คุณสมบัติของธาตุและโมเลกุล(Properties of the Elements and Certain Molecules)

Element or molecule	Symbol	Atomic number	Atomic or molecular weight*	Nominal density, g/cm^3	Atoms or molecules per cm^3† ($\times 10^{24}$)	σ_a,‡ barns	σ_s,‡ barns	Σ_a,† cm^{-1}	Σ_s,† cm^{-1}
Actinium	Ac	89	227			515			
Aluminum	Al	13	26.9815	2.699	0.06024	0.230	1.49	0.01386	0.08976
Antimony	Sb	51	121.75	6.62	0.03275	5.4	4.2	0.1769	0.1376
Argon	Ar	18	39.948	Gas		0.678	0.644		
Arsenic	As	33	74.9216	5.73	0.04606	4.3	7	0.1981	0.3224
Barium	Ba	56	137.34	3.5	0.01535	1.2		0.01842	
Beryllium	Be	4	9.0122	1.85	0.1236	0.0092	6.14	0.001137	0.7589
Bismuth	Bi	83	208.980	9.80	0.02824	0.033		0.0009319	
Boron	B	5	10.811	2.3	0.1281	759	3.6	97.23	0.4612
Bromine	Br	35	79.909	3.12	0.02351	6.8	6.1	0.1599	0.1434
Cadmium	Cd	48	112.40	8.65	0.04635	2450	5.6	113.56	0.2596
Calcium	Ca	20	40.08	1.55	0.02329	0.43		0.01001	
Carbon (graphite)§	C	6	12.01115	1.60	0.08023	0.0034	4.75	0.0002728	0.3811
Cerium	Ce	58	140.12	6.78	0.02914	0.63	4.7	0.01836	0.1370
Cesium	Cs	55	132.905	1.9	0.008610	29.0		0.2497	
Chlorine	Cl	17	35.453	Gas		33.2			
Chromium	Cr	24	51.996	7.19	0.08328	3.1	3.8	0.2582	0.3165
Cobalt	Co	27	58.9332	8.8	0.08993	37.2	6.7	3.345	0.6025
Copper	Cu	29	63.54	8.96	0.08493	3.79	7.9	0.3219	0.6709
Deuterium	D	1	2.01410	Gas		0.00053			
Dysprosium	Dy	66	162.50	8.56	0.03172	930	100	29.50	3.172
Erbium	Er	68	167.26	9.16	0.03203	162	11.0	5.189	0.3523
Europium	Eu	63	151.96	5.22	0.02069	4600	8.0	95.17	0.1655
Fluorine	F	9	18.9984	Gas		0.0095	4.0		
Gadolinium	Gd	64	157.25	7.95	0.03045	49000		1492	
Gallium	Ga	31	69.72	5.91	0.05105	2.9	6.5	0.1480	0.3318

Germanium	Ge	32	72.59	5.36	0.04447	2.3	7.5	0.1023	0.3335
Gold	Au	79	196.967	19.32	0.05907	98.8		5.836	
Hafnium	Hf	72	178.49	13.36	0.04508	102	8	4.598	0.3606
Heavy water[11]	D_2O		20.0276	1.105	0.03323	0.00133	13.6	4.420×10^{-5}	0.4519
Helium	He	2	4.0026	Gas		<0.05			
Holmium	Ho	67	164.930	8.76	0.03199	66.5	9.4	2.127	0.3007
Hydrogen	H	1	1.00797	Gas		0.332			
Indium	In	49	114.82	7.31	0.03834	193.5		7.419	
Iodine	I	53	126.9044	4.93	0.02340	6.2		0.1451	
Iridium	Ir	77	192.2	22.5	0.07050	426	14	30.03	0.9870
Iron	Fe	26	55.847	7.87	0.08487	2.55	10.9	0.2164	0.9251
Krypton	Kr	36	83.80	Gas		25.0	7.50		
Lanthanum	La	57	138.91	6.19	0.02684	9.0	9.3	0.2416	0.2496
Lead	Pb	82	207.19	11.34	0.03296	0.170	11.4	0.005603	0.3757
Lithium	Li	3	6.939	0.53	0.04600	70.7		3.252	
Lutetium	Lu	71	174.97	9.74	0.03353	77	8	2.581	0.2682
Magnesium	Mg	12	24.312	1.74	0.04310	0.063	3.42	0.002715	0.1474
Manganese	Mn	25	54.9380	7.43	0.08145	13.3	2.1	1.083	0.1710
Mercury	Hg	80	200.59	13.55	0.04068	375		15.26	
Molybdenum	Mo	42	95.94	10.2	0.06403	2.65	5.8	0.1697	0.3714
Neodymium	Nd	60	144.24	6.98	0.02914	50.5	16	1.472	0.4662
Neon	Ne	10	20.183	Gas		0.038	2.42		
Nickel	Ni	28	58.71	8.90	0.09130	4.43	17.3	0.4045	1.579
Niobium	Nb	41	92.906	8.57	0.05555	1.15		0.06388	
Nitrogen	N	7	14.0067	Gas		1.85	10.6		
Osmium	Os	76	190.2	22.5	0.07124	15.3		1.090	
Oxygen	O	8	15.9994	Gas		0.00027	3.76		
Palladium	Pd	46	106.4	12.0	0.06792	6.9	5.0	0.4686	0.3396
Phosphorus (yellow)	P	15	30.9738	1.82	0.03539	0.180		0.006370	
Platinum	Pt	78	195.09	21.45	0.06622	10.0	11.2	0.6622	0.7167
Plutonium	Pu	94	239.0522	19.6	0.04938	$\sigma_a = 1011.3$ $\sigma_f = 742.5$	7.7	49.93 36.66	0.3802
Polonium	Po	84	210	9.51	0.02727				

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Potassium	K	19	39.102	0.86	0.01325	2.10	1.5	0.02783	0.01988
Praseodymium	Pr	59	140.907	6.78	0.02898	11.5	3.3	0.3333	0.09563
Promethium	Pm	61							
Protactinium	Pa	91	231.0359			210			
Radium	Ra	88	226.0254	5.0	0.01332	11.5		0.1532	
Rhenium	Re	75	186.2	20	0.06596	88	11.3	5.804	0.7453
Rhodium	Rh	45	102.905	12.41	0.07263	150		10.89	
Rubidium	Rb	37	85.47	1.53	0.01078	0.37	6.2	0.003989	0.06684
Ruthenium	Ru	44	101.07	12.2	0.07270	2.56		0.1861	
Samarium	Sm	62	150.35	6.93	0.02776	5800		161.0	
Scandium	Sc	21	44.956	2.5	0.03349	26.5	24	0.8875	0.8038
Selenium	Se	34	78.96	4.81	0.03669	11.7	9.7	0.4293	0.3559
Silicon	Si	14	28.086	2.33	0.04996	0.16	2.2	0.007994	0.1099
Silver	Ag	47	107.870	10.49	0.05857	63.6		3.725	
Sodium	Na	11	22.9898	0.97	0.02541	0.530	3.2	0.01347	0.08131
Strontium	Sr	38	87.62	2.6	0.01787	1.21	10	0.02162	0.1787
Sulfur (yellow)	S	16	32.064	2.07	0.03888	0.520	0.975	0.02022	0.03791
Tantalum	Ta	73	180.948	16.6	0.05525	21.0	6.2	1.160	0.3426
Technetium	Tc	43	99			19			
Tellurium	Te	52	127.60	6.24	0.02945	4.7		0.1384	
Terbium	Tb	65	158.925	8.33	0.03157	25.5	20	0.8050	0.6314
Thallium	Tl	81	204.37	11.85	0.03492	3.4	9.7	0.1187	0.3387
Thorium	Th	90	232.038	11.71	0.03039	7.40	12.67	0.2249	0.3850
Thulium	Tm	69	168.934	9.35	0.03314	103	12	3.413	0.3977
Tin	Sn	50	118.69	7.298	0.03703	0.63		0.02333	

Titanium	Ti	22	47.90	4.51	0.05670	6.1	4.0	0.3459	0.2268
Tungsten	W	74	183.85	19.2	0.06289	18.5		1.163	
Uranium	U	92	238.03	19.1	0.04833	$\sigma_a = 7.59$	8.90	0.3668	0.4301
						$\sigma_f = 4.19$		0.2025	
Vanadium	V	23	50.942	6.1	0.07212	5.04	4.93	0.3635	0.3556
Water	H_2O		18.0153	1.0	0.03343	0.664	103	0.02220	3.443
Xenon	Xe	54	131.30	Gas		24.5	4.30		
Ytterbium	Yb	70	173.04	7.01	0.02440	36.6	25.0	0.8930	0.6100
Yttrium	Y	39	88.906	5.51	0.03733	1.28	7.60	0.04778	0.2837
Zinc	Zn	30	65.37	7.133	0.06572	1.10	4.2	0.07230	0.2760
Zirconium	Zr	40	91.22	6.5	0.04291	0.185	6.40	0.007938	0.2746

•Based on $^{12}C = 12.00000$.

†Four-digit accuracy for computational purposes only; last digit(s) usually is not meaningful.
‡Cross sections at 0.0253 eV or 2200 m/sec. The scattering cross sections, except for those of H_2O and D_2O, are measured values in a thermal neturon spectrum and are assumed to be 0.0253 eV values because σ_s is usually constant at thermal energies. The errors in σ_s tend to be large, and the tabulated values of σ_s should be used with caution. (From BNL-325, 3rd ed., 1973).
§The value of σ_a given in the table is for pure graphite. Commercial, reactor-grade graphite contains varying amounts of contaminants and σ_a is somewhat larger, say, about 0.0048 barns, so that $\Sigma_a \cong 0.0003851$ cm^{-1}.
¶The value of σ_a given in the table is for pure D_2O. Commercially available heavy water contains small amounts of ordinary water and σ_a in this case is somewhat larger.

ตารางนิวไคลด์

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
Neutron	$_0n^1$		1.0086654	1/2	12.8m	β^- 0.782
Hydrogen	$_1H^1$	99.9844–99.9867	1.0078252	1/2		
	H^2	0.0133–0.0156	2.0141022	1		
	H^3		3.0160494	1/2	12.26y	β^- 0.0186
Helium	$_2He^3$	1.3×10^{-4} (atm) 1.7×10^{-5} (well)	3.0160299	1/2		
	He^4	~100	4.0026036	0		
	He^6		6.01890	0	0.82s	β^- 3.51
Lithium	$_3Li^6$	7.42	6.015126	1		
	Li^7	92.58	7.016005	3/2		
	Li^8		8.022488		0.84s	β^- 13; 2α
	Li^9		9.028		0.17s	β^- ~8; n; 2α
Beryllium	$_4Be^7$		7.016931		53.6d	EC; γ 0.477
	Be^8		8.005308		10^{-16}s	2α 0.047
	Be^9	100	9.012186	3/2		
	Be^{10}		10.013535		2.5×10^6y	β^- 0.555
	Be^{11}		11.02166		13.6s	β^- 11.5, 9.3
Boron	$_5B^8$		8.024612		0.78s	β^+ 13.7; 2α
	B^{10}	19.61	10.012939	3		
	B^{11}	80.39	11.0093051	3/2		
	B^{12}		12.014353		0.020s	β^- 13.37; (α, γ)
	B^{13}		13.017779		~0.035s	β^-
Carbon	$_6C^{10}$		10.01683		19.1s	β^+ 2.1; γ 0.72
	C^{11}		11.011433	3/2	20.4m	β^+ 0.99
	C^{12}	98.893	12.000000	0		
	C^{13}	1.107	13.003354	1/2		
	C^{14}		14.0032419	0	5720y	β^- 0.155
	C^{15}		15.010600		2.4s	β^- 4.51, 9.82; γ 5.30
	C^{16}		16.01470		0.74s	β^-; n
Nitrogen	$_7N^{12}$		12.01871		0.011s	β^+ 16.6; (3α)
	N^{13}		13.005739	1/2	10.0m	β^+ 1.19
	N^{14}	99.634	14.0030744	1		
	N^{15}	0.366	15.000108	1/2		
	N^{16}		16.00609		7.38s	β^- 4.26, 10.4, 3.3; γ 6.13 (others)
	N^{17}		17.00845		4.14s	β^- 3.7; n 0.9
Oxygen	$_8O^{14}$		14.008597		72s	β^+ 1.83; $^+$ 2.3
	O^{15}		15.003072	1/2	2.0m	β^+ 1.72
	O^{16}	99.759	15.9949149	0		
	O^{17}	0.0374	16.999133	5/2		
	O^{18}	0.2039	17.9991598	0		
	O^{19}		19.003577		29.4s	β^- 3.25, 4.60; γ 0.20(m), 1.37
	O^{20}		20.00407		13.6s	β^- 2.69; γ 1.06
Fluorine	$_9F^{17}$		17.002098		66s	β^+ 1.75
	F^{18}		18.000950		110m	β^+ 0.649
	F^{19}	100	18.998405	1/2		
	F^{20}		19.999985		11.5s	β^- 5.41; γ 1.63
	F^{21}		20.99997		4.32s	β^- 6.1, 4.4, 5.8; γ 0.35, 1.39
Neon	$_{10}Ne^{18}$		18.00572		1.5s	β^+ 3.2; (γ)
	Ne^{19}		19.001892		17s	β^+ 2.24
	Ne^{20}	90.92	19.9924404	0		
	Ne^{21}	0.257	20.993849	3/2		
	Ne^{22}	8.82	21.991385	0		
	Ne^{23}		22.994475		38s	β^- 4.39, 3.95; γ 0.438 (others)
	Ne^{24}		23.99360		3.4m	β^- 1.98; γ 0.472 (m), (0.878)

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
Sodium	$_{11}Na^{20}$		20.0089		0.38s	β^+; $\alpha > 2$
	Na^{21}		20.99764		22s	β^+ 2.51; (γ)
	Na^{22}		21.994435	3	2.58y	β^+ 0.544; EC; γ 1.274
	Na^{23}	100	22.989773	3/2		
	Na^{24}		23.990967	4	15.0h	β^- 1.39; γ 1.368, 2.758
	Na^{24m}				0.02s	IT 0.472; β^- ~6
	Na^{25}		24.9899		60s	β^- 3.8, 2.8; γ 0.98, 0.58, 0.40
	Na^{26}		25.9917		1.0s	β^- 6.7; γ 1.82
Magnesium	$_{12}Mg^{22}$				3.9s	β^+; γ 0.074, 0.59
	Mg^{23}		22.99414		12s	β^+ 3.09, (2.64); (γ 0.44)
	Mg^{24}	78.70	23.985045	0		
	Mg^{25}	10.13	24.985840	5/2		
	Mg^{26}	11.17	25.982591	0		
	Mg^{27}		26.984345		9.5m	β^- 1.75, 1.59; γ 0.834, 1.015 (others)
	Mg^{28}		27.98388		21.3h	β^- 0.46; γ 0.032, 1.35, 0.40, 0.95
Aluminium	$_{13}Al^{24}$		24.0001		2.1s	β^+ 8.7, 4.5; γ 1.39, 2.73, 4.22 (others)
	Al^{25}		24.99041		7.3s	β^+ 3.24; (γ)
	Al^{26}		25.986900	5	7.4×10^5y	β^+ 1.16; (EC); γ 1.83 (others)
	Al^{26m}			0	6.4s	β^+ 3.21
	Al^{27}	100	26.981535	5/2		
	Al^{28}		27.981908		2.3m	β^- 2.87; γ 1.78
	Al^{29}		28.98044		6.6m	β^- 2.5, 1.3; γ 1.28, 2.43
	Al^{30}		29.9812		3.3s	β^- 5.05; γ 2.26, 3.52
Silicon	$_{14}Si^{26}$		25.9923		2.1s	β^+ 3.76, 2.94; γ 0.82
	Si^{27}		26.98670		4.2s	β^+ 3.85; (γ)
	Si^{28}	92.2[1]	27.976927	0		
	Si^{29}	4.70	28.976491	1/2		
	Si^{30}	3.09	29.973761	0		
	Si^{31}		30.975349		2.62h	β^- 1.48; (γ)
	Si^{32}		31.97402		710y	β^- ~0.1
Phosphorus	$_{15}P^{28}$		27.9917		0.28s	β^+ 10.6, others; γ 1.8–7.6
	P^{29}		28.98182		4.3s	β^+ 3.95; (γ)
	P^{30}		29.97832		2.50m	β^+ 3.24; (γ)
	P^{31}	100	30.973763	1/2		
	P^{32}		31.973908	1	14.3d	β^- 1.71
	P^{33}				25d	β^- 0.24
	P^{34}		33.9733		12.4s	β^- 5.1, 3.0; γ 2.1
Sulfur	$_{16}S^{30}$		29.9847		1.4s	β^+ 4.30, 4.98; γ 0.68
	S^{31}		30.97960		2.6s	β^+ 4.39; (γ)
	S^{32}	95.0	31.972074	0		
	S^{33}	0.760	32.971460	3/2		
	S^{34}	4.22	33.967864	0		
	S^{35}		34.969034	3/2	87d	β^- 0.167
	S^{36}	0.014	35.96709	0		
	S^{37}		36.9710		5.1m	β^- 1.6, 4.8; γ 3.1
	S^{38}		37.9712		2.87h	β^- 1.1; γ 1.88
Chlorine	$_{17}Cl^{32}$		31.9860		0.31s	β^+ 9.5, 5, 8.2; γ 2.2, 4.8 (others)
	Cl^{33}		32.97745		2.6s	β^+ 4.5; (γ)
	Cl^{34}		33.97376		1.6s	β^+ 4.4
	Cl^{34m}				32.4m	β^+ 2.41, 1.24; IT γe^- 0.145; γ 2.14, 3.32, 1.16
	Cl^{35}	75.53	34.968854	3/2		
	Cl^{36}		35.96831	2	3.0×10^5y	β^- 0.714; (EC); (β^+)
	Cl^{37}	24.47	36.965896	3/2		
	Cl^{38}		37.96800		37.3m	β^- 4.81, 1.11, 2.77; γ 2.15, 1.60
	Cl^{38m}				1s	IT γ 0.66

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	Cl^{39}		38.96800		56m	β^- 1.91 (others); γ 1.27, 0.25, 1.52
	Cl^{40}		39.9704		1.4m	β^- ~3.2, ~7.5; γ 1.46, 2.75, 6.0
Argon	$_{18}Ar^{35}$		34.97528		1.84s	β^+ 4.95; (γ)
	Ar^{36}	0.337	35.967548	0		
	Ar^{37}		36.966772	3/2	35.0d	EC
	Ar^{38}	0.063	37.962725	0		
	Ar^{39}		38.96432		270y	β^- 0.565
	Ar^{40}	99.600	39.962384	0		
	Ar^{41}		40.96451		1.83h	β^- 1.20; γ 1.29
	Ar^{42}		41.96304		34y	β^-
Potassium	$_{19}K^{37}$		36.97336		1.2s	β^+ 5.1
	K^{38}		37.96909		7.7m	β^+ 2.68; γ 2.16
	K^{38m}				0.95s	β^+ 5.0
	K^{39}	93.10	38.963714	3/2		
	K^{40}	0.0118	39.964008	4	1.27×10^9y	β^- 1.32; EC; γ 1.46; (β^+)
	K^{41}	6.88	40.961835	3/2		
	K^{42}		41.96242	2	12.36h	β^- 3.55, 1.98; γ 1.52
	K^{43}		42.96073	3/2	22.4h	β^- 0.83 (others); γ 0.619, 0.374 (others)
	K^{44}		43.9620		22m	β^- 2.63, 4.9; γ 1.16, others
	K^{45*}				34m	β^-
Calcium	$_{20}Ca^{38}$		37.9758		0.66s	β^+; γ 3.5
	Ca^{39}		38.97071		0.88s	β^+ 5.5
	Ca^{40}	96.97	39.962589	0		
	Ca^{41}		40.96228	7/2	1.1×10^5y	EC
	Ca^{42}	0.64	41.958628			
	Ca^{43}	0.145	42.958780	7/2		
	Ca^{44}	2.06	43.955490			
	Ca^{45}		44.956189		165d	β^- 0.255
	Ca^{46}	0.0033	45.95369			
	Ca^{47}		46.95451		4.5d	β^- 1.94, 0.66; γ 1.31 (others)
	Ca^{48}	0.185	47.95236			
	Ca^{49}		48.95566		8.8m	β^- 1.95, 0.89; γ 3.10, 4.05
Scandium	$_{21}Sc^{40}$		39.9775		0.2s	β^+ 9.2; γ 3.75
	Sc^{41}		40.96925		0.55s	β^+ 5.6
	Sc^{42}		41.96551		0.68s	β^+ 5.4
	Sc^{42m}		41.96623		62s	β^+ 2.87; γ 0.44, 1.23, 1.52
	Sc^{43}		42.96116	7/2	3.9h	β^+ 1.18, 0.82; EC; γ 0.37
	Sc^{44}		43.95941	2	3.9h	β^+ 1.47; γ 1.16 (others); (EC)
	Sc^{44m}		43.95970	6	2.44d	IT γe^- 0.27; (EC; γ)
	Sc^{45}	100	44.955919	7/2		
	Sc^{46}		45.95517	4	84d	β^- 0.357; γ 1.119, 0.887
	Sc^{46m}		45.95532		20s	IT γe^- 0.142
	Sc^{47}		46.95240		3.44d	β^- 0.44, 0.60; γ 0.160
	Sc^{48}		47.95223		1.83d	β^- 0.65; γ 1.04, 1.31, 0.99, (0.18)
	Sc^{49}		48.95002		57m	β^- 2.0; (γ)
	Sc^{50}		49.9516		1.8m	β^- ~3.5; γ 1.17, 1.59, 0.51
	Sc^{50m}				0.35s	IT γ 0.26
Titanium	$_{22}Ti^{43}$		42.96850		0.6s	β^+ 5.8
	Ti^{44}		43.95957		~50y	EC (to 3.9h Sc^{44}); γ 0.068, 0.078
	Ti^{45}		44.95813	7/2	3.08h	β^+ 1.02; EC; (γ)
	Ti^{45m}				0.006s	IT 0.28
	Ti^{46}	7.93	45.952633			
	Ti^{47}	7.28	46.95176	5/2		
	Ti^{48}	73.94	47.947948			
	Ti^{49}	5.51	48.947867	7/2		
	Ti^{50}	5.34	49.944789			
	Ti^{51}		50.94662		5.9m	β^- 2.14; γ 0.32 (others)
	Ti^{52}				12m	β^-

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
Vanadium	$_{23}V^{46}$?		45.96023		0.4s	β^+ 6.05
	V^{47}		46.95489		31m	β^+ 1.89; (γ)
	V^{48}		47.95226		16.1d	β^+ 0.69; EC; γ 1.31, 0.99 0.95, 2.23
	V^{49}		48.94852	7/2	330d	EC
	V^{50}	0.24	49.947165	6	6×10^{15}y	β^- 0.4; EC; γ 0.78, 1.59
	V^{51}	99.76	50.943978	7/2		
	V^{52}		51.94480		3.77m	β^- 2.6; γ 1.44
	V^{53}		52.94337		2m	β^- 2.5; γ 1.00, (1.29)
	V^{54}				55s	β^- 3.3; γ 0.84, 0.99, 2.2
Chromium	$_{24}Cr^{46}$?				1.1s	β^+
	Cr^{48}		47.9538		23h	EC; γ 0.116, 0.305 (m)
	Cr^{49}		48.95127		41.7m	β^+ 1.54, 1.39, 1.46; γ 0.089, 0.063, 0.15; (EC)
	Cr^{50}	4.31	49.946051			
	Cr^{51}		50.944786	7/2	27.8d	EC; (γ 0.32)
	Cr^{52}	83.76	51.940514			
	Cr^{53}	9.55	52.940651	3/2		
	Cr^{54}	2.38	53.938879			
	Cr^{55}		54.9411		3.5m	β^- 2.85
	Cr^{56}		55.9406		5.9m	β^- 1.50; γ 0.026, 0.083
Manganese	$_{25}Mn^{50}$		49.9540		0.28s	β^+ 6.58
	Mn^{50}				2.0m	β^+; γ 0.66–1.45
	Mn^{51}		50.94820		45m	β^+ 2.2; (γ)
	Mn^{52}		51.94556	6	5.7d	EC; β^+ 0.57; γ 0.747, 0.935 1.434 (others)
	Mn^{52m}		51.94597		21m	β^+ 2.63; γ 1.43 (others?); (IT 0.38)
	Mn^{53}		52.94129	7/2	$\sim 2 \times 10^6$y	EC
	Mn^{54}		53.94036	3	280d	EC; γ 0.835
	Mn^{55}	100	54.938054	5/2		
	Mn^{56}		55.93891	3	2.58h	β^- 2.84; 1.03, 0.72; γ 0.85, 1.81, 2.12 (others)
	Mn^{57}		56.9383		1.7m	β^- 2.6; γ 0.12, 0.13
	Mn^{58}				1.1m	β^-; γ 0.36–2.8
Iron	$_{26}Fe^{52}$		51.94812		8.3h	β^+ 0.80, EC (both to Mn^{52m}); γ 0.17
	Fe^{53}		52.94558		8.9m	β^+ 2.8, 2.4, 1.6; γ 0.38 (others)
	Fe^{54}	5.82	53.93962			
	Fe^{55}		54.938302		2.60y	EC
	Fe^{56}	91.66	55.93493			
	Fe^{57}	2.19	56.93539	1/2		
	Fe^{58}	0.33	57.93327			
	Fe^{59}		58.93487		45d	β^- 0.46, 0.27; γ 1.10, 1.29 (others)
	Fe^{60}				$\sim 1 \times 10^5$y	β^- 0.14 (to Co^{60m}); γ 0.027
	Fe^{61}				6.0m	β^- 2.8; γ 0.29
Cobalt	$_{27}Co^{54}$		53.9484		0.19s	β^+ 7.34
	Co^{54m}				1.5m	β^+ 4.5; γ 0.41, 1.1, 1.4
	Co^{55}		54.94202	7/2	18h	β^+ 1.50, 1.03; EC; γ 0.94, 1.41, 0.48, (0.25)
	Co^{56}		55.93987	4	77d	EC; β^+ 1.46; γ 0.845, 1.24, others 0.98–3.5
	Co^{57}		56.93629	7/2	270d	EC; $\gamma(e^-)$ 0.122, $e^-(\gamma)$ 0.0144(m), (γ 0.136)
	Co^{58}		57.93575		71d	EC; β^+ 0.48; γ 0.81 (others)
	Co^{58m}		57.93578		9.0h	IT $e^-(\gamma)$ 0.025
	Co^{59}	100	58.933189	7/2		
	Co^{60}		59.93381	5	5.26y	β^- 0.32; γ 1.173, 1.333
	Co^{60m}		59.93387		10.5m	IT $e^-(\gamma)$ 0.059; (β^-)
	Co^{61}		60.93243		1.65h	β^- 1.22; γ 0.07
	Co^{62}		61.93395		13.9m	β^- 2.88, 0.88; γ 1.17, others
	Co^{62}				1.7m	β^-; γ
	Co^{63}				1.4h	β^-

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Co^{63}				52s	β^- 3.6
	Co^{64}				7.8m	β^-, γ 0.66, 0.97, 1.34 (others)
	Co^{64m}				2m	γ
Nickel	$_{28}Ni^{56}$				6.1d	EC; γ 0.164, 0.820, 0.755, 0.27, 0.48, 1.57 (others)
	Ni^{57}		56.93976		37h	EC; β^+ 0.85 (others); γ 1.37, 0.13. 1.90 (others)
	Ni^{58}	67.88	57.93534			
	Ni^{59}		58.934344		8×10^4y	EC
	Ni^{60}	26.23	59.93078			
	Ni^{61}	1.19	60.93105	3/2		
	Ni^{62}	3.66	61.92835			
	Ni^{63}		62.92967		92y	β^- 0.067
	Ni^{64}	1.08	63.92796			
	Ni^{65}		64.93004		2.56h	β^- 2.10, 0.60, 1.01; γ 1.46, 1.11, 0.37 (others)
	Ni^{66}		65.92909		55h	β^- 0.20
Copper	$_{29}Cu^{58}$		57.94447		3.2s	β^+ 7.48, 4.6; γ 1.45, 2.9
	Cu^{59}		58.93950		81s	β^+ 3.7 (others); γ 1.31, 0.87, others
	Cu^{60}		59.93738	2	24m	β^+ 2.00, 3.00, 3.9; (EC); γ 1.33, 1.76, 0.85 (others)
	Cu^{61}		60.93344	3/2	3.32h	β^+ 1.22 (others); EC; γ 0.28, 0.66 (others)
	Cu^{62}		61.93256	1	9.9m	β^+ 2.91; (EC); (γ)
	Cu^{63}	69.09	62.92959	3/2		
	Cu^{64}		63.92976	1	12.8h	EC; β^- 0.573; β^+ 0.656; (γ 1.34)
	Cu^{65}	30.91	64.92779	3/2		
	Cu^{66}		65.92887		5.1m	β^- 2.63, (1.59); (γ 1.04)
	Cu^{67}		66.92776		61h	β^- 0.40, 0.48, 0.58; γ 0.18, 0.092 (others)
	Cu^{68}				32s	β^- 3.0; γ 1.08–2.32
Zinc	$_{30}Zn^{60}$				2.1m	β^+
	Zn^{61}		60.9392		1.48m	β^+ 4.38, 3.9 (others); γ 0.48 (others)
	Zn^{62}		61.93438		9.3h	EC; β^+ 0.67; γ 0.59, 0.042, 0.51 (others)
	Zn^{63}		62.93321		38m	β^+ 2.34 (others); (EC); (γ 0.67, others)
	Zn^{64}	48.89	63.929145	0		
	Zn^{65}		64.92923	5/2	245d	EC; γ 1.11; (β^+ 0.33)
	Zn^{66}	27.81	65.92605	0		
	Zn^{67}	4.11	66.92715	5/2		
	Zn^{68}	18.57	67.92486	0		
	Zn^{69}		68.92665		55m	β^- 0.90
	Zn^{69m}		68.92712		13.8h	IT $\gamma(e^-)$ 0.44
	Zn^{70}	0.62	69.92535			
	Zn^{71}		70.9280		2.4m	β^- 2.6, 2.1 (others); γ 0.51 (others)
	Zn^{71m}				4.1h	β^- 1.5; γ 0.38, 0.49, 0.61
	Zn^{72}				49h	β^- 0.30; γ 0.14, (0.19)
Gallium	$_{31}Ga^{64}$		63.93674		2.6m	β^+ 6.1, 2.8; γ 0.98, 3.3, 0.80, 1.3, 2.2 (others)
	Ga^{65}		64.93273		15m	β^+ 2.11, 1.39, 2.24, 0.82; EC; γ 0.054(m), 0.115 (others 0.09–2.33)
	Ga^{66}		65.93160	0	9.5h	β^+ 4.16 (others); EC; γ 1.04, 2.75 (others)
	Ga^{67}		66.92822	3/2	78h	EC; γe^- 0.093(m), γ 0.184, 0.091, 0.296 (others)
	Ga^{68}		67.92800	1	68m	β^+ 1.89; EC; (γ)
	Ga^{69}	60.4	68.92568	3/2		
	Ga^{70}		69.92605	1	21m	β^- 1.6 (others); (γ)
	Ga^{70m}				0.02s	IT 0.19

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Ga^{71}	39.6	70.92484	3/2		
	Ga^{72}		71.92603	3	14.1h	β^- 0.64, 0.96, 0.56, 1.51; γ 0.835, 2.20 (others)
	Ga^{72m}				0.04s	IT 0.10
	Ga^{73}		72.9250		4.8h	β^- 1.19 (to 0.53s Ge^{73m}); γ 0.30
	Ga^{74}		73.9272		8m	β^- 2.7, 1.1 (others); γ 0.60, 2.35 (others)
	Ga^{75}				2m	β^- 3.3; γ 0.58 (others)
	Ga^{76}				32s	β^- ~6; γ 0.57 (others)
Germanium	$_{32}Ge^{65}$		64.9378		1.5m	β^+ 3.7; (γ 0.67, 1.7)
	Ge^{66}		65.9348		2.7h	β^+ 1.3; EC; γ 0.046–0.71
	Ge^{67}		66.9329		19m	β^+ 3.2, 2.3, 1.6; γ 0.170 (others)
	Ge^{68}		67.929		280d	EC
	Ge^{69}		68.92808		40h	EC; β^+ 1.22 (others); γ 1.12, 0.58, 0.88 (others)
	Ge^{70}	20.52	69.92428	0		
	Ge^{71}		70.92509	1/2	11d	EC
	Ge^{71m}				0.020s	IT 0.023; γ 0.17 (m)
	Ge^{72}	27.43	71.92174	0		
	Ge^{73}	7.76	72.9234	9/2		
	Ge^{73m_2}				0.53s	IT $\epsilon^-\gamma$ 0.054; $\epsilon^-(\gamma)$ 0.013 (m_1)
	Ge^{74}	36.54	73.92115	0		
	Ge^{75}		74.9228		82m	β^- 1.19, 0.92; γ 0.265, 0.20 (others)
	Ge^{75m}				49s	IT $\epsilon^-\gamma$ 0.138
	Ge^{76}	7.76	75.9214	0		
	Ge^{77}		76.9236		11.3h	β^- 2.20, 1.38, 0.71; γ 0.042–2.32
	Ge^{77m}				54s	β^- 2.90, 2.7; IT $\gamma\epsilon^-$ 0.159; γ 0.215
	Ge^{78}		77.9227		2.1h	β^- 0.9; γ
Arsenic	$_{33}As^{687}$				~7m	β^+
	As^{69}		68.9323		15m	β^+ 2.9; γ 0.23
	As^{70}		69.9313		50m	β^+ 1.35, 2.45; EC; γ 1.04, 2.0 (others)
	As^{71}		70.92725		65h	EC; β^+ 0.81; γ 0.17 (m)
	As^{72}		71.9264		26h	EC; β^+ 2.50, 3.34, 1.84; γ 0.835 (others 0.63–3.7)
	As^{73}		72.9238		76d	EC (to 0.53s Ge^{73m_1})
	As^{74}		73.92391		18d	β^+ 0.91, (1.51); β^- 1.36, 0.72; EC; γ 0.59, 1.36, 0.72, 0.63 (others)
	As^{74m}				8s	IT 0.28
	As^{75}	100	74.92158	3/2		
	As^{75m}				0.017s	IT 0.305, 0.025; γ 0.280
	As^{76}		75.92242	2	26.8h	β^- 2.97, 2.41 (others); γ 0.559 (others)
	As^{77}		76.92067		38.7h	β^- 0.68; (γ)
	As^{78}		77.9218		91m	β^- 4.1, 1.4; γ 0.615, 0.70, 1.31 (others)
	As^{78m}				5.5m	IT γ 0.50
	As^{79}		78.9210		9m	β^- 2.15 (others); γ 0.097 (others)
	As^{80}		79.9230		15s	β^- 6.0, 5.4; γ 0.66, 1.64 (others)
	As^{81}				33s	β^- 3.8
	As^{85}				0.43s	β^-; n
Selenium	$_{34}Se^{71}$		70.9320		5m	β^+ 3.4; γ 0.16
	Se^{72}				8.4d	EC; $\gamma\epsilon^-$ 0.046
	Se^{73}		72.9267		7.1h	β^+ 1.32; EC; γ 0.359 (m); $\gamma\epsilon^-$ 0.066 (m)
	Se^{73m}				44m	β^+ 1.72; γ 0.25, 0.09, 0.58
	Se^{74}	0.87	73.9224	0		

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	Se^{75}		74.92251	5/2	120d	EC; γ 0.265, 0.136, 0.28. 0.40, 0.122 (others)
	Se^{76}	9.02	75.91923	0		
	Se^{77}	7.58	76.91993	1/2		
	Se^{77m}				18.8s	IT γe^- 0.162
	Se^{78}	23.52	77.91735	0		
	Se^{79}		78.91852	7/2	6.5×10^4y	β^- 0.16
	Se^{79m}				3.9m	IT $e^-(\gamma)$ 0.096
	Se^{80}	49.82	79.91651	0		
	Se^{81}		80.91786		18m	β^- 1.56 (others); (γ)
	Se^{81m}				57m	IT $e^-(\gamma)$ 0.103
	Se^{82}	9.19	81.9167	0		
	Se^{83}		82.9189		25m	β^- 1.0, 1.8; γ 0.23, 0.35, 1.85, 2.29
	Se^{83m}				69s	β^- 3.4, 1.5; γ 1.01, 2.02, 0.65, 0.35
	Se^{84}				3.3m	β^- (to 32m Br^{84})
	Se^{85}				39s	β^-
	Se^{86}				16e	β^-
Bromine	$_{35}Br^{74}$		73.9289		26m	β^+ 4.7; γ 0.64
	Br^{75}		74.9254		1.6h	EC; β^+ 1.7, others; γ 0.29, (0.62)
	Br^{76}		75.9242	1	16h	β^+ 3.1, 3.6 (others); EC; γ 0.56, 0.65, 1.22, 1.86 (others)
	Br^{77}		76.92140	3/2	58h	EC; (β^+); γ 0.25 (m), 0.52, 0.58, 0.30 (others)
	Br^{77m}				4.2m	IT $e^-\gamma$ 0.108
	Br^{78}		77.9211		6.4m	β^+ 2.5, 1.9; (EC); γ 0.62
	Br^{79}	50.54	78.91835	3/2		
	Br^{79m}				4.8s	IT γe^- 0.21
	Br^{80}		79.91854	1	17.6m	β^- 2.02, 1.38; γ 0.62 (others); (EC, β^+)
	Br^{80m}			5	4.5h	IT $e^-(\gamma)$ 0.048; $e^-\gamma$ 0.036
	Br^{81}	49.46	80.91634	3/2		
	Br^{82}		81.91680	5	35.3h	β^- 0.44; γ 0.25–1.48
	Br^{83}		82.91520		2.4h	β^- 0.94 (to Kr^{83m}); γ 0.05
	Br^{84}		83.91655		32m	β^- 4.7, others; γ 0.88, 1.90, 3.9 (others)
	Br^{84m}				6.0m	β^- 1.9, 0.8; γ 0.88, 1.46, 0.44 1.89
	Br^{85}		84.9154		3.0m	β^- 2.5
	Br^{86}				54s	β^- 7.1, others; γ 1.57, 2.76
	Br^{87}		86.9220		55s	β^- 2.6, 8.0; γ 5.4, others; (n)
	Br^{88}				16s	β^-; (n)
	Br^{89}				4.5s	β^-; (n)
	Br^{90}				1.6s	β^-; (n)
Krypton	$_{36}Kr^{74}$		73.9333		20m	β^+ 3.1
	Kr^{75}				5.5m	
	Kr^{76}				14.8h	EC; γ 0.039, 0.267, 0.316 (others)
	Kr^{77}		76.92449		1.2h	β^+ 1.67, 1.86; EC; γ 0.131, 0.149, 0.281, 0.665
	Kr^{78}	0.354	77.920368			
	Kr^{79}		78.92009		34.5h	EC; β^+ 0.60; (γ 0.045–0.83)
	Kr^{79m}				55s	IT 0.127
	Kr^{80}	2.27	79.91639			
	Kr^{81}		80.9166		2.1×10^5y	EC
	Kr^{81m}				13s	IT γe^- 0.19
	Kr^{82}	11.56	81.91348	0		
	Kr^{83}	11.55	82.91413	9/2		
	Kr^{83m}				1.9h	IT $e^-(\gamma)$ 0.033; $e^-(\gamma)$ 0.009 (m)
	Kr^{84}	56.90	83.911504	0		
	Kr^{85}		84.91243	9/2	10.6y	β^- 0.67; (γ)

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	Kr^{85m}				4.5h	β^- 0.82; γ 0.150; IT $\gamma(e^-)$ 0.305
	Kr^{86}	17.37	85.91062	0		
	Kr^{87}		86.91337		78m	β^- 3.8, 1.3; γ 0.40, 2.57, 0.85 (others)
	Kr^{88}		87.9142		2.8h	β^- 0.52, 2.7; γ 2.40, 0.19, 0.85, others
	Kr^{89}				3.2m	β^- 3.9, 2.0; γ 0.21, 0.45, 0.60, others
	Kr^{90}				33s	β^- 3.2, others; γ 0.12, 0.55, 1.13, 1.53 (others)
	Kr^{91}				10s	β^- 3.6, others; γ
	Kr^{92}				3s	β^-
	Kr^{93}				2.0s	β^-
	Kr^{94}				1.4s	β^-
	Kr^{95}				1–2s	β^-
	Kr^{97}				~1s	β^-
Rubidium	$_{37}Rb^{79}$				24m	β^+; γ 0.15, 0.19; (EC)
	Rb^{80}		79.9219		34s	β^+ 4.1, 3.5; γ 0.62; (EC)
	Rb^{81}		80.9190	3/2	4.7h	EC; β^+ 1.0, 0.58, 0.33; γ 1.1, 0.25, 0.45
	Rb^{81m}			9/2	32m	β^+ 1.4; IT 0.085
	Rb^{82}		81.91796		1.3m	β^+ 3.15, 3.5, 4.2; (γ 0.77, 1.40); (EC)
	Rb^{82m}			5	6.3h	EC; β^+ 0.80, 0.78, 0.67; γ 0.78, 0.62, 0.55, others
	Rb^{83}			5/2	83d	EC; γ 0.53, 0.48, 0.046; [to Kr^{83m}]
	Rb^{84}		83.91435	2	33d	EC; β^+ 0.80, 1.65; (β^-); γ 0.88 (others)
	Rb^{84m}				20m	IT $\gamma(e^-)$ 0.216; γ 0.25, 0.47
	Rb^{85}	72.15	84.91171	5/2		
	Rb^{86}		85.91116	2	18.7d	β^- 1.78, (0.70); (γ 1.08)
	Rb^{86m}				1.0m	IT γ 0.56
	Rb^{87}	27.85	86.90918	3/2	5.7×10^{10}y	β^- 0.27
	Rb^{88}		87.9112	2	18m	β^- 5.3, 3.3; γ 1.85, 0.91 (others)
	Rb^{89}		88.9112		15m	β^- 1.6, 3.9 (others); γ 1.05, 1.26, 0.66, 2.2, 2.6 (others)
	Rb^{90}		89.9144		2.8m	β^- 1.2–6.6; γ 0.5–5.2
	Rb^{91}				1.7m	β^- 4.6; γ 0.1
	Rb^{91m}				14m	β^- 3.0; γ
	Rb^{92}				4.2s	β^-
	Rb^{93}				5.2s	β^-
	Rb^{94}				2.9s	β^-
Strontium	$_{38}Sr^{80}$				1.8h	EC; γ 0.58
	Sr^{81}				29m	β^+
	Sr^{82}				25d	EC
	Sr^{83}				33h	EC; β^+ 1.15; γ 0.39, 0.76, others
	Sr^{84}	0.56	83.91338			
	Sr^{85}		84.9129		65d	EC; γ 0.514 (others)
	Sr^{85m}		84.9132		70m	IT $e^-(\gamma)$ 0.0075; γ 0.225; EC; γ 0.15
	Sr^{86}	9.86	85.9093	0		
	Sr^{87}	7.02	86.9089	9/2		
	Sr^{87m}				2.8h	IT γe^- 0.388; (EC)
	Sr^{88}	82.56	87.9056	0		
	Sr^{89}		88.9070		51d	β^- 1.46; (γ)
	Sr^{90}		89.9073		29y	β^- 0.54
	Sr^{91}		90.9098		9.7h	β^- 1.09, 1.36, 2.67; γ 1.03, 0.75, 0.65, 1.41
	Sr^{92}		91.9105		2.7h	β^- 0.55, 1.5; γ 1.37 (others)
	Sr^{93}				8m	β^- 3.0–4.8; γ 0.60, 0.88, others 0.18–3.0
	Sr^{94}				1.3m	β^-
	Sr^{95}				0.7m	β^-

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Sr^{97}				short	β^-
Yttrium	$_{39}Y^{82}$				10m	β^+ 2
	Y^{83}				7.4m	β^+
	Y^{84}				40m	β^+ 2.5, 3.5; EC; γ 0.80, 0.98, 1.04 (others)
	Y^{85}		84.9164		5.0h	β^+ 2.24, 2.01; EC; γ 0.23 (others); [to Sr^{85}]
	Y^{85}		84.9164		2.7h	β^+ 1.54; γ 0.503 (others); [to Sr^{85m}]
	Y^{86}		85.9148		14.6h	EC; β^+ 1.32 (others); γ 0.18–3.3
	Y^{86m}				49m	IT $e^-(\gamma)$ 0.010; γ 0.210
	Y^{87}		86.9107		80h	EC; γ 0.483; (β^+)
	Y^{87m}				14h	IT γe^- 0.381
	Y^{88}		87.9095		108d	EC; γ 1.84, 0.90; (β^+)
	Y^{89}	100	88.9054	1/2		
	Y^{89m}				16s	IT γ (e^-) 0.92
	Y^{90}		89.9067	2	64h	β^- 2.27; (γ)
	Y^{90m}				3.2h	IT $\gamma(e^-)$ 0.48; γ 0.20
	Y^{91}		90.9069	1/2	58d	β^- 1.54; (γ)
	Y^{91m}				50m	IT $\gamma(e^-)$ 0.551
	Y^{92}		91.9085		3.6h	β^- 3.6 (others); γ 0.932 (others 0.07–2.4)
	Y^{93}		92.9092		10h	β^- 2.89; (γ 0.27–2.4)
	Y^{94}		93.9115		20m	β^- 5.0; γ 0.56–3.5
	Y^{95}				11m	β^-
	Y^{96}				2.3m	β^- 3.5; γ 1.0, 0.7 (others)
	Y^{97}				short	β^-
Zirconium	$_{40}Zr^{86}$				17h	EC; γ 0.24
	Zr^{87}		86.9145		1.6h	β^+ 2.1; (γ); [to 14h Y^{87m}]
	Zr^{88}				85d	EC; γ 0.394 (*m*)
	Zr^{89}		88.9085		79h	EC; β^+ 0.90 [to Y^{89m}]
	Zr^{89m}				4.2m	IT $\gamma(e^-)$ 0.59; (EC; β^+) (γ 1.53)
	Zr^{90}	51.46	89.9043			
	Zr^{90m}				0.83s	IT 2.30
	Zr^{91}	11.23	90.9052	5/2		
	Zr^{92}	17.11	91.9046			
	Zr^{93}		92.9061		1×10^6y	β^- 0.063, 0.034
	Zr^{94}	17.40	93.9061			
	Zr^{95}		94.9079		65d	β^- 0.36, 0.40 (others); γ 0.72, 0.76
	Zr^{96}	2.80	95.908			
	Zr^{97}		96.9107		17h	β^- 1.91, (0.45) [to Nb^{97m}]; (γ)
	Zr^{98}				1m	β^-
Niobium	$_{41}Nb^{89}$		88.9126		1.9h	β^+ 2.9
	Nb^{89m}				0.8h	β^+
	Nb^{90}		89.9109		14.6h	EC, β^+ 1.50, (0.65); γ 0.133–2.3
	Nb^{90m_1}				24s	IT γe^- 0.12
	Nb^{90m_2}				0.01s	IT γ 0.25 [to Nb^{90m_1}]
	Nb^{91}		90.9070		long	EC
	Nb^{91m}				62d	IT $e^-(\gamma)$ 0.104; (EC; γ)
	Nb^{92}		91.9068		10.1d	EC; γ 0.93 (others); (β^+)
	Nb^{92m}				$\sim 10^7$y	
	Nb^{93}	100	92.9060	9/2		
	Nb^{93m}				3.7y	IT $e^-(\gamma)$ 0.029
	Nb^{94}		93.9070		2.0×10^4y	β^- 0.50; γ 0.70, 0.87
	Nb^{94m}				6.6m	IT $e^-(\gamma)$ 0.042; $(\beta^-; \gamma)$
	Nb^{95}		94.9067		35.1d	β^- 0.16; γ 0.77
	Nb^{95m}				90h	IT $e^-(\gamma)$ 0.235
	Nb^{96}		95.9079		24h	β^- 0.69; γ 0.77, 0.56, 1.18, others
	Nb^{97}		96.9078		72m	β^- 1.27; γ 0.67, (1.02)
	Nb^{97m}				60s	IT $\gamma(e^-)$ 0.75

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Nb^{98}				51m	β^- 2.6, 3.5; γ 0.78, 0.72 (others 0.3–2.7)
	Nb^{99}				2.5m	β^- 3.2; γ 0.10, 0.26
	Nb^{99}				10s	
	Nb^{100}				12m	β^- 3.1, 3.5; γ 0.53, 0.62
	Nb^{101}				1.0m	β^-
Molybdenum	$_{42}Mo^{90}$		89.9136		6h	EC; β^+ 1.2 [to 0.01s Nb^{90m_2}]
	Mo^{91}		90.9117		15.5m	β^+ 3.3 [to Nb^{91}]
	Mo^{91m}				65s	IT $\gamma(e^-)$ 0.65; β^+ 2.5, 2.8; γ 1.2, 1.5; (EC) [to Nb^{91m}]
	Mo^{92}	15.84	91.9063			
	Mo^{93}		92.9065		>2y	EC
	Mo^{93m}		92.9091		6.9h	IT γe^- 0.264; γ 0.684, 1.48
	Mo^{94}	9.04	93.9047	0		
	Mo^{95}	15.72	94.9057	5/2		
	Mo^{96}	16.53	95.9045	0		
	Mo^{97}	9.46	96.9058	5/2		
	Mo^{98}	23.78	97.9055			
	Mo^{99}		98.9079		67h	β^- 1.23, 0.45 [to Tc^{99m}]; γ 0.740, 0.181 (m) (others)
	Mo^{100}	9.63	99.9076			
	Mo^{101}		100.9089		14.6m	β^- 2.2, others; γ 0.19, 1.02, 2.08, others
	Mo^{102}				11.5m	β^- 1.2
	Mo^{103}				70s	β^-
	Mo^{104}				1.1m	β^-
	Mo^{105}				40s	β^-
Technetium	$_{43}Tc^{92}$				4.0m	β^+ 4.1; γ 1.54, 0.79, 0.33, 0.135, others
	Tc^{93}		92.9099		2.7h	EC; β^+ 0.82; γ 1.35, 1.48 (others); [to Mo^{93}]
	Tc^{93m}				44m	IT γe^- 0.39; EC [to Mo^{93}]; γ 2.7
	Tc^{94}				4.9h	EC; (β^+); γ 0.87, 0.70, 0.85
	Tc^{94m}		93.9094		52m	β^+ 2.5; EC; γ 0.87, 1.85 (others); IT
	Tc^{95}		94.9075		20h	EC; γ 0.77 (others)
	Tc^{95m}				60d	EC; γ 0.204, 0.584, 0.84 (others); (β^+; IT 0.04)
	Tc^{96}		95.9077		4.3d	EC; γ 0.77, 0.84, 0.81, 1.12 (others)
	Tc^{96m}				52m	IT $e^-(\gamma)$ 0.034; (β^+, γ)
	Tc^{97}		96.9059		2.6×10^6y	EC
	Tc^{97m}				90d	IT $e^-\gamma$ 0.097
	Tc^{98}		97.907		1.5×10^6y	β^- 0.30; γ 0.77, 0.67
	Tc^{99}		98.9064	9/2	2.1×10^5y	β^- 0.29
	Tc^{99m}				6.0h	IT $e^-(\gamma)$ 0.0021; γ 0.140; (γ 0.142)
	Tc^{100}		99.9066		16s	β^- 3.4 (others); (γ)
	Tc^{101}		100.9059		14.0m	β^- 1.3, (1.1); γ 0.307 (others 0.13, 0.94)
	Tc^{102}		101.9081		5s	β^- 4.1
	Tc^{102}				4.5m	β^- 2; γ 0.47, 0.63, 1.07, 1.77, 1.98
	Tc^{103}				50s	β^- 2.0, 2.2; γ 0.135, 0.215, 0.35
	Tc^{104}				18m	β^- 1.8, 5.3; γ 0.36, 4.7
	Tc^{105}				7.7m	β^- 3.5; γ 0.11
Ruthenium	$_{44}Ru^{93}$				52s	β^+
	Ru^{94}				~57m	
	Ru^{95}		94.9099		1.65h	EC; β^+ 1.2; γ 0.34, 1.4, 0.64, 0.15; [to 20h Tc^{95}]
	Ru^{96}	5.51	95.90759			
	Ru^{97}				2.9d	EC; γ 0.216 (others); [to Tc^{97}]
	Ru^{98}	1.87	97.90528			

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Ru^{98}	12.72	98.90593	5/2		
	Ru^{100}	12.62	99.90421			
	Ru^{101}	17.07	100.90557	5/2		
	Ru^{102}	31.61	101.90434			
	Ru^{103}		102.9063		40d	β^- 0.21 (others); γ 0.498 (others 0.05–0.61); [to Rh^{103m}]
	Ru^{104}	18.58	103.90543			
	Ru^{105}		104.90768		4.44h	β^- 1.15, 1.08 (others); γ 0.73, 0.48, 0.67, 0.32 (others)
	Ru^{106}		105.90733		1.0y	β^- 0.040; [to 30s Rh^{106}]
	Ru^{107}				4.2m	β^- 4.6; γ 0.195, 0.37, 0.48, 0.86 (others)
	Ru^{108}				4.6m	β^- 1.3; γ 0.165
Rhodium	$_{45}Rh^{96}$				~11m	
	Rh^{97}				35m	β^+ 2.1; γ 0.19, 0.26, 0.42
	Rh^{98}		97.910		8.7m	β^+ 2.5; γ 0.65
	Rh^{99}		98.90818		16d	EC; γ 0.35, 0.090, 0.18, 0.53 (others); (β^+)
	Rh^{99}				4.7h	EC; γ 0.33, 0.61 (others); (β^+)
	Rh^{100}		99.90812		21h	EC; γ 0.54, 2.38, 0.82, 1.58, others; (β^+)
	Rh^{101}				~7y	EC; γ 0.195, 0.125
	Rh^{101m}				4.5d	EC; γ 0.31 (others); (IT 0.15)
	Rh^{102}		101.9068		210d	EC; β^- 1.15; β^+ 1.28; γ 0.475 (others)
	Rh^{102m}				~2.5y	EC; γ
	Rh^{103}	100	102.90551	1/2		
	Rh^{103m}				57m	IT $e^-(\gamma)$ 0.040
	Rh^{104}		103.9066		42s	β^- 2.4; (γ)
	Rh^{104m}				4.4m	IT $e^-(\gamma)$ 0.077; γe^- 0.051; (γ; β^-)
	Rh^{105}		104.90567		36h	β^- 0.56, 0.25; γ 0.32 (others)
	Rh^{105m}				30s	IT $e^-\gamma$ 0.130
	Rh^{106}		105.90728		30s	β^- 3.54 (others); γ 0.513, 0.624 (others)
	Rh^{106m}				2.2h	β^- 0.79, 0.95, 1.18, 1.62; γ 0.513, others 0.22–1.22
	Rh^{107}		106.9067		22m	β^- 1.2; γ 0.307, 0.365 (others)
	Rh^{108}				17s	β^- 4.0; γ 0.43, 0.62 (others)
	Rh^{109}				~30s	β^-; γ 0.32, 0.49
	Rh^{109m}				50s	IT 0.11
	Rh^{110}				~3s	β^-
Palladium	$_{46}Pd^{98}$				17m	EC
	Pd^{99}		98.9124		22m	β^+ 2.0; EC; γ 0.14, 0.42, 0.67, 0.28
	Pd^{100}				4.1d	EC; γ 0.081
	Pd^{101}				8.5h	EC; γ 0.29, 0.59 (others); (β^+)
	Pd^{102}	0.96	101.90562			
	Pd^{103}		102.90611		17d	EC; γ 0.053 (others)
	Pd^{104}	10.97	103.90398			
	Pd^{105}	22.23	104.90507	5/2		
	Pd^{106}	27.33	105.90348			
	Pd^{107}		106.90512		7×10^6y	β^- 0.035 [to stable Ag^{107}]
	Pd^{107m}				21s	IT γe^- 0.22
	Pd^{108}	26.71	107.90388			
	Pd^{109}		108.90595		13.6h	β^- 1.03 [to Ag^{109m}]; (γ)
	Pd^{109m}				4.7m	IT γe^- 0.18
	Pd^{110}	11.81	109.90516			
	Pd^{111}		110.90766		22m	β^- 2.13 [to Ag^{111m}]; (γ)
	Pd^{111m}				5.5h	IT $e^-\gamma$ 0.17; β^-; (γ 1.69)
	Pd^{112}		111.9075		21h	β^- 0.28; $e^-\gamma$ 0.018

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	Pd^{113}				1.4m	β^-
	Pd^{114}				2.4m	β^-
	Pd^{115}				45s	β^-
Silver	$_{47}Ag^{102}$				13m	β^+ 2.2; γ 0.55, 0.72 (others)
	Ag^{103}		102.9078	7/2	1.1h	EC; β^+ 1.2; γ 0.15, 0.11
	Ag^{103m}				5.7s	IT $e^-\gamma$ 0.135
	Ag^{104}		103.90857	5	67m	EC; β^+ 0.99; γ 0.56, 0.77, 0.94, others
	Ag^{104m}			2	29m	β^+ 2.70; γ 0.56; IT 0.02; EC
	Ag^{105}		104.9068	1/2	40d	EC; γ 0.35, 0.28, others 0.064–1.09
	Ag^{106}		105.9067	1	24m	β^+ 1.95, (1.45); γ 0.51, others 0.21–1.8; EC; (β^-)
	Ag^{106m}			6	8.3d	EC; γ 0.51, others 0.22–2.63
	Ag^{107}	51.35	106.90508	1/2		
	Ag^{107m}				44s	IT $e^-(\gamma)$ 0.093
	Ag^{108}		107.90594		2.4m	β^- 1.65; (EC; γ; β^+)
	Ag^{108m}				>5y	EC; γ 0.72, 0.62, 0.43; (IT 0.031; γ 0.081)
	Ag^{109}	48.65	108.90475	1/2		
	Ag^{109m}				41s	IT $e^-(\gamma)$ 0.088
	Ag^{110}		109.90609		24s	β^- 2.87, (2.21); (γ)
	Ag^{110m}			6	253d	β^- 0.085, 0.53; γ 0.44–2.46; (IT 0.116)
	Ag^{111}		110.90531	1/2	7.5d	β^- 1.05; (γ)
	Ag^{111m}				1.2m	IT 0.065
	Ag^{112}		111.9071	2	3.2h	β^- 4.0, 3.4 (others); γ 0.62 (others)
	Ag^{113}		112.9065	1/2	5.3h	β^- 2.0; (γ 0.12–1.18)
	Ag^{113m}				1.2m	IT; β^-; γ 0.14–0.70
	Ag^{114}		113.9085		5s	β^- 4.6; γ 0.57
	Ag^{114m}				2m	β^-
	Ag^{115}		114.9087		21m	β^- 2.9; (γ)
	Ag^{115m}				20s	β^- [to 2.3d Cd^{115}]
	Ag^{116}				2.5m	β^- 5.0; γ 0.52, 0.70
	Ag^{117}				1.1m	β^-
Cadmium	$_{48}Cd^{103}$				10m	β^+; γ 0.22, 0.62, 0.85
	Cd^{104}				57m	EC; γ 0.084 (others)
	Cd^{106}				55m	β^+ 0.80, 1.69; γ 0.025–2.3
	Cd^{106}	1.22	105.90646			
	Cd^{107}		106.90661	5/2	6.7h	EC [to Ag^{107m}]; (γ 0.85; β^+)
	Cd^{108}	0.87	107.90418			
	Cd^{109}		108.90492	5/2	470d	EC [to Ag^{109m}]
	Cd^{110}	12.39	109.90300			
	Cd^{111}	12.75	110.90418	1/2		
	Cd^{111m_2}				49m	IT $e^-\gamma$ 0.150; γ 0.247 (m)
	Cd^{112}	24.07	111.90275			
	Cd^{113}	12.26	112.90440	1/2		
	Cd^{113m}		112.9049		14y	β^- 0.58; (IT)
	Cd^{114}	28.86	113.90336			
	Cd^{115}		114.90542		2.3d	β^- 1.11, 0.59; γ 0.523, 0.490 (others) [to In^{115m}]
	Cd^{115m}			11/2	43d	β^- 1.63 (others); (γ); [to In^{115}]
	Cd^{116}	7.58	115.90476			
	Cd^{117}		116.9074		50m	β^- 1.8, 2.3; γ 0.425; [to 1.9h In^{117m}]
	Cd^{117}		116.9074		2.9h	β^- 1.0; γ 0.27 2.2
	Cd^{118}				50m	β^- 0.8; [to 5s In^{118}]
	Cd^{119}				2.7m	β^-; [to 2.3m In^{119}]
	Cd^{119}				11m	β^- 3.5; [to 18m In^{119m}]
Indium	$_{49}In^{106}$				5.3m	β^+ 4.9, 2.7; γ 0.63, 0.86, 1.66, 0.99 (others)
	In^{107}				30m	β^+ ~2; γ 0.22

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In^{108}		107.9097		57m	EC; β^+ 1.3; γ 0.15–1.05
In^{108m}				40m	β^+ 3.50, 2.66; γ 0.63, 0.84; EC
In^{109}		108.90709	9/2	4.3h	EC; γ 0.21, 0.63 (others); (β^+)
In^{109m}				1.3m	IT $\gamma(e^-)$ 0.66
In^{110}		109.9072		66m	β^+ 2.25; γ 0.66 (others); EC
In^{110m}			7	4.9h	EC; γ 0.94, 0.88, 0.66 (others)
In^{111}		110.9055	9/2	2.82d	EC; γ 0.173, 0.246
In^{111m}				~10m	IT γ 0.53
In^{112}		111.90552		14m	β^- 0.66; EC; β^+ 1.62; (γ 0.62)
In^{112m_1}				21m	IT 0.155
In^{112m_2}				0.04s	IT 0.31
In^{113}	4.28	112.90411	9/2		
In^{113m}			1/2	1.73h	IT γe^- 0.393
In^{114}		113.90489		72s	β^- 1.98; (EC; β^+; γ)
In^{114m_1}			5	50d	IT $e^-\gamma$ 0.191; (EC; γ)
In^{114m_2}				2.5s	IT 0.15
In^{115}	95.72	114.90386	9/2	5×10^{14}y	β^- 0.48
In^{115m}			1/2	4.5h	IT γe^- 0.336; (β^- 0.84)
In^{116}		115.9053		14s	β^- 3.3; (γ)
In^{116m_1}			5	54m	β^- 1.00, 0.87, 0.60; γ 1.27, 1.09, 0.41, 0.82, 2.09 (others)
In^{116m_2}				2.2s	IT $e^-\gamma$ 0.16; [to In^{116m_1}]
In^{117}		116.90452	9/2	38m	β^- 0.74; γ 0.56, 0.16; [to stable Sn^{117}]
In^{117m}			1/2	1.9h	β^- 1.77, 1.62; IT $e^-\gamma$ 0.31; γ 0.16 (others)
In^{118}		117.9063		5s	β^- 4.2, 3.0; γ 1.22
In^{118m}				4.4m	β^- 1.3, 2.1; γ 1.22, 1.04, 0.69, 0.8, 0.45, 0.21
In^{119}		118.9059		2m	β^- 1.6; γ 0.82, (0.71)
In^{119m}				18m	β^- 2.7, 1.8; γ 0.91; (IT 0.3)
In^{120}				3s	β^- 5.6
In^{120m}				44s	β^- 2.0, 3.3, 4.0; γ 1.02, 1.18, 0.87, others
In^{121}				30s	β^-; γ 0.94
In^{121}				3.1m	β^- 3.7
In^{122}				7.5s	β^- 4.5; γ 1.14, 1.00
In^{123}				10s	β^-; γ 1.10
In^{123}				36s	β^- 4.6
In^{124}				3s	β^- 5.2; γ 1.35, 1.00
Tin $_{50}Sn^{108}$				9m	EC
Sn^{109}				18m	EC; β^+ ~1.5, >2.5; γ 0.34, 1.12, 0.52, 0.89
Sn^{110}				4.0h	EC; γ 0.283; [to 66m In^{110}]
Sn^{111}		110.9082		35m	EC; β^+ 1.5
Sn^{112}	0.96	111.90481			
Sn^{113}		112.90484		118d	EC; (γ 0.255); [to 1.7h In^{113m}]
Sn^{113m}				27m	IT $e^-\gamma$ 0.079
Sn^{114}	0.66	113.90276			
Sn^{115}	0.35	114.90335	1/2		
Sn^{116}	14.30	115.90174	0		
Sn^{117}	7.61	116.90294	1/2		
Sn^{117m}				14d	IT $e^-(\gamma)$ 0.159; $\gamma(e^-)$ 0.161
Sn^{118}	24.03	117.90160	0		
Sn^{119}	8.58	118.90330	1/2		
Sn^{119m_2}				250d	IT $e^-(\gamma)$ 0.065; $e^-(\gamma)$ 0.024 (m_1)
Sn^{120}	32.85	119.90219	0		
Sn^{121}		120.90424		27h	β^- 0.38
Sn^{121m}				~25y	β^- 0.42
Sn^{122}	4.72	121.90343			
Sn^{123}		122.90574		41m	β^- 1.26; γ 0.15

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	Sn^{123}				125d	β^- 1.42, (0.34); (γ 1.08)
	Sn^{124}	5.94	123.90526			
	Sn^{125}		124.90776		9.5d	β^- 2.33 (others); (γ 0.23 1.97)
	Sn^{125m}				9.7m	β^- 2.04 (others); (γ 0.33–1.4)
	Sn^{126}				2×10^5y	β^-; γ 0.06, 0.067, 0.092
	Sn^{127}				2.1h	β^-; γ 1.10, 0.82
	Sn^{127m}				4m	
	Sn^{128}				59m	β^- 0.80, 0.73; γ 0.50, 0.57, 0.072, 0.04
	Sn^{129}				1.0h	β^-
	Sn^{130}				8.8m	
	Sn^{131}				2.6m	β^-
	Sn^{131}				3.4m	β^-
	Sn^{132}				1.6h	
					2.2m	β^-
Antimony	$_{51}Sb^{112}$				0.9m	β^+; γ 1.27
	Sb^{113}				7m	β^+ 1.85, 2.42
	Sb^{114}		113.9097		3.4m	β^+ 2.7, 4.0; γ 0.90, 1.30
	Sb^{115}		114.9068		30m	EC; β^+ 1.5; γ 0.50
	Sb^{116}		115.9070		15m	EC; β^+ 1.5, 2.3; γ 1.30, 0.90 2.22
	Sb^{116m}				60m	EC; β^+ 1.45; γ 1.29, 0.90, .0.40, 0.14, 0.11, 2.23
	Sb^{117}		116.9049		2.8h	EC; γ 0.161; (β^+); [to stable Sn^{117}]
	Sb^{118}		117.9060		5h	EC; γ 1.03, 1.22, 0.26, 0.040 (m)
	Sb^{118m_1}				3.5m	β^+ 2.60; EC; (γ)
	Sb^{118m_2}				0.9s	γ 0.14, 0.30, 0.38
	Sb^{119}		118.90392		38h	EC; $e^-\gamma$ 0.024 (m)
	Sb^{120}		119.90511		16m	EC; β^+ 1.70; (γ)
	Sb^{120}				5.8d	EC; γ 0.089 (m), 0.20, 1.04, 1.18
	Sb^{121}	57.25	120.90381	5/2		
	Sb^{122}		121.90517	2	2.74d	β^- 1.40, 1.97; γ 0.564 (others); (EC, β^+)
	Sb^{122m_1}				4.2m	IT $e^-(\gamma)$ 0.026; γ 0.077 (m_2), 0.061 (m_1)
	Sb^{123}	42.75	122.90421	7/2		
	Sb^{124}		123.90595	3	60d	β^- 0.62, 2.31, 0.23; γ 0.603, 1.69 (others 0.63–2.3)
	Sb^{124m_1}				1.5m	IT $e^-(\gamma)$ 0.010; β^- 1.19; γ 0.51, 0.65, 0.60
	Sb^{124m_2}				21m	IT $e^-(\gamma)$ 0.025
	Sb^{125}		124.90525		2.7y	β^- 0.30, 0.12, 0.62; γ 0.035 0.67
	Sb^{126}				12.5d	β^- 1.9, others; γ 0.29–0.99
	Sb^{126m}				19m	β^- 1.9; γ 0.415, 0.665, 0.696; IT $\leq$0.03
	Sb^{127}		126.90690		3.9d	β^- 0.80, 1.5, 1.1, 0.86; γ 0.46, 0.77, 0.25 (others)
	Sb^{128}				8.6h	β^- 1.0; γ 0.16–1.18
	Sb^{128m}				11m	β^- 2.5, 2.8; γ 0.32, 0.75
	Sb^{129}				4.6h	β^- 1.87, others; γ 0.53, 0.16, 0.31, 0.79
	Sb^{130}				33m	β^-; γ 0.19, 0.33, 0.82, 0.94
	Sb^{130m}				7m	γ 0.20, 0.82 (others)
	Sb^{131}				23m	β^-
	Sb^{132}				2m	β^-
	Sb^{133}				2.4m	β^-
	$Sb^{134?}$				0.8m	β^-
Tellurium	$_{52}Te^{114}$				16m	
	Te^{115}				6m	
	Te^{116}		115.9087	0	2.5h	EC; (β^+); γ 0.094; [to 15m Sb^{116}]
	Te^{117}		116.9087	1/2	1.0h	EC; β^+ 1.74; γ 0.72 (others)

Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
Te^{118}				6.0d	EC; [to 3.5m Sb^{118m}]
Te^{119}		118.90638	1/2	16h	EC; γ 0.645, (1.76); (β^+)
Te^{119m}			11/2	4.6d	EC; γ 0.153, 1.22, 0.271, 0.93, 1.10 (others)
Te^{120}	0.089	119.90402			
Te^{121}				17d	EC; γ 0.575, 0.506, 0.070; (β^+)
Te^{121m}				154d	IT $e^-(\gamma)$ 0.082; γ 0.213; (EC; γ)
Te^{122}	2.46	121.90305			
Te^{123}	0.87	122.90426	1/2	1.2×10^{13}y	EC
Te^{123m}				104d	IT $e^-(\gamma)$ 0.089; γe^- 0.159
Te^{124}	4.61	123.90281			
Te^{125}	6.99	124.90444	1/2		
Te^{125m_1}				58d	IT $e^-(\gamma)$ 0.109; $e^-(\gamma)$ 0.035 (m_1)
Te^{126}	18.71	125.90333			
Te^{127}		126.90521		9.3h	β^- 0.70; (γ)
Te^{127m}				105d	IT $e^-(\gamma)$ 0.089; (β^-; γ)
Te^{128}	31.79	127.90449			
Te^{129}		128.90657		72m	β^- 1.45, 0.99 (others); γ 0.027 (m), 0.47 (others)
Te^{129m}				33d	IT $e^-(\gamma)$ 0.106; β^-
Te^{130}	34.48	129.90623			
Te^{131}		130.90857		25m	β^- 2.14, 1.68 (others); γ 0.148, 0.45 (others)
Te^{131m}				1.2d	β^- 0.42, 0.57 (others); IT $e^-\gamma$ 0.182; γ 0.78, 0.84, 1.14, others
Te^{132}		131.90854		77h	β^- 0.22; γ 0.23, 0.053
Te^{133}				~2m	β^- ~2.4; γ
Te^{133m}				53m	β^- 1.3, 2.4; γ 0.31–0.97; IT 0.334
Te^{134}				42m	β^- ~1.2; γ 0.20, 0.26, 0.17, 0.08
Te^{135}				1.4m	β^-
Iodine I^{117}				10m	
I^{118}				17m	
I^{119}				19m	β^+; EC; γ
I^{120}				1.4h	β^+ 4.0; EC
I^{121}				2.1h	EC; β^+ 1.13; γ 0.21, others
I^{122}		121.9074		3.5m	β^+ 3.1; EC
I^{123}			5/2	13h	EC; γ 0.159 (others)
I^{124}		123.90622	2	4.2d	EC; β^+ 1.55, 2.15; γ 0.603, 1.69, 0.65 (others)
I^{125}		124.90460	5/2	60d	EC; $e^-(\gamma)$ 0.035 (m) [to stable Te^{125}]
I^{126}		125.90563	2	13.1d	EC; β^- 0.87 (others); (β^+); γ 0.665, 0.386 (others)
I^{127}	100	126.90447	5/2		
I^{128}		127.90583	1	25.0m	β^- 2.12, 1.66; γ 0.45 (others); (EC)
I^{129}		128.90498	7/2	1.6×10^7y	β^- 0.15; $e^-(\gamma)$ 0.038
I^{130}		129.90667	5	12.5h	β^- 0.60, 1.02; γ 0.53, 0.67, 0.74, 0.42, 1.15
I^{131}		130.90612	7/2	8.06d	β^- 0.60 (others); γ 0.364 (others)
I^{132}		131.90800	4	2.29h	β^- 0.80, 1.04, 1.61, 2.14 (others); γ 0.673, 0.78, others 0.24–2.7
I^{133}		132.9075	7/2	21h	β^- 1.22 (others); γ 0.53 (others)
I^{134}		133.90984		53m	β^- 2.41, 1.25, others; γ 0.85, 0.89 (others 0.14–1.8)
I^{135}			7/2	6.7h	β^- 1.0, 1.4, 0.5; γ 0.14–2.0
I^{136}		135.9147		84s	β^- 4.2, 5.6, 2.7, 7.0; γ 1.32, others 0.20–3.2

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	I^{137}				24s	β^-; γ 0.39; (n)
	I^{138}				6s	β^-; (n)
	I^{139}				2s	β^-; (n)
Xenon	$_{54}Xe^{121}$				40m	β^+ 2.77; EC; γ 0.096, 0.08, 0.13, 0.44
	Xe^{122}				19h	EC; γ 0.090, 0.148, 0.239
	Xe^{123}				1.8h	EC; β^+ 1.51; γ 0.148, 0.178, 0.33
	Xe^{124}	0.096	123.9061			
	Xe^{125}				18h	EC; γ 0.055, 0.075, 0.113, 0.188, 0.242 (others)
	Xe^{125m}				55s	IT; γ 0.111, 0.075
	Xe^{126}	0.090	125.90417			
	Xe^{127}		126.9051		36.4d	EC; γ 0.203, 0.173, 0.37 (others)
	Xe^{127m}				75s	IT $e^-\gamma$ 0.175; γ 0.125
	Xe^{128}	1.919	127.90353			
	Xe^{129}	26.44	128.90478	1/2		
	Xe^{129m}				8.0d	IT $e^-(\gamma)$ 0.196; $e^-\gamma$ 0.040
	Xe^{130}	4.08	129.90350			
	Xe^{131}	21.18	130.90508	3/2		
	Xe^{131m}				12d	IT $e^-(\gamma)$ 0.163
	Xe^{132}	26.89	131.90416			
	Xe^{133}		132.9055		5.27d	β^- 0.34; $e^-\gamma$ 0.081 (m); (γ)
	Xe^{133m}				2.3d	IT $e^-\gamma$ 0.233
	Xe^{134}	10.44	133.90539			
	Xe^{135}		134.9070		9.2h	β^- 0.91; γ 0.25 (others)
	Xe^{135m}				15.7m	IT γe^- 0.53
	Xe^{136}	8.87	135.90721			
	Xe^{137}				3.9m	β^- 3.5; γ 0.26, 0.45
	Xe^{138}				17m	β^- 2.4; γ 0.42, 0.51, 1.78, 2.01
	Xe^{139}				41s	β^- ~3.5, ~4.6; γ 0.22, 0.30, 0.17, 0.40
	Xe^{140}				16s	β^-
	Xe^{141}				1.7s	β^-
	Xe^{142}				~1.5s	β^-
	Xe^{143}				1s	β^-
	Xe^{144}				1s	β^-
Cesium	$_{55}Cs^{123}$				8m	β^+
	Cs^{125}				45m	β^+ 2.05; EC; γ 0.112
	Cs^{126}		125.9093		1.6m	β^+ 3.8; γ 0.38, 0.48; EC
	Cs^{127}		126.9073	1/2	6.2h	EC; γ 0.406, 0.125 (others); (β^+)
	Cs^{128}		127.90773		3.8m	β^+ 2.89, 2.45; γ 0.44 (others); EC
	Cs^{129}			1/2	32h	EC; γ 0.37, 0.41 (others), $e^-(\gamma)$ 0.040
	Cs^{130}		129.90672	1	30m	EC; β^+ 1.97; (β^-)
	Cs^{131}		130.90547	5/2	9.69d	EC
	Cs^{132}		131.9061	2	6.48d	EC; γ 0.668 (others); (β^-; β^+)
	Cs^{133}	100	132.9051	7/2		
	Cs^{134}		133.9065	4	2.1y	β^- 0.66, 0.086 (others); γ 0.605, 0.80, 0.57 (others)
	Cs^{134m}			8	2.90h	IT $e^-\gamma$ 0.128; $e^-(\gamma)$ 0.010; (β^-)
	Cs^{135}		134.9058	7/2	2.0×10^6y	β^- 0.21
	Cs^{135m}				53m	IT $\gamma(e^-)$ 0.84; γ 0.78
	Cs^{136}		135.9071	5	12.9d	β^- 0.34, (0.66); γ 0.33, 1.07, others 0.067–1.26
	Cs^{137}		136.9068	7/2	30y	β^- 0.51, (1.18)
	Cs^{138}		137.9102		32m	β^- 1.5–3.4; γ 1.43, 1.01, 0.46, 2.21 (others)
	Cs^{139}		138.9132		9.5m	β^- 4; γ 1.28, 0.63
	Cs^{140}				1.1m	β^-; γ 0.61
	Cs^{141}				25s	β^-
	Cs^{142}				~1m	β^-

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
Barium	$_{56}Ba^{123}$				2m	
	Ba^{125}				6.5m	
	Ba^{126}				96m	EC; γ 0.225, 0.70
	Ba^{127}				11m	β^+
	Ba^{128}				2.4d	EC
	Ba^{129}				2.1h	EC; γ 0.05–1.62
	Ba^{129}				2.6h	EC; β^+ 1.43; γ
	Ba^{130}	0.101	129.90625			
	Ba^{131}				11.6d	EC; γ 0.055–1.7
	Ba^{131m}				14.6m	IT $e^-(\gamma)$ 0.078; $\gamma(e^-)$ 0.107
	Ba^{132}	0.097	131.9051			
	Ba^{133}		132.9056		7.2y	EC; γ 0.355, 0.081, 0.302 (others)
	Ba^{133m}				39h	IT $e^-\gamma$ 0.276; $e^-(\gamma)$ 0.012
	Ba^{134}	2.42	133.9043			
	Ba^{135}	6.59	134.9056	3/2		
	Ba^{135m_1}				29h	IT $e^-\gamma$ 0.268
	Ba^{135m_2}				0.33s	IT?; γ 0.80, 0.70
	Ba^{136}	7.81	135.9044			
	Ba^{137}	11.32	136.9056	3/2		
	Ba^{137m}				2.6m	IT γe^- 0.662
	Ba^{138}	71.66	137.9050			
	Ba^{139}		138.9086		82.9m	β^- 2.34, 2.17 (others); γ 0.165 (others)
	Ba^{140}		139.9105		12.8d	β^- 1.01, 0.5 (others); γ 0.030, 0.54 (others)
	Ba^{141}		140.9137		18m	β^- 2.8 (others); γ 0.19, 0.29, 0.35, 0.46, 0.64 (others)
	Ba^{142}				11m	β^- ~4; γ 0.08–1.8
	Ba^{143}				12s	β^-
Lanthanum	$_{57}La^{125}$				<1m	
	La^{126}				1.0m	β^+; γ 0.26
	La^{127}				3.8m	
	La^{128}				4.2m	β^+; γ 0.28
	La^{129}				7m	
	La^{130}				9m	β^+; γ 0.36
	La^{131}				60m	EC; β^+ 1.43, 1.94, 0.70; γ 0.11–0.88
	La^{132}		131.9103		4.5h	β^+ ~3.8; γ 1.0–3.3
	La^{133}		132.9080		4.0h	EC; β^+ 1.2; γ 0.8
	La^{134}		133.9083		6.5m	EC; β^+ 2.7; γ 0.60
	La^{135}		134.9067		19.8h	EC; (γ)
	La^{136}		135.9074		10m	EC; β^+ 1.8; (γ 0.83)
	La^{137}				6×10^4y	EC
	La^{138}	0.089	137.9068	5	1.1×10^{11}y	EC; γ 1.43; β^- 0.20; γ 0.81
	La^{139}	99.911	138.9061	7/2		
	La^{140}		139.9093	3	40.2h	β^- 1.34, others 0.42–2.20; γ 1.60, 0.49, 0.82, 0.33 (others)
	La^{141}		140.9106		3.8h	β^- 2.4; (γ)
	La^{142}				92m	β^- 4.0, others; γ 0.63, 2.4, others 0.87–3.4
	La^{143}		142.9157		14m	β^- 3.3; γ 0.20–2.85
Cerium	$_{58}Ce^{121}$				10m	EC; (β^+; γ)
	Ce^{122}				4.2h	β^+
	Ce^{123}				6.3h	EC; β^+ 1.3; γ 1.8
	Ce^{124}				72h	EC
	Ce^{125}				22h	EC; (β^+); γ 0.28
	Ce^{136}	0.193	135.9071			
	Ce^{137}				8.7h	EC; $e^-(\gamma)$ 0.010 (m); (γ)
	Ce^{137m}				34.5h	IT $e^-\gamma$ 0.255; (EC; γ)
	Ce^{138}	0.250	137.9057			
	Ce^{138m}				0.009s	IT 0.30; γ 1.04, 0.80
	Ce^{139}		138.9063		140d	EC; γ 0.166 (m)
	Ce^{139m}				55s	IT $\gamma(e^-)$ 0.74
	Ce^{140}	88.48	139.90528			
	Ce^{141}		140.90801	7/2	32.5d	β^- 0.44, 0.58; γ 0.145

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Ce^{142}	11.07	141.9090		$\sim 5 \times 10^{15}$y	α 1.5
	Ce^{143}		142.91217		33h	β^- 1.09, 1.38, others; γ 0.29, 0.057 (*m*), others 0.23–1.10
	Ce^{144}		143.91343		284d	β^- 0.32, 0.19; γ 0.133 (others)
	Ce^{145}		144.9162		3.0m	β^- 2.0
	Ce^{146}		145.9183		14m	β^- 0.70; γ 0.32, 0.22, 0.14, 0.11 (others)
	Ce^{147}				1.1m	β^-
	Ce^{148}				0.7m	β^-
Praseodymium	$_{59}Pr^{134}$				40m	γ 0.72
	Pr^{135}				22m	β^+ 2.5; γ 0.08, 0.22, 0.30
	Pr^{136}				1.1h	EC; β^+ 2.0; γ 0.17 (others)
	Pr^{137}				1.5h	EC; β^+ 1.7
	Pr^{138}				2.1h	EC; β^+ 1.4; γ 0.30, 0.80, 1.04 (others)
	Pr^{139}		138.9085		4.5h	EC; β^+ 1.0; γ 1.3, 1.6
	Pr^{140}		139.90878		3.5m	EC; β^+ 2.4; γ 1.2
	Pr^{141}	100	140.90739	5/2		
	Pr^{142}		141.90979	2	19.2h	β^- 2.15; (γ 1.57)
	Pr^{143}		142.91063	7/2	13.7d	β^- 0.93
	Pr^{144}		143.91310		17.3m	β^- 2.98; (γ)
	Pr^{145}		144.9141		6.0h	β^- 1.80; γ 0.07–1.15
	Pr^{146}		145.9172		25m	β^- 3.8, 2.3; γ 0.45, 1.49, 0.75 (others)
	Pr^{147}				12m	β^-; γ 0.32, 0.58, 0.64, 0.92, 1.25
	Pr^{148}				2m	β^-; γ 0.30
Neodymium	$_{60}Nd^{138?}$				22m	β^+ 2.4; γ
	Nd^{139}				5.5h	EC; β^+; γ 1.3
	Nd^{140}				3.3d	EC; γ 0.11–0.50
	Nd^{141}		140.90932	3/2	2.5h	EC; (β^+ 0.78); (γ)
	Nd^{141m}				63s	IT $\gamma(e^-)$ 0.76
	Nd^{142}	27.11	141.90748			
	Nd^{143}	12.17	142.90962	7/2		
	Nd^{144}	23.85	143.90990		2.4×10^{15}y	α 1.83
	Nd^{145}	8.30	144.9122	7/2		
	Nd^{146}	17.22	145.9127			
	Nd^{147}		146.91583	5/2	11.1d	β^- 0.81, 0.37; γ 0.091 (*m*), 0.53 (others)
	Nd^{148}	5.73	147.9165			
	Nd^{149}		148.9198	5/2	1.8h	β^- 1.1, 1.5, 0.95; γ 0.114, 0.210, 0.240, 0.112 (others)
	Nd^{150}	5.62	149.9207			
	Nd^{151}		150.9242		12m	β^- 2.0, 1.2, 1.8; γ 0.085–2.17
Promethium	$_{61}Pm^{141}$		140.9132		22m	β^+ 2.6; EC; γ 0.20
	Pm^{141m}				0.0022s	IT γe^- 0.43; γ 0.19
	Pm^{142}		141.9126		30s	β^+ 3.8; γ 1.6
	Pm^{143}		142.9108		280d	EC; γ 0.742
	Pm^{144}				~400d	EC; γ 0.61, 0.70, 0.48
	Pm^{145}		144.9123		18y	EC; γ 0.072, (0.067)
	Pm^{146}		145.9145		1.9y	EC; β^- 0.78; γ 0.75, 0.45
	Pm^{147}		146.91486	7/2	2.65y	β^- 0.225; (γ)
	Pm^{148}		147.9171	1	5.4d	β^- 2.45, 0.99, 1.9; γ 0.55, 1.46, 0.91
	Pm^{148m}			6	43d	β^- 0.39, 0.49, 0.68; γ 0.55, 0.63, 0.73, others; (IT)
	Pm^{149}		148.9181	7/2	53h	β^- 1.07 (others); (γ)
	Pm^{150}		149.9203		2.7h	β^- 2.3, 3.2; γ 0.33, others 0.41–3.08
	Pm^{151}		150.9216	5/2	28h	β^- 0.33–1.2; γ 0.10, 0.34, others 0.026–0.95
	Pm^{152}				6m	β^- 2.2; γ 0.12 (*m*), 0.24, ~1
	Pm^{153}				5.5m	β^- 1.65; γ 0.125, 0.18
	Pm^{154}				2.5m	β^- 2.5

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
Samarium	$_{62}Sm^{141*}$				~20d	EC
	Sm^{142}				72m	EC; β^+ 1.0; (γ)
	Sm^{143}		142.9145		8.7m	EC; β^+ 2.5; (γ)
	Sm^{143m}				1.1m	IT 0.75
	Sm^{144}	3.09	143.9116			
	Sm^{145}		144.9130		340d	EC; e^-(γ) 0.061 (m)
	Sm^{146}		145.9129		5×10^7y	α 2.55
	Sm^{147}	14.97	146.91462	7/2	1.1×10^{11}y	α 2.15
	Sm^{148}	11.24	147.9146			
	Sm^{149}	13.83	148.9169	7/2		
	Sm^{150}	7.44	149.9170			
	Sm^{151}		150.9197		~93y	β^- 0.076; (γ)
	Sm^{152}	26.72	151.9195			
	Sm^{153}		152.9217	3/2	47h	β^- 0.70, 0.64, 0.80; γ 0.103, 0.070 (others)
	Sm^{154}	22.71	153.9220			
	Sm^{155}		154.9247		22m	β^- 1.53; γ 0.105 (others)
	Sm^{156}		155.9257		9.4h	β^- 0.43, 0.71; γ 0.087, 0.20, 0.165, (0.25)
	Sm^{157}				0.5m	β^-; γ 0.57
Europium	$_{63}Eu^{144?}$				18m	β^+ 2.4
	Eu^{145}				5.8d	EC; γ 0.89, 0.65, 0.23 (others); (β^+)
	Eu^{146}				4.4d	EC; (β^+); γ 0.75, 0.64, 0.71, 0.67 (others)
	Eu^{147}		146.9166		22d	EC; γ 0.12, 0.077, 0.20 (others); (α 2.88)
	Eu^{148}				54d	EC; γ 0.55, 0.63, others 0.24–2.19
	Eu^{149}				106d	EC; γ 0.022 (m), others to 0.558
	Eu^{150}		149.9196		12.5h	EC; γ 0.33–2.02
	Eu^{150}				>5y	EC; γ 0.334, 0.439 (others)
	Eu^{151}	47.82	150.9196	5/2		
	Eu^{152}		151.9215	3	12.5y	EC; β^- 0.71 (others); (β^+); γ 0.122 (m), 0.344, 1.41, 0.96, 1.11, 1.08, 0.78 (others)
	Eu^{152m}			0	9.3h	β^- 1.87 (others); EC; γ 0.122, 0.84 (others); (β^+)
	Eu^{153}	52.18	152.9209	5/2		
	Eu^{154}		153.9228	3	16y	β^- 0.25–1.85; γ 0.123 (m), others 0.25–1.60
	Eu^{155}		154.9228		1.81y	β^- 0.15–0.25; γ 0.019–0.14
	Eu^{156}		155.9247		15d	β^- 0.50, 2.45; γ 0.089–2.20
	Eu^{157}		156.9253		15h	β^- ~1.7; γ 0.041–0.73
	Eu^{158}				60m	β^- 2.65
	Eu^{159}				18m	β^- 2.2; γ 0.07–0.22
	Eu^{160}				2.5m	β^- ~3.6
Gadolinium	$_{64}Gd^{146}$				24m	EC; β^+ 2.5; γ 0.78, 1.05
	Gd^{146}				50d	EC; γ 0.11, 0.15, 0.07
	Gd^{147}				22h	EC; γ 0.23, 0.38, 0.94, 0.64, 0.78, 0.28 (others)
	Gd^{148}		147.9177		84y	α 3.18
	Gd^{149}		148.9189		9.5d	EC; γ 0.150, 0.35, 0.30, 0.75 (others); (α)
	Gd^{150}		149.9185		2×10^6y	α 2.73
	Gd^{151}				120d	EC; γ 0.022–0.35
	Gd^{152}	0.200	151.9195		1.1×10^{14}y	α 2.14
	Gd^{153}		152.9211		242d	EC; γ 0.103 (m), 0.070, 0.10 (others)
	Gd^{154}	2.15	153.9207			
	Gd^{155}	14.73	154.9226	3/2		
	Gd^{156}	20.47	155.9221			
	Gd^{157}	15.68	156.9239	3/2		
	Gd^{158}	24.87	157.9241			

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Gd^{159}		158.9260	3/2	18h	β^- 0.95, 0.89, 0.59; γ 0.058, 0.36 (others)
	Gd^{160}	21.90	159.9271			
	Gd^{161}		160.9293		3.7m	β^- 1.60, (1.54); γ 0.36, 0.057, 0.315, 0.102 (others)
	Gd^{162}?				>1y	β^-; γ 0.04–1.39
	$_{65}Tb^{147}$				24m	β^+; γ 0.31, 0.15
Terbium	Tb^{148}				70m	β^+ 4.6; γ 0.78, 1.12
	Tb^{149}				4.1h	EC; β^+; α 3.95; γ 0.35, 0.16 (others)
	Tb^{149m}				4.3m	α 3.99; IT
	Tb^{150}				3.1h	β^+; γ 0.64 (others)
	Tb^{151}		150.9230		18h	EC; γ 0.11–1.31; (α 3.44)
	Tb^{152}				18h	EC; γ 0.12–1.05; (β^+)
	Tb^{152m}				4m	EC; β^+; γ 0.24, 0.14; (α)
	Tb^{153}				2.6d	EC; γ 0.016–0.99
	Tb^{154}				21h	EC; β^+ 2.8; γ 0.123 (*m*), 0.24–2.48
	Tb^{154}				8h	EC; γ 0.123–1.29
	Tb^{155}				5.6d	EC; γ 0.019–0.72
	Tb^{156}				5.4d	EC; γ 0.089–2.31
	Tb^{156m}				5.5h	IT 0.088; (β^-)
	Tb^{157}				>30y	EC
	Tb^{158}		157.9250		>3y	EC; γ 0.04
	Tb^{158m}				11s	IT $e^-(\gamma)$ 0.11
	Tb^{159}	100	158.9250	3/2		
	Tb^{160}		159.9268	3	73d	β^- 0.27–1.71; γ 0.88, 0.30, 0.97, 0.087 (others)
	Tb^{161}		160.9272	3/2	6.9d	β^- 0.51, 0.45, 0.58; γ 0.049, 0.026, 0.057, 0.075 (others)
	$Tb^{162?}$				2h	β^-
	Tb^{163}				7m	β^-; γ 0.18
	Tb^{164}				23h	β^-
	$_{66}Dy^{149}$				~15m	EC; γ 0.17
Dysprosium	Dy^{150}				8m	β^+; γ 0.39; α 4.21
	Dy^{151}				18m	EC; γ 0.145; (α 4.06; β^+)
	Dy^{152}		151.9244		2.3h	EC; β^+; γ 0.26; (α 3.66)
	Dy^{153}		152.9254		6h	EC; γ 0.08–0.54; (α 3.48)
	Dy^{154}		153.9248		10^6y	α 2.85
	Dy^{154m}				13h	α 3.35
	Dy^{155}				10h	EC; γ 0.065–1.66; (β^+)
	Dy^{156}	0.052	155.9238			
	Dy^{157}				8.5h	EC; γ 0.33 (others)
	Dy^{158}	0.090	157.9240			
	Dy^{159}		158.9254		144d	EC; $e^-(\gamma)$ 0.058, (γ)
	Dy^{160}	2.294	159.9248			
	Dy^{161}	18.88	160.9266	5/2		
	Dy^{162}	25.53	161.9265			
	Dy^{163}	24.97	162.9284	5/2		
	Dy^{164}	28.18	163.9288			
	Dy^{165}		164.9317	7/2	2.3h	β^- 1.28, 1.19 (others); γ 0.095 (others 0.043–1.08)
	Dy^{165m}				1.3m	IT $e^-\gamma$ 0.106; (β^-; γ)
	Dy^{166}		165.9329	0	82h	β^- 0.40 (others); γ 0.084, 0.054, 0.030 (others)
	Dy^{167}				4.4m	β^-
	$_{67}Ho^{151}$				36s	EC; α 4.51
Holmium	Ho^{151m}				42s	α 4.60
	Ho^{152}				2.4m	α 4.38
	Ho^{152m}				52s	α 4.45
	Ho^{153}				9m	EC; (α 3.92)
	Ho^{154}				5.6m	EC; α 4.12
	Ho^{155}				46m	β^+ 2.1; γ 0.14
	Ho^{156}				~1h	EC; γ 0.138

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Ho^{158}				1.9h	β^+ 1.90, 2.98; γ 0.85
	Ho^{159}				33m	EC; γ 0.057–0.309
	Ho^{160}				28m	EC; γ 0.73, 0.96, 0.88, 0.65 (others); (β^+)
	Ho^{160m}				5.3h	IT $e^-(\gamma)$ 0.060
	Ho^{161}			7/2	2.5h	EC; γ 0.026–0.18
	Ho^{162}		161.9288		12m	β^+ 1.14; EC; $e^-\gamma$ 0.081
	Ho^{162m}				68m	IT $e^-(\gamma)$ 0.010; $e^-\gamma$ 0.058, 0.038; EC; γ 0.185, 0.081, 1.21
	Ho^{163}		162.9284		>500y	EC
	Ho^{163m}				0.8s	IT γe^- 0.30
	Ho^{164}		163.9303		37m	β^- 0.99, 0.90; EC; γ 0.037, 0.073, 0.091
	Ho^{165}	100	164.9303	7/2		
	Ho^{166}		165.9324	0	27h	β^- 1.85, 1.77; γ 0.08 (m) (others)
	Ho^{166m}		165.9324		>30y	β^- <0.10; γ 0.08–1.42
	Ho^{167}		166.9331		3.0h	β^- 0.28, 1.0; γ 0.057–0.53
	Ho^{168}				3.3m	β^- ~2.2; γ 0.85
	Ho^{170}				45s	β^- ~3.1; γ 0.43
	$_{68}Er^{152}$				11s	α 4.93
Erbium	Er^{153}				36s	α 4.68
	Er^{154}				4.5m	α 4.26
	Er^{155}				2.5h	β^+ 1.30; γ 0.098–0.85
	Er^{159}				~1h	EC; γ 0.048–0.30
	Er^{160}				29h	EC
	Er^{161}				3.1h	EC; γ 0.83, 0.21 (others 0.084–1.97)
	Er^{162}	0.136	161.9288			
	Er^{163}				75m	EC; γ 0.43, 1.1
	Er^{164}	1.56	163.9293			
	Er^{165}			5/2	10h	EC
	Er^{166}	33.41	165.9304			
	Er^{167}	22.94	166.9320	7/2		
	Er^{167m}				2.5s	IT γe^- 0.21
	Er^{168}	27.07	167.9324			
	Er^{169}		168.9347	1/2	9.5d	β^- 0.34; $e^-(\gamma)$ 0.0084
	Er^{170}	14.88	169.9355			
	Er^{171}		170.9382	5/2	7.5h	β^- 1.05 (others); γ 0.308, 0.296, 0.112 (others)
	Er^{172}		171.9396		50h	β^- 0.50, 0.38, 0.29; γ 0.050, 0.41, 0.61 (others)
	$_{69}Tm^{161}$				30m	EC; γ 0.084, 0.144, 0.147, 0.17
Thulium	Tm^{162}				77m	EC; γ 0.10, 0.24
	Tm^{163}				1.9h	EC; β^+ 1.05, 0.40; γ 0.022–0.66
	Tm^{164}		163.9335		2.0m	EC; β^+ 2.9; γ 0.091 (others)
	Tm^{165}				30h	EC; γ 0.25, 0.29, 0.80, 0.34 (others)
	Tm^{166}		165.9330	2	7.7h	EC; (β^+ 2.1); γ 0.073–2.10
	Tm^{167}			1/2	9.4d	EC; γ 0.057 (m)
	Tm^{168}				93d	EC; γ 0.075–1.64; (β^-)
	Tm^{169}	100		1/2		
	Tm^{170}		169.9359	1	127d	β^- 0.97, 0.88; $e^-\gamma$ 0.084 (m)
	Tm^{171}		170.9366	1/2	1.9y	β^- 0.10; (γ 0.067)
	Tm^{172}		171.9386		63.6h	β^- 0.28–1.92; γ 0.079 (others 0.18–1.61)
	Tm^{173}				7.3h	β^- 0.9; γ 0.40, 0.47
	Tm^{174}				5.5m	β^- 2.5
	Tm^{175}				20m	β^- 2.0; γ 0.51
	Tm^{176}				1.5m	β^- 4.2
	$_{70}Yb^{155}$				1.6s	α 5.21
Ytterbium	Yb^{164}				75m	EC
	Yb^{166}		165.9333		56h	EC; γ 0.082

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	Yb^{167}				18m	EC; γ 0.026 0.18
	Yb^{168}	0.135	167.9339			
	Yb^{169}				31d	EC; γ 0.008–0.31
	Yb^{169m}				46s	IT 0.024
	Yb^{170}	3.03	169.9349			
	Yb^{171}	14.31	170.9365	1/2		
	Yb^{172}	21.82	171.9366			
	Yb^{173}	16.13	172.9383	5/2		
	Yb^{174}	31.84	173.9390			
	Yb^{175}		174.9414		4.2d	β^- 0.47, 0.07; γ 0.396 (others)
	Yb^{175m}				0.072s	IT 0.495
	Yb^{176}	12.73	175.9427			
	Yb^{177}		176.9455		1.9h	β^- 1.38 (others); (γ 0.12 1.24)
	Yb^{177m}				6.5s	IT $e^-\gamma$ 0.23; γe^- 0.104
Lutetium	$_{71}Lu^{167}$				55m	EC; γ 0.03 0.40; (β^+)
	Lu^{168}				7.1m	EC; γ 0.087, 0.99, 0.90 (others); (β^+)
	Lu^{168}				2.15h	EC; γ 0.087
	Lu^{169}				1.5d	EC; γ 0.024–1.39
	Lu^{170}		169.9387		2.0d	EC; γ 0.084 (*m*), 2.04 (others 0.15–3.02)
	Lu^{171}				8.3d	EC; γ 0.020–1.50
	Lu^{172}				6.7d	EC; γ 0.079–2.08
	Lu^{172m}				3.7m	IT $e^-(\gamma)$ 0.042
	Lu^{173}		172.9390		500d	EC; γ 0.079,0.101, 0.273 (others)
	Lu^{174}		173.9406		3.6y	EC; γ 0.077, 1.23
	Lu^{174m}				160d	IT $e^-(\gamma)$ 0.059; γ 0.067, 0.045
	Lu^{175}	97.41	174.9409	7/2		
	Lu^{176}	2.59	175.9427	7	3×10^{10}y	β^- 0.43; γ 0.31, 0.20, 0.088 (*m*)
	Lu^{176m}			1	3.7h	β^- 1.20, 1.10; γ 0.088 (*m*)
	Lu^{177}		176.9440	7/2	6.8d	β^- 0.50 (others), γ 0.113 (others)
	Lu^{177m}				160d	β^- ~1; γ 0.208, others 0.10–0.41
	Lu^{178}				22m	β^-; γ 0.33, 0.43, 0.56, 0.67, 0.78
	Lu^{179}				4.6h	β^- 1.35, 1.08; γ 0.215
	Lu^{180}				2.5m	β^- 3.3
Hafnium	$_{72}Hf^{168}$				22m	EC; γ 0.13, 0.17; (β^+)
	Hf^{169}				1.5h	EC; γ 0.049, 0.12; (β^+)
	Hf^{170}				12h	EC
	Hf^{171}				11h	EC; γ 0.12–1.07
	Hf^{172}				~5y	EC; γ 0.024, 0.12, 0.08 (others)
	Hf^{173}				24h	EC; γ 0.12, 0.30 (others)
	Hf^{174}	0.18	173.9403		2×10^{15}y	α 2.50
	Hf^{175}				70d	EC; γ 0.343 (others)
	Hf^{176}	5.20	175.9416			
	Hf^{177}	18.50	176.9435			
	Hf^{178}	27.14	177.9439			
	Hf^{178m}				4s	IT $e^-(\gamma)$ 0.089; γ 0.427, 0.326, 0.214, 0.093 (*m*)
	Hf^{179}	13.75	178.9460	9/2		
	Hf^{179m}				19s	IT $e^-(\gamma)$ 0.161; γ 0.217
	Hf^{180}	35.24	179.9468			
	Hf^{180m}				5.5h	IT $e^-\gamma$ 0.058; γ 0.44, 0.33, 0.22, 0.093, 0.50
	Hf^{181}		180.94908		45d	β^- 0.41 (others), γ 0.133 (m_2), 0.48 (m_1), 0.35, 0.14 (others)
	Hf^{182}		181.9507		9×10^6y	β^-; γ 0.27
	Hf^{183}		182.9538		65m	β^- ~1.4; γ

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	Hf^{184}				2.2h	β^-
Tantalum	$_{73}Ta^{172}$				24m	EC; β^+
	Ta^{173}				3.7h	EC; γ 0.090, 0.17, (β^+)
	Ta^{174}				1.2h	β^+; EC; γ 0.13, 0.21, 0.28, 0.35 (others)
	Ta^{175}				11h	EC; γ 0.050–1.64
	Ta^{176}				8.0h	EC; γ 0.088 (m), 0.20 (others 0.091–2.9)
	Ta^{177}		176.9447		57h	EC; γ 0.113 (others 0.05–1.06)
	Ta^{178}		177.9459		2.2h	EC; γ 0.089–0.43
	Ta^{178}				9.3m	EC; γ 0.093 (others); (β^+)
	Ta^{179}		178.9461		1.6y	EC
	Ta^{180}	0.0123	179.9475			
	Ta^{180m}				8.1h	EC; γ 0.093; β^- 0.60, 0.70; (γ 0.102)
	Ta^{181}	99.9877	180.94798	7/2		
	Ta^{182}		181.95014		115d	β^- 0.18–0.51; γ 0.033–1.61
	Ta^{182m}				16m	IT $e^-(\gamma)$ 0.184; γ 0.172, 0.147 (others)
	Ta^{183}		182.95144		5.0d	β^- 0.62 (others); γ 0.041–0.406
	Ta^{184}		183.9538		8.7h	β^- 0.15–1.36; γ 0.11–1.2
	Ta^{185}		184.9555		48m	β^- 1.72 (others); γ 0.175, 0.075, 0.100 (others)
	Ta^{186}		185.9583		10.5m	β^- 2.2; γ 0.125–1.1
Tungsten	$_{74}W^{176}$				80m	EC; γ 1.3, 0.1; (β^+)
	W^{177}				2.2h	EC; γ 0.45, 1.2
	W^{178}				22d	EC; (γ?)
	W^{179}				40m	EC; γ 0.031
	W^{179m}				7m	IT 0.22
	W^{180}	0.135	179.9470			
	W^{180m}				0.005s	IT 0.24; γ 0.37
	W^{181}		180.9482		126d	EC; $e^-(\gamma)$ 0.0063 (m); (other γ's)
	W^{182}	26.41	181.94827			
	W^{183}	14.40	182.95029	1/2		
	W^{183m}				5.3s	IT 0.103; γ 0.11, 0.053, 0.046
	W^{184}	30.64	183.95099			
	W^{185}		184.9535		74d	β^- 0.43, (0.30); (γ 0.125)
	W^{185m}				1.7m	IT $e^-\gamma$ 0.125; γ 0.175, 0.075 0.100
	W^{186}	28.41	185.9543			
	W^{187}		186.9574	3/2	24h	β^- 0.63, 1.32, 0.34; γ 0.69, 0.48 (others)
	W^{188}		187.9587		65d	β^- 0.43, 0.34; γ 0.057, 0.15, 0.22, 0.26, 0.29
Rhenium	$_{75}Re^{177}$				17m	β^+
	Re^{178}				15m	EC; β^+ 3.1
	Re^{179}				20m	EC
	Re^{180}		179.9501		2.4m	EC; (β^+ 1.1); γ 0.88, 0.11
	Re^{180m}				20h	EC; β^+ 1.9
	Re^{181}				20h	EC; γ 0.020–1.54
	Re^{182}				13h	EC; γ 0.032–2.05
	Re^{182}				64h	EC; γ 0.018–1.44
	Re^{183}				68d	EC; γ 0.041–0.407
	Re^{184}				35d	EC; γ 0.111, 0.90, 0.79, 0.89 (others)
	Re^{184m}				165d	EC; (IT 0.217); γ 0.11–0.90
	Re^{185}	37.07	184.9530	5/2		
	Re^{186}		185.9551		89h	β^- 1.07, 0.93; γ 0.137 (others); (EC)
	Re^{187}	62.93	186.9560	5/2	6×10^{10}y	β^- 0.001
	Re^{188}		187.9582		17h	β^- 2.13, 2.0; γ 0.155 (others)
	Re^{188m}				19m	IT $e^-(\gamma)$ 0.002, 0.016; γ 0.064, 0.106, 0.092

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	Re^{189}				23h	β^- 0.98, others; γ 0.070, 0.15, 0.22, 0.25
	Re^{190}		189.9622		2.8m	β^- 1.7; γ 0.19, 0.39, 0.57, 0.83
	Re^{191}				9.8m	β^- 1.8
Osmium	$_{76}Os^{181}$				23m	EC; γ 0.09, 0.10
	Os^{181}				2.7h	EC; γ 0.23
	Os^{182}				22h	EC; γ 0.510, 0.18, 0.26 (others); [to 13h Re^{182}]
	Os^{183}				13.7h	EC; γ 0.114, 0.382 (*m*), 0.168 (others)
	Os^{183m}				9.9h	EC; IT 0.171; γ 1.108, 1.102 (others)
	Os^{184}	0.018	183.9526			
	Os^{185}		184.9541		94d	EC; γ 0.65, 0.88 (others)
	Os^{186}	1.59	185.9539			
	Os^{187}	1.64	186.9560	1/2		
	Os^{188}	13.3	187.9560			
	$Os^{188m?}$				26d	IT
	Os^{189}	16.1	188.9582	3/2		
	Os^{189m}				5.7h	IT $e^-(\gamma)$ 0.031
	Os^{190}	26.4	189.9586			
	Os^{190m}		189.9604		10m	IT $e^-(\gamma)$ 0.038; γ 0.61, 0.50, 0.36, 0.19
	Os^{191}		190.9612		14.6d	β^- 0.14; [to 4.8s Ir^{191m}]
	Os^{191m}				14h	IT $e^-(\gamma)$ 0.074
	Os^{192}	41.0	191.9614			
	Os^{193}		192.9645		31h	β^- 1.13 (others); γ 0.129 (others 0.07–0.56)
	Os^{194}				1.9y	β^-
	Os^{195}				6.5m	β^- 2
Iridium	$_{77}Ir^{182}$				15m	EC; γ 0.13–4.0; (β^+)
	Ir^{183}				55m	EC; γ 0.24, others
	Ir^{184}				3.2h	EC; γ 0.125–4.3; (β^+)
	Ir^{185}				14h	EC; γ 0.037–1.10
	Ir^{186}		185.9580		15.8h	EC; γ 0.071–2.89; (β^+ 1.94)
	Ir^{187}				10.5h	EC; γ 0.010–0.99
	Ir^{188}		187.9590		41h	EC; γ 0.155, others 0.32–2.22; (β^+ 1.66)
	Ir^{189}				12d	EC; γ 0.070, 0.25, others 0.031–0.28
	Ir^{190}		189.9608		12.3d	EC; γ 0.187–1.43
	Ir^{190m}		189.9637		3.2h	EC; β^+ 2.04; [to 10m Os^{190m}]
	Ir^{191}	37.3	190.9608	3/2		
	Ir^{191m}				4.8s	IT $e^-(\gamma)$ 0.042; $e^-\gamma$ 0.129, 0.047, 0.082
	Ir^{192}		191.9630		74.0d	β^- 0.67, 0.54, 0.24; γ 0.316, 0.47, 0.30 (others); (EC)
	Ir^{192m_1}				1.45m	IT $e^-(\gamma)$ 0.057; (β^-)
	Ir^{192m_2}				6×10^2y	IT 0.16 [to 74d Ir^{192}]
	Ir^{193}	62.7	192.9633	3/2		
	Ir^{193m}				12d	IT $e^-(\gamma)$ 0.080
	Ir^{194}		193.9652		19h	β^- 2.24, 1.91 (others); γ 0.328 (others)
	Ir^{194m}				0.032s	IT 0.115
	Ir^{195}				2.3h	β^- ~1; γ 0.10–0.66
	Ir^{197}				7m	β^- 1.5, 2.0; γ 0.50
	Ir^{198}				50s	β^- 3.6; γ 0.78
Platinum	$_{78}Pt^{185}$				1.2h	
	Pt^{186}				2.9h	EC
	Pt^{187}				2.2h	
	Pt^{188}		187.9596		10d	EC; γ 0.195, 0.187, 0.055 (others); (α 3.9)
	Pt^{189}				11h	EC; γ 0.072–0.80
	Pt^{190}	0.0127	189.9599		7×10^{11}y	α 3.11

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Pt^{191}				3.0d	EC; γ 0.042–0.62
	Pt^{192}	0.78	191.9614			
	Pt^{193}		192.9633		0.3–500y	EC
	Pt^{193m}				4.4d	IT $e^-(\gamma)$ 0.135; $e^-(\gamma)$ 0.013
	Pt^{194}	32.9	193.9628	0		
	Pt^{195}	33.8	194.96482	1/2		
	Pt^{195m}				4.1d	IT $e^-(\gamma)$ 0.130; $e^-\gamma$ 0.031, 0.099
	Pt^{196}	25.3	195.96498	0		
	Pt^{197}		196.96736		20h	β^- 0.67, 0.48; γ 0.077 (m), 0.19
	Pt^{197m}				1.3h	IT 0.35; (β^-; γ 0.28)
	Pt^{198}	7.21	197.9675			
	Pt^{199}		198.9707		30m	β^- 0.8–1.7; γ 0.074–0.96
	Pt^{199m}				14s	IT $\gamma(e^-)$ 0.39; $e^-(\gamma)$ 0.032
	Pt^{200}				11.5h	β^-
	Pt^{201}				2.3m	β^-
	$_{79}Au^{185}$				7m	EC
Gold	Au^{186}				12m	EC; γ 0.16, 0.22, 0.30, 0.40
	Au^{187}				8m	EC
	Au^{188}				8m	EC; γ 0.25, 0.33, 0.63; (α 5.1)
	Au^{189}				30m	EC; γ
	Au^{190}				40m	EC; γ 0.29 (others 0.30–3.46)
	Au^{191}			3/2	3.4h	EC; γ 0.030–2.17
	Au^{192}		191.9649	1	4.1h	EC; β^+ 2.2; γ 0.045–1.16
	Au^{193}			3/2	17h	EC; γ 0.186, 0.112 (others 0.013–0.49)
	Au^{193m}				3.9s	IT $e^-(\gamma)$ 0.032; γ 0.26; (EC)
	Au^{194}		193.9655	1	39h	EC; γ 0.328, 0.29, 0.62 (others 0.095–2.41); (β^+)
	Au^{195}		194.96511	3/2	183d	EC; γ 0.099, 0.031, 0.13
	Au^{195m}				31s	IT $e^-(\gamma)$ 0.057; γ 0.20, 0.061, 0.26
	Au^{196}		195.96655	2	6.2d	EC; γ 0.356, 0.333 (others); (β^- 0.26)
	Au^{196m}			12	9.7h	IT $e^-(\gamma)$ 0.175; γ 0.148, 0.188, 0.085 (m) (others)
	Au^{197}	100	196.96655	3/2		
	Au^{197m}				7.2s	IT $e^-(\gamma)$ 0.130; γ 0.28
	Au^{198}		197.96824	2	2.70d	β^- 0.96 (others); γ 0.412 (others)
	Au^{199}		198.96865	3/2	3.15d	β^- 0.30, 0.25; γ 0.158, 0.208
	Au^{200}		199.9708		48m	β^- 2.2, 0.7; γ 0.37, 1.23
	Au^{201}		200.9719		25m	β^- 1.5; (γ 0.53)
	Au^{202}				25s	β^-
	Au^{203}				55s	β^- 1.9; γ 0.69
	$_{80}Hg^{185}$				53s	EC; α 5.64
Mercury	Hg^{186}				1.5m	EC; γ 0.13, 0.27, 0.35, 0.44
	Hg^{187}				3m	EC; α 5.14; γ 0.18, 0.25, 0.40
	Hg^{188}				3.7m	EC; γ 0.14
	Hg^{189}				9m	EC; γ 0.17, 0.24, 0.32, 0.50
	Hg^{190}				20m	EC; γ 0.14, 0.22
	Hg^{191}				57m	EC; γ 0.25, 0.27
	Hg^{192}				5h	EC; γ 0.031–0.31
	Hg^{193}				6h	EC; γ 0.038–1.08
	Hg^{193m}				11h	EC; γ 0.032–1.65; IT $e^-(\gamma)$ 0.101
	Hg^{194}		193.9657		146d	EC
	Hg^{194m}				0.4s	IT; γ 0.134, 0.048
	Hg^{195}			1/2	9.5h	EC; γ 0.061–1.17
	Hg^{195m}			13/2	40h	EC; IT $e^-(\gamma)$ 0.123; γ 0.016–1.24
	Hg^{196}	0.146	195.96582			
	Hg^{197}			1/2	65h	EC; γ 0.077 (m), (0.191)
	Hg^{197m}			13/2	23h	IT $e^-(\gamma)$ 0.165; γ 0.134; (EC; γ)
	Hg^{198}	10.02	197.96677			

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Hg^{199}	16.84	198.96826	1/2		
	Hg^{199m}		198.96883		44m	IT $e^-\gamma$ 0.370; γ 0.158
	Hg^{200}	23.13	199.96834			
	Hg^{201}	13.22	200.97031	3/2		
	Hg^{202}	29.80	201.97063			
	Hg^{203}		202.97285		47d	β^- 0.21; γ 0.279
	Hg^{204}	6.85	203.97348			
	Hg^{205}		204.9762		5.5m	β^- 1.65; (γ 0.20)
	Hg^{206}		205.97747		8.5m	β^- 1.29
Thallium	$_{81}Tl^{191}$				10m	EC
	Tl^{192}				short	
	Tl^{192m}				11m	IT 0.11; EC; γ 0.42
	Tl^{193}				23m	EC; γ 0.24, 0.25, 0.26, 0.31 (others)
	Tl^{194}				33.0m	EC; γ 0.43
	Tl^{194m}				32.8m	EC; γ 0.097; IT
	Tl^{195}			1/2	1.2h	EC; γ 0.037 (others); β^+ ~1.8
	Tl^{195m}				3.5s	IT $e^-(\gamma)$ 0.099; γ 0.383, 0.393
	Tl^{196}		195.9708		1.8h	EC; γ 0.426; β^+
	Tl^{196m}		195.9750		1.4h	EC; γ 0.084 (others); (IT)
	Tl^{197}			1/2	2.8h	EC; γ 0.152 (others); (β^+)
	Tl^{197m}				0.54s	IT γe^- 0.222; γ 0.385, 0.387
	Tl^{198}		197.9705	2	5.3h	EC; γ 0.412, others 0.19 2.78; (β^+)
	Tl^{198m}			7	1.9h	IT 0.261; γ 0.28 (others); EC; γ 0.049 0.64
	Tl^{199}		198.9694	1/2	7.4h	EC; γ 0.158 (m), others 0.037 0.49
	Tl^{199m}				0.042s	IT 0.37
	Tl^{200}		199.97097	2	26h	EC; γ 0.065–2.28; (β^+)
	Tl^{201}		200.9708	1/2	73h	EC; γ 0.167 (others)
	Tl^{202}		201.9721	2	12d	EC; γ 0.44 (others)
	Tl^{203}	29.50	202.97233	1/2		
	Tl^{204}		203.97389	2	3.80y	β^- 0.76; (EC)
	Tl^{205}	70.50	204.97446	1/2		
	Tl^{206}		205.97608		4.3m	β^- 1.57
	Tl^{207}		206.97745		4.8m	β^- 1.44; (γ)
	Tl^{208}		207.98201		3.1m	β^- 1.79, 1.28, 1.52; γ 2.61, 0.58, 0.51, 0.86 (others)
	Tl^{209}		208.98530		2.2m	β^- 2.0; γ 0.12, 0.45, 1.56
	Tl^{210}		209.99000		1.3m	β^- 1.97; γ 0.09–2.45
Lead	$_{82}Pb^{194}$				11m	EC; γ 0.20
	Pb^{195}				17m	EC; [to 3.5s Tl^{195m}]
	Pb^{196}				37m	EC; γ 0.19–0.50
	Pb^{197m}				42m	EC [to 0.54s Tl^{197m}]; IT 0.234; γ 0.085
	Pb^{198}				2.4h	EC; γ 0.031–0.87
	Pb^{199}				1.5h	EC; γ 0.367, 0.353, 0.72
	Pb^{199m}				12m	IT $e^-\gamma$ 0.42
	Pb^{200}				21.5h	EC; γ 0.033–0.61
	Pb^{201}				9.5h	EC; γ 0.33 (others 0.13 1.40)
	Pb^{201m}				1.0m	IT γe^- 0.63
	Pb^{202}		201.9722		~3×10^5y	EC
	Pb^{202m}		201.9745		3.6h	IT 0.79, 0.13; γ 0.42, 0.96, 0.66 (others); (EC)
	Pb^{203}		202.97321		52h	EC; γ 0.279 (others)
	Pb^{203m}		202.97410		6.1s	IT γe^- 0.825
	Pb^{204}	1.48	203.97307			
	Pb^{204m_2}		203.97542		67m	IT $\gamma(e^-)$ 0.912; γ 0.375 (m_1), 0.899
	Pb^{205}		204.97452		3×10^7y	EC
	Pb^{205m}		204.97561		0.004s	IT $e^-(\gamma)$ 0.026; γ 0.99 (others)
	Pb^{206}	23.6	205.97446	0		
	Pb^{207}	22.6	206.97590	1/2		
	Pb^{207m}		206.97765		0.8s	IT γe^- 1.06; γ 0.57

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Pb^{208}	52.3	207.97664	0		
	Pb^{209}		208.98111		3.3h	β^- 0.64
	Pb^{210}		209.98418		22y	β^- 0.015, 0.061; $e^-(\gamma)$ 0.046; (α)
	Pb^{211}		210.98880		36.1m	β^- 1.36 (others); (γ 0.07 1.10)
	Pb^{212}		211.99190		10.6h	β^- 0.34, 0.58; γ 0.239 (others)
	Pb^{214}		213.9998		26.8m	β^- 0.59, 0.65; γ 0.053–0.35
	$_{83}Bi^{196?}$				7m	EC; (α 5.83)
Bismuth	Bi^{197}				2m	α 6.2
	Bi^{198}			9/2	26m	EC; (α 5.47)
	Bi^{200}			7	35m	EC; γ 0.46, 1.03
	Bi^{201}			9/2	1.85h	EC
	Bi^{201}				62m	EC; (α 5.15)
	Bi^{202}			5	1.6h	EC; γ 0.42, 0.96
	Bi^{203}		202.9768	9/2	11.8h	EC; γ 0.060–1.90; (β^+; α 4.85)
	Bi^{204}		203.9777	6	11.2h	EC; γ 0.079–2.10
	Bi^{205}		204.97742	9/2	15.3d	EC; γ 0.026–2.61; (β^+)
	Bi^{206}		205.9783	6	6.24d	EC; γ 0.11–1.90
	Bi^{207}		206.97847		30y	EC; γ 0.57, 1.06 (Pb^{207m}) (others)
	Bi^{208}		207.97973		$\sim 8 \times 10^5$y	EC; γ 2.61
	Bi^{208m}				0.0026s	IT 0.92; γ 0.51
	Bi^{209}	100	208.98042	9/2		
	Bi^{210}		209.98411	1	5.01d	β^- 1.16; (α)
	Bi^{210m}				3×10^6y	α 4.95, 4.92 (others); γ 0.26 (m), 0.30 (m) (others)
	Bi^{211}		210.98729		2.15m	α 6.62, 6.28; γ 0.35; (β^-)
	Bi^{212}		211.99127		60.6m	β^- 2.25 (others); α 6.05 (others); $e^-(\gamma)$ 0.040 (other γ's)
	Bi^{213}		212.99433		47m	β^- 1.39, 0.96; γ 0.44; (α 5.86)
	Bi^{214}		213.99863		19.7m	β^- 1.51, 1.0, 3.18; γ 0.61-2.42; (α)
	Bi^{215}		215.0019		8m	β^-
	$_{84}Po^{192}$				0.5s	α 6.58
Polonium	Po^{193}				4s	α 6.47
	Po^{194}				13s	α 6.38
	Po^{195}				30s	α 6.25
	Po^{196}				1.8m	α 6.14
	Po^{197}				4m	α 6.04
	Po^{198}				7m	α 5.93
	Po^{199}				12m	α 5.87
	Po^{200}				11m	EC; (α 5.86, 5.75)
	Po^{201}			3/2	18m	EC; (α 5.57, 5.67, 5.77)
	Po^{202}			0	44m	EC; (α 5.57)
	Po^{203}			5/2	42m	EC; (α 5.48)
	Po^{204}			0	3.5h	EC; (α 5.37)
	Po^{205}			5/2	1.8h	EC; (α 5.23)
	Po^{206}		205.9805	0	8.8d	EC; γ 0.060–1.32; (α 5.22)
	Po^{207}		206.98159	5/2	6.0h	EC; γ 0.100–2.06; (β^+; α 5.1)
	Po^{208}		207.98126		2.9y	α 5.11; (EC; γ)
	Po^{209}		208.98246	1/2	103y	α 4.88; (EC; γ)
	Po^{210}		209.98287	0	138.4d	α 5.305
	Po^{211}		210.98665		0.52s	α 7.448 (others); (γ)
	Po^{211m}		210.98804		25s	α 7.14 (others); γ 1.06, 0.57 (Pb^{207m})
	Po^{212}		211.98886		3×10^{-7}s	α 8.78
	Po^{212m}		211.99201		46s	α 11.7 (others); (γ)
	Po^{213}		212.99284		4.2×10^{-6}s	α 8.34
	Po^{214}		213.99519		1.6×10^{-4}s	α 7.69
	Po^{215}		214.99947		0.0018s	α 7.37; (β^-)
	Po^{216}		216.00192		0.16s	α 6.78

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Po^{217}				<10s	α 6.54
	Po^{218}		218.0089		3.05m	α 6.00; (β^-)
	$_{85}At^{200?}$				0.9m	α 6.41, 6.46
	At^{201}				1.5m	α 6.35
Astatine	At^{202}				3.0m	EC; α 6.13, 6.23
	At^{203}				7.4m	EC; α 6.09
	At^{204}				9.3m	EC; (α 5.95)
	$At^{204?}$				25m	EC
	At^{205}				26m	EC; α 5.90
	At^{206}				30m	EC; (α 5.70; γ)
	$At^{206?}$				2.9h	EC
	At^{207}		206.9857		1.8h	EC; α 5.75
	At^{208}		207.9865		1.6h	EC; γ 0.66, 0.17, 0.25; (α 5.65)
	$At^{208?}$				6.2h	EC
	At^{209}		208.98614		5.5h	EC; γ 0.78, 0.54, 0.20, 0.091; (α 5.64)
	At^{210}		209.9870		8.3h	EC; γ 0.047–1.60; (α)
	At^{211}		210.98750	9/2	7.21h	EC; α 5.86; (γ)
	At^{212}				0.30s	α 7.66, 7.60; γ 0.063
	At^{212m}				0.12s	α 7.82, 7.88; γ 0.063
	At^{213}		212.9931		<2s	α 9.02
	At^{214}		213.9963		2×10^{-6}s	α 8.78
	At^{215}		214.99866		$\sim 10^{-4}$s	α 8.00
	At^{216}		216.00240		3×10^{-4}s	α 7.79
	At^{217}		217.00465		0.018s	α 7.05
	At^{218}		218.00855		1.3s	α 6.69 (others)
	At^{219}		219.0114		0.9m	α 6.27; (β^-)
	$_{86}Rn^{204}$				3m	α 6.28
Radon	Rn^{206}				6.5m	α 6.25; EC
	Rn^{207}				11m	EC; (α 6.12)
	Rn^{208}				22m	EC; α 6.14
	Rn^{209}				30m	EC; α 6.04
	Rn^{210}		209.9897		2.7h	α 6.04; EC
	Rn^{211}		210.99060		16h	EC; γ 0.032–1.82; α 5.78 (others)
	Rn^{212}		211.99073		25m	α 6.26
	Rn^{213}				0.019s	α 8.13
	Rn^{215}		214.9987		$\sim 10^{-6}$s	α 8.6
	Rn^{216}		216.00023		4.5×10^{-5}s	α 8.01
	Rn^{217}		217.00392		5.4×10^{-4}s	α 7.68
	Rn^{218}		218.00559		0.019s	α 7.12 (others); (γ)
	Rn^{219}		219.00952		3.92s	α 6.81, 6.55 (others); γ 0.27 (others)
	Rn^{220}		220.01140		54s	α 6.28; (γ)
	Rn^{221}				25m	β^-; α 6.00
	Rn^{222}		222.0175		3.82d	α 5.49 (others); (γ)
	$_{87}Fr^{205?}$				~4s	α 6.83
Francium	Fr^{206}				16s	α 6.74
	Fr^{207}				19s	α 6.74
	Fr^{208}				37s	α 6.59
	Fr^{209}				54s	α 6.62
	Fr^{210}				2.6m	α 6.50
	Fr^{211}				3.1m	α 6.52
	Fr^{212}		211.9961		19m	EC; α 6.39, 6.41, 6.34; γ
	Fr^{213}				34s	α 6.77
	Fr^{214}				0.004s	α 8.55
	Fr^{215}				<0.001s	α 9.4
	Fr^{217}		217.0048		<2s	α 8.3
	Fr^{218}		218.0075		0.005s	α 7.85
	Fr^{219}		219.00925		0.02s	α 7.30
	Fr^{220}		220.01233		28s	α 6.69
	Fr^{221}		221.01418		4.8m	α 6.33, 6.11; γ 0.22
	Fr^{222}				15m	β^-; (α)
	Fr^{223}		223.01980		22m	β^- 1.15; γ 0.049, 0.080 (others) (α 5.34)

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
Radium	$_{88}Ra^{212}$				18s	α 6.90
	Ra^{213}				2.7m	α 6.74, 6.61
	Ra^{214}				2.6s	α 7.17
	Ra^{215}				0.0016s	α 8.7
	Ra^{219}		219.0100		~0.001s	α 8.00
	Ra^{220}		220.01097		0.023s	α 7.45 (others); (γ)
	Ra^{221}		221.01386		28s	α 6.61, 6.75, 6.66, 6.57; γ 0.15, 0.18 (others)
	Ra^{222}		222.01536		38s	α 6.56, 6.23; γ 0.33
	Ra^{223}		223.01856		11.7d	α 5.71, 5.60 (others); γ 0.031–0.58
	Ra^{224}		224.02022		3.64d	α 5.68 (others); (γ)
	Ra^{225}		225.02352		14.8d	β^- 0.32; γe^- 0.040
	Ra^{226}		226.0254		1622y	α 4.78 (others;) (γ)
	Ra^{227}		227.02922		41m	β^- 1.30 (others); (γ)
	Ra^{228}		228.03123		6.7y	β^- 0.055; (γ?)
	Ra^{229}				~1m	β^-
	Ra^{230}				1h	β^- 1.2
Actinium	$_{89}Ac^{213}$				~1s	α 7.42
	Ac^{214}				12s	α 7.12, 7.18, 7.24
	Ac^{221}		221.0157		<2s	α 7.54
	Ac^{222}		222.0178		4.2s	α 6.96
	Ac^{223}		223.01912		2.2m	α 6.64; EC
	Ac^{224}		224.0217		2.9h	EC; γ 0.22, 0.13; α 6.17
	Ac^{225}		225.02314		10.0d	α 5.82, 5.78 (others); γ 0.037 (others)
	Ac^{226}		226.0262		29h	β^- 1.17; γ 0.23, 0.16, 0.07; EC; γ 0.25, 0.18
	Ac^{227}		227.02781	3/2	22y	β^- 0.046; (α; γ)
	Ac^{228}		228.03117		6.13h	β^- 1.11, 0.45, 2.18; γ 0.057–1.64
	Ac^{229}				66m	β^-
	Ac^{230}				<1	β^- 2.2
	Ac^{231}		231.0386		15n	β^- 2.1; γ 0.085–0.71
Thorium	$_{90}Th^{223}$		223.0209		0.9s	α 7.55
	Th^{224}		224.02138		1.1s	α 7.17, 6.9 (others); γ 0.18 (others)
	Th^{225}		225.0237		8.0m	α 6.47 (others); EC; γ
	Th^{226}		226.02489		31m	α 6.33, 6.22; γ 0.11 (others)
	Th^{227}		227.02777		18.2d	α 5.98, 6.04 (others); γ 0.030–0.33
	Th^{228}		228.02675		1.9y	α 5.42, 5.34; $e^-(\gamma)$ 0.084; (γ)
	Th^{229}		229.03163		7.3×10^3y	α 4.84, others; γ 0.20, 0.15
	Th^{230}		230.0331		7.5×10^4y	α 4.68, 4.61; $e^-(\gamma)$ 0.068, (γ)
	Th^{231}		231.03635		25.6h	β^- 0.30, 0.22, 0.14; γ 0.017–0.23
	Th^{232}	100	232.03821		1.39×10^{10}y	α 4.01, 3.95; $e^-(\gamma)$ 0.059
	Th^{233}		233.04143		22.4m	β^- 1.23; (γ)
	Th^{234}		234.0436		24.1d	β^- 0.19, 0.10; γ 0.029, 0.063, 0.091
	Th^{235}				<5m	β^-
Protactinium	$_{91}Pa^{224}$				~0.6s	α 7.75
	Pa^{225}				0.8s	α 7.24
	Pa^{226}		226.0278		1.8m	α 6.81
	Pa^{227}		227.02885		38m	α 6.46; EC
	Pa^{228}		228.03100		22h	EC; (α); γ 0.057–1.89
	Pa^{229}		229.03195		1.5d	EC; (α 5.69)
	Pa^{230}		230.03437		17d	EC; β^- 0.41; γ 0.053–0.95; (α; β^+)
	Pa^{231}		231.03594	3/2	3.48×10^4y	α 5.00, 4.94, 5.02, 4.72 (others); γ 0.027–0.38
	Pa^{232}		232.03861		1.31d	β^- 0.26, 0.37 (others); γ 0.047–1.15
	Pa^{233}		233.04011	3/2	27.0d	β^- 0.25, 0.15; γ 0.016–0.42
	Pa^{234}		234.0434		6.7h	β^- 0.14, 0.28 (others); γ 0.043–1.68

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Pa^{234m}				1.18m	β^- 2.33 (others); (IT 0.021; γ)
	Pa^{235}		235.0454		24m	β^- 1.4
	Pa^{236}				12m	β^- 3.3
	Pa^{237}		237.0510		39m	β^- 2.30, others; γ 0.88, 0.46, 0.92 (others)
Uranium	$_{92}U^{227}$		227.0309		1.3m	α 6.8
	U^{228}		228.03128		9.3m	α 6.08; EC; γ
	U^{229}		229.0332		58m	EC; 6.36, 6.33 (others); γ 0.029 (others)
	U^{230}		230.03393		21d	α 5.88, 5.81; $e^-(\gamma)$ 0.072; (γ)
	U^{231}		231.0363		4.3d	EC; γ 0.018 0.22; (α 5.45)
	U^{232}		232.03717		74y	α 5.32, 5.26; $e^-(\gamma)$ 0.058; (γ)
	U^{233}		233.03950	5/2	1.62×10^5y	α 4.82, 4.77 (others); $e^-(\gamma)$ 0.043; (γ)
	U^{234}	0.0056	234.0409		2.48×10^5y	α 4.77, 4.72 (others); $e^-(\gamma)$ 0.053; (γ); (SF)
	U^{235}	0.7205	235.04393	7/2	7.13×10^8y	α 4.39 (others); γ 0.18, 0.14, 0.10 (others); (SF)
	U^{236m}				26m	IT $e^-(\gamma)$ <0.0001
	U^{236}		236.04573		2.4×10^7y	α 4.50, 4.45; γ 0.05; (SF)
	U^{237}		237.04858		6.75d	β^- 0.25 (others); γ 0.06, 0.21, others 0.027–0.43
	U^{238}	99.274	238.0508		4.51×10^9y	α 4.19 (others); (γ 0.045); (SF)
	U^{239}		239.0543		23.5m	β^- 1.21; γ 0.074
	U^{240}		240.05670		14h	β^- 0.36 (others); γ 0.044
Neptunium	$_{93}Np^{231}$		231.0383		50m	α 6.28
	Np^{232}				13m	EC; γ
	Np^{233}		233.0406		35m	EC; (α 5.53)
	Np^{234}		234.0428		4.4d	EC; γ 0.043–1.61; (β^+)
	Np^{235}		235.04407		410d	EC; (α 5.02; γ)
	Np^{236}				$>5 \times 10^3$y	
	Np^{236m}		236.04662		22h	EC; β^- 0.52; $e^-\gamma$ 0.045
	Np^{237}		237.04803	5/2	2.20×10^6y	α 4.78, 4.76 (others); γ 0.087, 0.019, 0.030 (others)
	Np^{238}		238.0509	2	2.10d	β^- 1.24, 0.26 (others), 0.044–1.03
	Np^{239}		239.05294	5/2	2.35d	β^- 0.33, 0.44 (others); γ 0.013–0.49
	Np^{240}		240.0562		7.3m	β^- 2.18, 1.60, 1.30; γ 0.56, 0.04, 0.60 (others)
	Np^{240}				63m	β^- 0.89; γ 0.085–1.16
	Np^{241}		241.0582		16m	β^- 1.36
	Np^{241}				3.4h	
Plutonium	$_{94}Pu^{232}$		232.0411		36m	EC; α 6.58
	Pu^{233}		233.0427		20m	EC; (α 6.30)
	Pu^{234}		234.0433		9.0h	EC; (α 6.19)
	Pu^{235}		235.0453		26m	EC; (α 5.85)
	Pu^{236}		236.04607		2.85y	α 5.76, 5.72 (others); γ 0.047 (others); (SF)
	Pu^{237}		237.04828		45d	EC; γ 0.033, 0.060 (others); (α)
	Pu^{237m}				0.18s	IT $e^-(\gamma)$ 0.145
	Pu^{238}		238.0495		86.4y	α 5.49, 5.45 (others); γ 0.044 (others); (SF)
	Pu^{239}		239.05216	1/2	2.44×10^4y	α 5.15, 5.13, 5.10 (others); γ 0.053, 0.013 (others); (SF)
	Pu^{240}		240.05397		6580y	α 5.16, 5.12 (others); γ 0.045 (others); (SF)
	Pu^{241}		241.05671	5/2	13.0y	β^- 0.021; (α; γ)
	Pu^{242}		242.0587		3.8×10^5y	α 4.90, 4.86; γ 0.045; (SF)
	Pu^{243}		243.0620		5.0h	β^- 0.58, 0.49; γ 0.084, 0.054, 0.012 (others)
	Pu^{244}				8×10^7y	α; (SF)
	Pu^{245}				10.1h	β^-

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Pu^{246}		246.0702		11d	β^- 0.15, 0.33; γ 0.047, 0.027 (others)
	$_{95}Am^{237}$		237.0498		1.3h	EC; (α 6.01)
Americium	Am^{238}				1.86h	EC; γ 0.98, 0.58, 1.35, 0.37 (others)
	Am^{239}		239.0530		12.1h	EC; γ 0.225, 0.275; (α 5.77)
	Am^{240}				51h	EC; γ 1.00, 0.90 (others)
	Am^{241}		241.05669	5/2	458y	α 5.48, 5.43 (others); γ 0.060 (m), 0.017, 0.013
	Am^{242}		242.0595	1	16h	β^- 0.63, 0.67; EC; γ 0.042, 0.045
	Am^{242m}				150y	IT $e^-(\gamma)$ 0.049; (α; γ)
	Am^{243}		243.06138	5/2	8.0×10^3y	α 5.27, 5.22 (others); γ 0.075 (others)
	Am^{244}		244.0645		10.1h	β^- 0.38; γ 0.043–0.74
	Am^{244m}				26m	β^- 1.5; (EC)
	Am^{245}		245.06631		2.0h	β^- 0.90; γ 0.036–0.26
	Am^{246}		246.0698		25m	β^- 1.31, 1.60 (others); γ 0.035–1.06
	$_{96}Cm^{238}$		238.0530		2.5h	EC; α 6.50
Curium	Cm^{239}				2.9h	EC; γ 0.19
	Cm^{240}		240.05550		27d	α 6.26; (SF)
	Cm^{241}		241.0575		35d	EC; γ 0.48 (others); (α 5.95)
	Cm^{242}		242.0588	0	162d	α 6.11, 6.07 (others); γ 0.044 (others); (SF)
	Cm^{243}		243.06138		32y	α 5.78, 5.74 (others); γ 0.28, 0.23 0.21 (others); (EC)
	Cm^{244}		244.06291		18y	α 5.80, 5.76 (others); γ 0.043 (others); (SF)
	Cm^{245}		245.06534		9.3×10^3y	α 5.36, 5.45 (others); γ 0.17, 0.13
	Cm^{246}		246.0674		5.5×10^3y	α 5.37; (SF)
	Cm^{247}				1.6×10^7y	α
	Cm^{248}				4.7×10^5y	α 5.05; SF
	Cm^{249}		249.0758		64m	β^- 0.86
	Cm^{250}				$\sim 2 \times 10^4$y	SF
	$_{97}Bk^{243}$		243.0629		4.5h	EC; γ 0.84, 0.96, 0.74 (others); (α)
Berkelium	Bk^{244}				4.4h	EC; γ 0.90, 0.20 (others); (α)
	Bk^{245}		245.0662		5.0d	EC; γ 0.25 (others); (α)
	Bk^{246}				1.8d	EC; γ 0.82 (others)
	Bk^{247}		247.0702		7×10^3y	α 5.51, 5.67 (others); γ 0.084, 0.27
	Bk^{248}		248.0730		16h	β^- 0.65; EC
	Bk^{249}		249.07484		314d	β^- 0.13; (α; γ)
	Bk^{250}		250.0785		3.2h	β^- 0.73, 1.76; γ 0.99 1.03 (others)
	$_{98}Cf^{244}$		244.06593		25m	α 7.17
Californium	Cf^{245}		245.0679		44m	EC; α 7.11
	Cf^{246}		246.0688		36h	α 6.75, 6.71 (others); γ 0.042 (others); (SF)
	Cf^{247}				2.5h	EC; γ 0.32, 0.42, 0.46
	Cf^{248}		248.07235		350d	α 6.26, 6.22; γ 0.04; (SF)
	Cf^{249}		249.07470		360y	α 5.81 (others); γ 0.40, 0.34 (others); (SF)
	Cf^{250}		250.0766		13y	α 6.02, 5.98; γ 0.043; (SF)
	Cf^{251}				$\sim$800y	α; γ 0.18
	Cf^{252}				2.55y	α 6.11, 6.07; α 0.042, 0.10; (SF)
	Cf^{253}		253.0850		17d	β^- 0.27
	Cf^{254}				60d	SF
	$_{99}Es^{245}$				1.2m	α 7.7
	Es^{246}				7.3m	α 7.35; EC
Einsteinium	Es^{248}				25m	EC; (α 6.87)

	Nuclide	Per Cent Abundance	Nuclidic Mass	Spin	Half-life	Decay Modes, Radiations, Energies
	Es^{249}		249.0762		2h	EC; (α 6.76)
	Es^{250}				8h	EC
	Es^{251}		251.0799		1.5d	EC; (α 6.48)
	Es^{252}		252.0829		~140d	α 6.64
	Es^{253}		253.08469		20d	α 6.63 (others); γ 0.09, 0.38, 0.39, 0.43; (SF)
	Es^{254}		254.0881		39h	β^- 0.48, 1.13 (others); γ 0.044, 0.69, 0.65 (others); (EC)
	Es^{254}				250d	α 6.42; γ 0.062 (m)
	Es^{255}				40d	β^-
	Es^{256}				<1h	β^-
Fermium	$_{100}Fm^{248}$		248.0772		0.6m	α 7.8
	Fm^{249}				2.5m	α 7.9
	Fm^{250}		250.0795		30m	α 7.43; (EC)
	Fm^{251}				7h	EC; (α 6.89)
	Fm^{252}		252.0827		23h	α 7.04 (others); (γ)
	Fm^{253}				5d	EC; α 6.94
	Fm^{254}		254.0870		3.24h	α 7.20, 7.16 (others); γ 0.041 (others); (SF)
	Fm^{255}				19.9h	α 7.03 (others); (γ; SF)
	Fm^{256}				3.1h	SF
	$Fm^{257?}$				11d	SF
	$_{101}Md^{255}$		255.0906		~30m	EC; α 7.34
Mendelevium	Md^{256}				~1.5h	EC
	102^{254}				3s	α 8.3; SF
	102^{256}				8s	α
	$_{103}Lw^{257}$				8s	α 8.6

Nobelium
No
102

Lawrencium
Lw
103

มหาวิทยาลัยรามคำแหง

เปลวเทียนให้แสง รามคำแหงให้ทาง

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