 05
Bi^{212}	β^-	60 5m	2 250	s	66 3		3 49	3 74	7 23
Bi^{213}	β^-	47^m	1 2	a	98		2 46	3 46	5 92
Bi^{214}	β^-	$19\ 7^m$	3 173		~23		4 05	~3 71	~7 76
			1 650		~77		2 95	~3 19	~6 14
Fr^{223}	β^-	21^m	1 20	cc			2 55	≥3 10	≥5 65
Ra^{225}	β^-	$14\ 8^d$	0 25				0 28	≥6 11	≥6 39
Ra^{228}	β^-	$6\ 7^y$	<0 018				−3 33	≥8 32	≥4 99
Ra^{230}	β^-	1^h	1 2	s			2 58	≥3 56	≥6 14
Ac^{226}	β^-	29^h	1 17	a	100		2 56	5 02	7 58
Ac^{227}	β^-	22^y	0 041		99		−2 15	8 84	6 69
Ac^{228}	β^-	$6\ 13^h$	2 03				3 40	>4 34	>7 74
			1 74				3 19	>4 34	>7 53
			1 10	s			2 45	>4 34	>6 79
Ac^{230}	β^-	$<1^m$	2 2	s			3 60	≥1 78	≥5 38
Th^{231}	β^-	$25\ 6^h$	0 302		44		0 60	5 32	5 92
			0 216	s	11		0 12	5 92	6 04
			0 093	s	45		−1 01	5 31	4 30
Th^{233}	β^-	$23\ 5^m$	1 23	s	100		2 69	3 15	5 84
Th^{234}	β^-	$24\ 10^d$	0 192	s	80		−0 01	6 42	6 41
			0 104	s	20		−0 85	7 02	6 17
Pa^{230}	β^-	$17\ 7^d$	0.43	a	<10		1 11	>7 18	>8 29
			0 22	a	<10		0 20	>7 18	>7 38
	K				>80				
Pa^{232}	β^-	$1\ 32^d$	0 28	a			0 52	≥5 06	≥5 58
Pa^{233}	β^-	$27\ 4^d$	0 58	s	5		1 54	7 68	9 22
			0 27	s	~70		0 49	~6 53	~7 02
Pa^{234}	β^-	$1\ 14^m$	2 32	s	98		3 71	1 84	5 55
			~1 50	s	~2		~2 99	~3 53	~6 52
			0 82	s	0 2		2 01	4 53	6 54
		$6\ 7^h$	1 2	s	10		2 65	5 38	8 03
			0 45	s	90		1 20	4 43	5 63
Pa^{235}	β^-	23^m	1 4	a			2 89	≥3 14	≥6 03
U^{237}	β^-	$6\ 7^d$	0 23	s	<100		0 28	>5 76	>6 04
U^{239}	β^-	$23\ 5^m$	1 22	s	100		2 71	3 15	5 86
Np^{236}	β^-	22^h	0 51	s	20		1 41	5 60	7 01
			0 36	s	14		0 92	5 75	6 67
	K				66				
Np^{238}	β^-	$2\ 10^d$	1 272	s	47		2 79	5 59	8 38
			0 258	s	53		0 45	5 53	5 98

Nucleus	Decay	τ	E_β	Method	Experimental % Branching	Calculated % Branching	log f_0	log t	log ft
Np^{239}	β^-	2 33^d	0 719	s			1 89	>5 30	>7 19
			0 651	s			1 74	>5 30	>7 04
			0 44	s			1 21	>5 30	>6 51
			0 34	s			0 84	>5 30	>6 14
Np^{241}	β^-	60^m	0 9	s			2 23	>3 56	>5 79
			0 5				1 38	>3 56	>4 94
Pu^{241}	β^-	14^y	0 020				−3 00	≥8 64	≥5 64
Pu^{243}	β^-	5^h	0 39	s			1 05	≥4 26	≥5 31
Am^{242}	β^-	16 0^h	0 628	s	60		1 71	4 98	6 69
	K				10				
	β^-	100^y	0 575	s	99		1 61	9 50	11 11


$w_0 + 1 = M_Z - M_{Z-1}$
0
0.2
0.4
0.6
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1.0
1.2
1.4
1.6
1.8
2.0
$f_K = 2\pi (\alpha Z)^{2s+1} (\alpha A^{1/3})^{2s-2} \frac{(1+s)}{\Gamma(2s+1)} (w_0 + s)^2$
$s = \sqrt{1 - \alpha^2 Z^2}$
$w = \sqrt{p^2 + 1}$
$\alpha = \frac{1}{137.03}$
Z = Atomic number of the parent nucleus
A = Mass number of the parent nucleus
Z = 91
Z = 81
Z = 71
Z = 61
Z = 51
Z = 41
Z = 31
Z = 21
Z = 11
Z = 1
$\log_{10} f_K$
6
4
2
0
-2
-4
-6
-8
-1.0
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1.0
$w_0 (m c^2)$