

L. Spanier and S.A.E. Johansson Masses

† Nuclide is unstable to one-particle emission

‡ Nuclide is unstable to two-particle, but not one particle emission

Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess
¹⁰² Sb	-50.740	¹⁰³ Te	-40.850 †	¹⁰⁸ I	-49.870 †	¹¹⁰ Xe	-49.860	¹¹⁴ Cs	-54.590	¹¹⁴ Ba	-45.690
¹⁰³ Sb	-55.450	¹⁰⁴ Te	-48.420	¹⁰⁹ I	-55.400 †	¹¹¹ Xe	-53.280	¹¹⁵ Cs	-59.820	¹¹⁵ Ba	-49.410
¹⁰⁴ Sb	-57.710	¹⁰⁵ Te	-51.080	¹¹⁰ I	-58.380	¹¹² Xe	-58.690	¹¹⁶ Cs	-62.500	¹¹⁶ Ba	-55.040
¹⁰⁵ Sb	-62.200	¹⁰⁶ Te	-55.970	¹¹¹ I	-63.370	¹¹³ Xe	-61.550	¹¹⁷ Cs	-67.100	¹¹⁷ Ba	-58.120
¹⁰⁶ Sb	-64.220	¹⁰⁷ Te	-58.380	¹¹² I	-65.810	¹¹⁴ Xe	-66.380	¹¹⁸ Cs	-69.170	¹¹⁸ Ba	-63.090
¹⁰⁷ Sb	-68.400	¹⁰⁸ Te	-62.960	¹¹³ I	-70.240	¹¹⁵ Xe	-68.650	¹¹⁹ Cs	-73.140	¹¹⁹ Ba	-65.530
¹⁰⁸ Sb	-70.090	¹⁰⁹ Te	-65.330	¹¹⁴ I	-72.120	¹¹⁶ Xe	-72.860	¹²⁰ Cs	-74.610	¹²⁰ Ba	-69.850
¹⁰⁹ Sb	-73.900	¹¹⁰ Te	-69.900	¹¹⁵ I	-75.960	¹¹⁷ Xe	-74.550	¹²¹ Cs	-77.990	¹²¹ Ba	-71.660
¹¹⁰ Sb	-75.340	¹¹¹ Te	-71.920	¹¹⁶ I	-77.290	¹¹⁸ Xe	-78.170	¹²² Cs	-78.910	¹²² Ba	-75.360
¹¹¹ Sb	-78.970	¹¹² Te	-75.940	¹¹⁷ I	-80.560	¹¹⁹ Xe	-79.300	¹²³ Cs	-81.740	¹²³ Ba	-76.590
¹¹² Sb	-80.070	¹¹³ Te	-77.420	¹¹⁸ I	-81.350	¹²⁰ Xe	-82.350	¹²⁴ Cs	-82.150	¹²⁴ Ba	-79.720
¹¹³ Sb	-83.170	¹¹⁴ Te	-80.890	¹¹⁹ I	-84.080	¹²¹ Xe	-82.940	¹²⁵ Cs	-84.480	¹²⁵ Ba	-80.430
¹¹⁴ Sb	-83.750	¹¹⁵ Te	-81.830	¹²⁰ I	-84.350	¹²² Xe	-85.460	¹²⁶ Cs	-84.450	¹²⁶ Ba	-83.040
¹¹⁵ Sb	-86.330	¹¹⁶ Te	-84.750	¹²¹ I	-86.580	¹²³ Xe	-85.570	¹²⁷ Cs	-86.330	¹²⁷ Ba	-83.280
¹¹⁶ Sb	-86.420	¹¹⁷ Te	-85.190	¹²² I	-86.390	¹²⁴ Xe	-87.610	¹²⁸ Cs	-85.890	¹²⁸ Ba	-85.430
¹¹⁷ Sb	-88.500	¹¹⁸ Te	-87.590	¹²³ I	-88.140	¹²⁵ Xe	-87.280	¹²⁹ Cs	-87.390	¹²⁹ Ba	-85.270
¹¹⁸ Sb	-88.130	¹¹⁹ Te	-87.540	¹²⁴ I	-87.530	¹²⁶ Xe	-88.890	¹³⁰ Cs	-86.600	¹³⁰ Ba	-87.030
¹¹⁹ Sb	-89.740	¹²⁰ Te	-89.450	¹²⁵ I	-88.860	¹²⁷ Xe	-88.170	¹³¹ Cs	-87.750	¹³¹ Ba	-86.510
¹²⁰ Sb	-88.930	¹²¹ Te	-88.950	¹²⁶ I	-87.850	¹²⁸ Xe	-89.390	¹³² Cs	-86.730	¹³² Ba	-87.920
¹²¹ Sb	-90.260	¹²² Te	-90.410	¹²⁷ I	-88.800	¹²⁹ Xe	-88.310	¹³³ Cs	-88.140	¹³³ Ba	-87.100
¹²² Sb	-89.310	¹²³ Te	-89.490	¹²⁸ I	-87.720	¹³⁰ Xe	-89.290	¹³⁴ Cs	-87.360	¹³⁴ Ba	-88.420
¹²³ Sb	-90.370	¹²⁴ Te	-90.540	¹²⁹ I	-88.780	¹³¹ Xe	-88.420	¹³⁵ Cs	-88.540	¹³⁵ Ba	-87.950
¹²⁴ Sb	-89.100	¹²⁵ Te	-89.450	¹³⁰ I	-87.580	¹³² Xe	-89.510	¹³⁶ Cs	-87.550	¹³⁶ Ba	-89.450
¹²⁵ Sb	-89.830	¹²⁶ Te	-90.490	¹³¹ I	-88.350	¹³³ Xe	-88.390	¹³⁷ Cs	-88.500	¹³⁷ Ba	-88.800
¹²⁶ Sb	-88.260	¹²⁷ Te	-89.240	¹³² I	-86.900	¹³⁴ Xe	-89.230	¹³⁸ Cs	-82.780	¹³⁸ Ba	-90.090
¹²⁷ Sb	-88.660	¹²⁸ Te	-89.970	¹³³ I	-87.400	¹³⁵ Xe	-87.880	¹³⁹ Cs	-80.580	¹³⁹ Ba	-84.700
¹²⁸ Sb	-86.790	¹²⁹ Te	-88.440	¹³⁴ I	-85.690	¹³⁶ Xe	-88.480	¹⁴⁰ Cs	-76.270	¹⁴⁰ Ba	-82.780
¹²⁹ Sb	-86.880	¹³⁰ Te	-88.870	¹³⁵ I	-85.920	¹³⁷ Xe	-82.420	¹⁴¹ Cs	-73.910	¹⁴¹ Ba	-78.770
¹³⁰ Sb	-84.700	¹³¹ Te	-87.060	¹³⁶ I	-79.530	¹³⁸ Xe	-79.930	¹⁴² Cs	-69.600	¹⁴² Ba	-76.730
¹³¹ Sb	-84.470	¹³² Te	-87.200	¹³⁷ I	-76.760	¹³⁹ Xe	-75.320	¹⁴³ Cs	-67.530	¹⁴³ Ba	-73.100
¹³² Sb	-81.990	¹³³ Te	-85.110	¹³⁸ I	-71.860	¹⁴⁰ Xe	-72.660	¹⁴⁴ Cs	-63.320	¹⁴⁴ Ba	-71.350
¹³³ Sb	-81.440	¹³⁴ Te	-84.950	¹³⁹ I	-68.920	¹⁴¹ Xe	-67.880	¹⁴⁵ Cs	-60.970	¹⁴⁵ Ba	-67.460
¹³⁴ Sb	-74.340	¹³⁵ Te	-78.210	¹⁴⁰ I	-63.850	¹⁴² Xe	-65.210	¹⁴⁶ Cs	-56.470	¹⁴⁶ Ba	-65.410
¹³⁵ Sb	-71.030	¹³⁶ Te	-75.160	¹⁴¹ I	-60.710	¹⁴³ Xe	-60.670	¹⁴⁷ Cs	-53.810	¹⁴⁷ Ba	-61.230
¹³⁶ Sb	-65.560	¹³⁷ Te	-69.970	¹⁴² I	-55.500	¹⁴⁴ Xe	-58.000	¹⁴⁸ Cs	-49.020	¹⁴⁸ Ba	-58.880
¹³⁷ Sb	-62.070	¹³⁸ Te	-66.740	¹⁴³ I	-52.530	¹⁴⁵ Xe	-53.180	¹⁴⁹ Cs	-46.060	¹⁴⁹ Ba	-54.400
¹³⁸ Sb	-56.430	¹³⁹ Te	-61.380	¹⁴⁴ I	-47.400	¹⁴⁶ Xe	-50.220	¹⁵⁰ Cs	-40.980	¹⁵⁰ Ba	-51.730
¹³⁹ Sb	-52.740	¹⁴⁰ Te	-57.960	¹⁴⁵ I	-44.140	¹⁴⁷ Xe	-45.120	¹⁵¹ Cs	-37.700	¹⁵¹ Ba	-46.950
¹⁴⁰ Sb	-46.910	¹⁴¹ Te	-52.420	¹⁴⁶ I	-38.740	¹⁴⁸ Xe	-41.850	¹⁵² Cs	-32.320	¹⁵² Ba	-43.960
¹⁴¹ Sb	-43.010	¹⁴² Te	-48.790	¹⁴⁷ I	-35.180	¹⁴⁹ Xe	-36.460	¹⁵³ Cs	-28.740	¹⁵³ Ba	-38.880
¹⁴² Sb	-36.980	¹⁴³ Te	-43.120	¹⁴⁸ I	-29.490	¹⁵⁰ Xe	-32.890	¹⁵⁴ Cs	-23.070	¹⁵⁴ Ba	-35.570
¹⁴³ Sb	-32.870	¹⁴⁴ Te	-39.560	¹⁴⁹ I	-25.640	¹⁵¹ Xe	-27.220	¹⁵⁵ Cs	-19.190	¹⁵⁵ Ba	-30.190
¹⁴⁴ Sb	-26.640	¹⁴⁵ Te	-33.850	¹⁵⁰ I	-19.680	¹⁵² Xe	-23.350	¹⁵⁶ Cs	-13.230	¹⁵⁶ Ba	-26.580
¹⁴⁵ Sb	-22.340	¹⁴⁶ Te	-29.990	¹⁵¹ I	-15.530	¹⁵³ Xe	-17.390	¹⁵⁷ Cs	-9.060	¹⁵⁷ Ba	-20.900
¹⁴⁶ Sb	-16.070	¹⁴⁷ Te	-24.010	¹⁵² I	-9.290	¹⁵⁴ Xe	-13.230	¹⁵⁸ Cs	-2.830	¹⁵⁸ Ba	-16.990
¹⁴⁷ Sb	-11.640	¹⁴⁸ Te	-19.870	¹⁵³ I	-4.860	¹⁵⁵ Xe	-7.000	¹⁵⁹ Cs	1.620	¹⁵⁹ Ba	-11.030
¹⁴⁸ Sb	-5.110	¹⁴⁹ Te	-13.610	¹⁵⁴ I	1.640	¹⁵⁶ Xe	-2.560	¹⁶⁰ Cs	8.110	¹⁶⁰ Ba	-6.830
¹⁴⁹ Sb	-0.410	¹⁵⁰ Te	-9.180	¹⁵⁵ I	6.350	¹⁵⁷ Xe	3.940	¹⁶¹ Cs	12.840	¹⁶¹ Ba	-0.600
¹⁵⁰ Sb	6.390	¹⁵¹ Te	-2.660	¹⁵⁶ I	13.120	¹⁵⁸ Xe	8.660	¹⁶² Cs	19.580	¹⁶² Ba	3.870
¹⁵¹ Sb	11.370	¹⁵² Te	2.040	¹⁵⁷ I	18.090	¹⁵⁹ Xe	15.420	¹⁶³ Cs	24.570	¹⁶³ Ba	10.360
¹⁵² Sb	18.420	¹⁵³ Te	8.830	¹⁵⁸ I	25.110	¹⁶⁰ Xe	20.400	¹⁶⁴ Cs	31.550	¹⁶⁴ Ba	15.100
¹⁵³ Sb	23.660	¹⁵⁴ Te	13.810	¹⁵⁹ I	30.350	¹⁶¹ Xe	27.410	¹⁶⁵ Cs	36.780	¹⁶⁵ Ba	21.830
¹⁵⁴ Sb	30.970	¹⁵⁵ Te	20.840	¹⁶⁰ I	37.610	¹⁶² Xe	32.650	¹⁶⁶ Cs	43.990	¹⁶⁶ Ba	26.820
¹⁵⁵ Sb	36.470	¹⁵⁶ Te	26.090	¹⁶¹ I	43.100	¹⁶³ Xe	39.890	¹⁶⁷ Cs	49.460	¹⁶⁷ Ba	33.780
¹⁵⁶ Sb	44.020	¹⁵⁷ Te	33.370	¹⁶² I	50.600	¹⁶⁴ Xe	45.370	¹⁶⁸ Cs	56.900	¹⁶⁸ Ba	39.010
¹⁵⁷ Sb	49.770	¹⁵⁸ Te	38.870	¹⁶³ I	56.330	¹⁶⁵ Xe	52.840	¹⁶⁹ Cs	62.590	¹⁶⁹ Ba	46.190
¹⁵⁸ Sb	57.560	¹⁵⁹ Te	46.400	¹⁶⁴ I	64.050	¹⁶⁶ Xe	58.560	¹⁷⁰ Cs	70.240	¹⁷⁰ Ba	51.650
¹⁵⁹ Sb	63.560	¹⁶⁰ Te	52.140	¹⁶⁵ I	70.020	¹⁶⁷ Xe	66.250	¹⁷¹ Cs	76.150	¹⁷¹ Ba	59.050
¹⁶⁰ Sb	71.520	¹⁶¹ Te	59.900	¹⁶⁶ I	77.960	¹⁶⁸ Xe	72.200	¹⁷² Cs	84.010	¹⁷² Ba	64.710
¹⁶¹ Sb	77.590	¹⁶² Te	65.890	¹⁶⁷ I	84.160	¹⁶⁹ Xe	80.100	¹⁷³ Cs	90.140	¹⁷³ Ba	72.320
¹⁶² Sb	85.650	¹⁶³ Te	73.880	¹⁶⁸ I	92.320 †	¹⁷⁰ Xe	86.270	¹⁷⁴ Cs	98.160	¹⁷⁴ Ba	78.200
¹⁶³ Sb	91.930	¹⁶⁴ Te	80.100	¹⁶⁹ I	98.590	¹⁷¹ Xe	94.380 †	¹⁷⁵ Cs	104.120	¹⁷⁵ Ba	86.000
¹⁶⁴ Sb	100.180 †	¹⁶⁵ Te	88.260 †	¹⁷⁰ I	106.660 †	¹⁷² Xe	100.580	¹⁷⁶ Cs	111.990	¹⁷⁶ Ba	92.090
¹⁶⁵ Sb	106.670	¹⁶⁶ Te	94.470	¹⁷¹ I	112.990	¹⁷³ Xe	108.560	¹⁷⁷ Cs	118.140	¹⁷⁷ Ba	99.690
¹⁶⁶ Sb	115.120 †	¹⁶⁷ Te	102.640 †	¹⁷² I	121.250 †	¹⁷⁴ Xe	114.800	¹⁷⁸ Cs	126.190	¹⁷⁸ Ba	105.570
¹⁶⁷ Sb	121.810	¹⁶⁸ Te	109.050	¹⁷³ I	127.780	¹⁷⁵ Xe	122.960 †	¹⁷⁹ Cs	132.530	¹⁷⁹ Ba	113.330
¹⁶⁸ Sb	130.460 †	¹⁶⁹ Te	117.410 †	¹⁷⁴ I	136.230 †	¹⁷⁶ Xe	129.400	¹⁸⁰ Cs	140.760 †	¹⁸⁰ Ba	119.390
¹⁶⁹ Sb	137.370	¹⁷⁰ Te	124.030	¹⁷⁵ I	142.960	¹⁷⁷ Xe	137.740 †	¹⁸¹ Cs	147.290	¹⁸¹ Ba	127.320
¹⁷⁰ Sb	146.220 †	¹⁷¹ Te	132.580 †	¹⁰⁷ Xe	-31.900 †	¹¹¹ Cs	-41.570 †	¹¹¹ Ba	-25.890 †	¹⁸² Ba	133.570
¹⁷¹ Sb	153.340	¹⁷² Te	139.400	¹⁰⁸ Xe	-40.030 ‡	¹¹² Cs	-45.450 †	¹¹² Ba	-35.100 ‡	¹⁸³ Ba	145.390 †
		¹⁰⁷ I	-47.030 †	¹⁰⁹ Xe	-43.890	¹¹³ Cs	-51.300 †	¹¹³ Ba	-39.420	¹⁸⁴ Ba	154.130 †

Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess
¹¹⁵ La	-37.360 †	¹¹⁹ Ce	-45.670	¹²⁷ Pr	-66.380	¹³² Nd	-72.570	¹⁴¹ Pm	-80.810	¹⁴⁵ Sm	-79.840
¹¹⁶ La	-41.510 †	¹²⁰ Ce	-51.400	¹²⁸ Pr	-67.990	¹³³ Nd	-73.500	¹⁴² Pm	-81.760	¹⁴⁶ Sm	-79.750
¹¹⁷ La	-47.560 †	¹²¹ Ce	-54.580	¹²⁹ Pr	-71.450	¹³⁴ Nd	-76.320	¹⁴³ Pm	-84.680	¹⁴⁷ Sm	-78.260
¹¹⁸ La	-51.040	¹²² Ce	-59.600	¹³⁰ Pr	-72.550	¹³⁵ Nd	-76.890	¹⁴⁴ Pm	-80.870	¹⁴⁸ Sm	-78.710
¹¹⁹ La	-56.390	¹²³ Ce	-62.100	¹³¹ Pr	-75.520	¹³⁶ Nd	-79.360	¹⁴⁵ Pm	-80.480	¹⁴⁹ Sm	-77.060
¹²⁰ La	-59.210	¹²⁴ Ce	-66.450	¹³² Pr	-76.180	¹³⁷ Nd	-79.640	¹⁴⁶ Pm	-78.570	¹⁵⁰ Sm	-77.240
¹²¹ La	-63.880	¹²⁵ Ce	-68.320	¹³³ Pr	-78.730	¹³⁸ Nd	-81.840	¹⁴⁷ Pm	-78.710	¹⁵¹ Sm	-75.300
¹²² La	-66.050	¹²⁶ Ce	-72.050	¹³⁴ Pr	-79.030	¹³⁹ Nd	-81.890	¹⁴⁸ Pm	-76.740	¹⁵² Sm	-75.160
¹²³ La	-70.070	¹²⁷ Ce	-73.360	¹³⁵ Pr	-81.250	¹⁴⁰ Nd	-84.300	¹⁴⁹ Pm	-76.590	¹⁵³ Sm	-72.910
¹²⁴ La	-71.630	¹²⁸ Ce	-76.530	¹³⁶ Pr	-81.250	¹⁴¹ Nd	-84.930	¹⁵⁰ Pm	-74.340	¹⁵⁴ Sm	-72.430
¹²⁵ La	-75.060	¹²⁹ Ce	-77.340	¹³⁷ Pr	-83.190	¹⁴² Nd	-87.540	¹⁵¹ Pm	-73.880	¹⁵⁵ Sm	-69.840
¹²⁶ La	-76.070	¹³⁰ Ce	-80.030	¹³⁸ Pr	-82.960	¹⁴³ Nd	-83.410	¹⁵² Pm	-71.320	¹⁵⁶ Sm	-69.000
¹²⁷ La	-78.970	¹³¹ Ce	-80.410	¹³⁹ Pr	-85.280	¹⁴⁴ Nd	-82.700	¹⁵³ Pm	-70.530	¹⁵⁷ Sm	-66.060
¹²⁸ La	-79.500	¹³² Ce	-82.700	¹⁴⁰ Pr	-85.600	¹⁴⁵ Nd	-80.350	¹⁵⁴ Pm	-67.630	¹⁵⁸ Sm	-64.850
¹²⁹ La	-81.930	¹³³ Ce	-82.730	¹⁴¹ Pr	-87.890	¹⁴⁶ Nd	-80.160	¹⁵⁵ Pm	-66.490	¹⁵⁹ Sm	-61.550
¹³⁰ La	-82.040	¹³⁴ Ce	-84.670	¹⁴² Pr	-83.450	¹⁴⁷ Nd	-77.850	¹⁵⁶ Pm	-63.240	¹⁶⁰ Sm	-59.980
¹³¹ La	-84.070	¹³⁵ Ce	-84.400	¹⁴³ Pr	-82.450	¹⁴⁸ Nd	-77.390	¹⁵⁷ Pm	-61.740	¹⁶¹ Sm	-56.330
¹³² La	-83.820	¹³⁶ Ce	-86.060	¹⁴⁴ Pr	-79.600	¹⁴⁹ Nd	-85.150	¹⁵⁸ Pm	-58.150	¹⁶² Sm	-54.800
¹³³ La	-85.510	¹³⁷ Ce	-85.700	¹⁴⁵ Pr	-79.090	¹⁵⁰ Nd	-74.030	¹⁵⁹ Pm	-56.280	¹⁶³ Sm	-50.390
¹³⁴ La	-84.970	¹³⁸ Ce	-87.820	¹⁴⁶ Pr	-76.460	¹⁵¹ Nd	-71.130	¹⁶⁰ Pm	-52.340	¹⁶⁴ Sm	-48.100
¹³⁵ La	-86.360	¹³⁹ Ce	-87.820	¹⁴⁷ Pr	-75.680	¹⁵² Nd	-70.030	¹⁶¹ Pm	-50.130	¹⁶⁵ Sm	-43.770
¹³⁶ La	-86.030	¹⁴⁰ Ce	-89.790	¹⁴⁸ Pr	-72.770	¹⁵³ Nd	-66.810	¹⁶² Pm	-45.850	¹⁶⁶ Sm	-41.140
¹³⁷ La	-87.840	¹⁴¹ Ce	-85.030	¹⁴⁹ Pr	-71.680	¹⁵⁴ Nd	-65.360	¹⁶³ Pm	-43.290	¹⁶⁷ Sm	-36.490
¹³⁸ La	-87.530	¹⁴² Ce	-83.710	¹⁵⁰ Pr	-68.460	¹⁵⁵ Nd	-61.800	¹⁶⁴ Pm	-38.690	¹⁶⁸ Sm	-33.550
¹³⁹ La	-89.160	¹⁴³ Ce	-80.330	¹⁵¹ Pr	-67.050	¹⁵⁶ Nd	-60.000	¹⁶⁵ Pm	-35.810	¹⁶⁹ Sm	-28.600
¹⁴⁰ La	-84.090	¹⁴⁴ Ce	-79.490	¹⁵² Pr	-63.520	¹⁵⁷ Nd	-56.110	¹⁶⁶ Pm	-30.900	¹⁷⁰ Sm	-25.360
¹⁴¹ La	-82.480	¹⁴⁵ Ce	-76.530	¹⁵³ Pr	-61.770	¹⁵⁸ Nd	-53.950	¹⁶⁷ Pm	-27.700	¹⁷¹ Sm	-20.140
¹⁴² La	-78.780	¹⁴⁶ Ce	-75.420	¹⁵⁴ Pr	-57.910	¹⁵⁹ Nd	-49.720	¹⁶⁸ Pm	-22.500	¹⁷² Sm	-16.620
¹⁴³ La	-77.370	¹⁴⁷ Ce	-72.180	¹⁵⁵ Pr	-55.810	¹⁶⁰ Nd	-47.220	¹⁶⁹ Pm	-19.010	¹⁷³ Sm	-11.140
¹⁴⁴ La	-74.080	¹⁴⁸ Ce	-70.770	¹⁵⁶ Pr	-51.620	¹⁶¹ Nd	-42.660	¹⁷⁰ Pm	-13.540	¹⁷⁴ Sm	-7.370
¹⁴⁵ La	-72.650	¹⁴⁹ Ce	-67.230	¹⁵⁷ Pr	-49.180	¹⁶² Nd	-39.830	¹⁷¹ Pm	-9.770	¹⁷⁵ Sm	-1.650
¹⁴⁶ La	-69.090	¹⁵⁰ Ce	-65.500	¹⁵⁸ Pr	-44.660	¹⁶³ Nd	-34.950	¹⁷² Pm	-4.050	¹⁷⁶ Sm	2.360
¹⁴⁷ La	-67.360	¹⁵¹ Ce	-61.650	¹⁵⁹ Pr	-41.890	¹⁶⁴ Nd	-31.800	¹⁷³ Pm	-0.040	¹⁷⁷ Sm	8.290
¹⁴⁸ La	-63.500	¹⁵² Ce	-59.590	¹⁶⁰ Pr	-37.050	¹⁶⁵ Nd	-26.620	¹⁷⁴ Pm	5.920	¹⁷⁸ Sm	12.520
¹⁴⁹ La	-61.460	¹⁵³ Ce	-55.410	¹⁶¹ Pr	-33.950	¹⁶⁶ Nd	-23.170	¹⁷⁵ Pm	10.170	¹⁷⁹ Sm	18.650
¹⁵⁰ La	-57.300	¹⁵⁴ Ce	-53.020	¹⁶² Pr	-28.800	¹⁶⁷ Nd	-17.710	¹⁷⁶ Pm	16.340	¹⁸⁰ Sm	23.090
¹⁵¹ La	-54.940	¹⁵⁵ Ce	-48.530	¹⁶³ Pr	-25.390	¹⁶⁸ Nd	-13.960	¹⁷⁷ Pm	20.810	¹⁸¹ Sm	29.410
¹⁵² La	-50.460	¹⁵⁶ Ce	-45.800	¹⁶⁴ Pr	-19.950	¹⁶⁹ Nd	-8.240	¹⁷⁸ Pm	27.180	¹⁸² Sm	34.040
¹⁵³ La	-47.780	¹⁵⁷ Ce	-40.990	¹⁶⁵ Pr	-16.250	¹⁷⁰ Nd	-4.230	¹⁷⁹ Pm	31.850	¹⁸³ Sm	40.540
¹⁵⁴ La	-42.990	¹⁵⁸ Ce	-37.930	¹⁶⁶ Pr	-10.530	¹⁷¹ Nd	1.740	¹⁸⁰ Pm	38.410	¹⁸⁴ Sm	45.350
¹⁵⁵ La	-39.980	¹⁵⁹ Ce	-32.810	¹⁶⁷ Pr	-6.540	¹⁷² Nd	6.000	¹⁸¹ Pm	43.280	¹⁸⁵ Sm	51.980
¹⁵⁶ La	-34.880	¹⁶⁰ Ce	-29.440	¹⁶⁸ Pr	-0.570	¹⁷³ Nd	12.200	¹⁸² Pm	50.020	¹⁸⁶ Sm	56.440
¹⁵⁷ La	-31.550	¹⁶¹ Ce	-24.020	¹⁶⁹ Pr	3.680	¹⁷⁴ Nd	16.690	¹⁸³ Pm	55.070	¹⁸⁷ Sm	62.740
¹⁵⁸ La	-26.150	¹⁶² Ce	-20.340	¹⁷⁰ Pr	9.900	¹⁷⁵ Nd	23.110	¹⁸⁴ Pm	61.850	¹⁸⁸ Sm	67.350
¹⁵⁹ La	-22.520	¹⁶³ Ce	-14.640	¹⁷¹ Pr	14.390	¹⁷⁶ Nd	27.820	¹⁸⁵ Pm	66.560	¹⁸⁹ Sm	77.680 †
¹⁶⁰ La	-16.830	¹⁶⁴ Ce	-10.670	¹⁷² Pr	20.840	¹⁷⁷ Nd	34.440	¹⁸⁶ Pm	73.110	¹⁹⁰ Sm	85.060 ‡
¹⁶¹ La	-12.890	¹⁶⁵ Ce	-4.700	¹⁷³ Pr	25.570	¹⁷⁸ Nd	39.350	¹⁸⁷ Pm	77.980	¹⁹¹ Sm	94.120 †
¹⁶² La	-6.930	¹⁶⁶ Ce	-0.460	¹⁷⁴ Pr	32.220	¹⁷⁹ Nd	46.160	¹⁸⁸ Pm	88.550 †	¹⁹² Sm	101.140
¹⁶³ La	-2.710	¹⁶⁷ Ce	5.770	¹⁷⁵ Pr	37.170	¹⁸⁰ Nd	51.260	¹⁸⁹ Pm	96.170 ‡	¹⁹³ Sm	109.980 †
¹⁶⁴ La	3.520	¹⁶⁸ Ce	10.270	¹⁷⁶ Pr	44.020	¹⁸¹ Nd	58.250	¹⁹⁰ Pm	105.550 †	¹⁹⁴ Sm	117.190
¹⁶⁵ La	8.000	¹⁶⁹ Ce	16.730	¹⁷⁷ Pr	49.170	¹⁸² Nd	63.550	¹⁹¹ Pm	112.810 ‡	¹⁹⁵ Sm	126.220 †
¹⁶⁶ La	14.480	¹⁷⁰ Ce	21.470	¹⁷⁸ Pr	56.220	¹⁸³ Nd	70.450	¹⁹² Pm	121.900 †	¹²⁹ Eu	-33.760 †
¹⁶⁷ La	19.220	¹⁷¹ Ce	28.170	¹⁷⁹ Pr	61.570	¹⁸⁴ Nd	75.420	¹²² Sm	-4.570 †	¹³⁰ Eu	-37.250 †
¹⁶⁸ La	25.930	¹⁷² Ce	33.130	¹⁸⁰ Pr	68.800	¹⁸⁵ Nd	82.240	¹²³ Sm	-12.240 †	¹³¹ Eu	-42.510 †
¹⁶⁹ La	30.910	¹⁷³ Ce	40.040	¹⁸¹ Pr	74.340	¹⁸⁶ Nd	87.370	¹²⁴ Sm	-21.650 ‡	¹³² Eu	-45.340 †
¹⁷⁰ La	37.850	¹⁷⁴ Ce	45.220	¹⁸² Pr	81.310	¹⁸⁷ Nd	98.190 †	¹²⁵ Sm	-26.320 ‡	¹³³ Eu	-49.950
¹⁷¹ La	43.050	¹⁷⁵ Ce	52.330	¹⁸³ Pr	86.550	¹⁸⁸ Nd	106.040 ‡	¹²⁶ Sm	-32.730	¹³⁴ Eu	-52.210
¹⁷² La	50.200	¹⁷⁶ Ce	57.720	¹⁸⁴ Pr	93.630	¹⁸⁹ Nd	115.710 †	¹²⁷ Sm	-36.620	¹³⁵ Eu	-56.290
¹⁷³ La	55.620	¹⁷⁷ Ce	65.020	¹⁸⁵ Pr	99.030	¹⁹⁰ Nd	123.290 ‡	¹²⁸ Sm	-42.270	¹³⁶ Eu	-58.080
¹⁷⁴ La	62.970	¹⁷⁸ Ce	70.610	¹⁸⁶ Pr	110.100 †	¹²⁵ Pm	-39.210 †	¹²⁹ Sm	-45.430	¹³⁷ Eu	-61.710
¹⁷⁵ La	68.610	¹⁷⁹ Ce	78.100	¹⁸⁷ Pr	118.170 †	¹²⁶ Pm	-42.760 †	¹³⁰ Sm	-50.370	¹³⁸ Eu	-63.120
¹⁷⁶ La	76.150	¹⁸⁰ Ce	83.690	¹⁸⁸ Pr	128.070 †	¹²⁷ Pm	-48.080 †	¹³¹ Sm	-52.890	¹³⁹ Eu	-66.410
¹⁷⁷ La	81.990	¹⁸¹ Ce	90.900	¹¹⁹ Nd	-16.970 †	¹²⁸ Pm	-50.930	¹³² Sm	-57.210	¹⁴⁰ Eu	-67.530
¹⁷⁸ La	89.680	¹⁸² Ce	96.400	¹²⁰ Nd	-26.460 ‡	¹²⁹ Pm	-55.570	¹³³ Sm	-59.170	¹⁴¹ Eu	-70.560
¹⁷⁹ La	95.280	¹⁸³ Ce	103.770	¹²¹ Nd	-31.140	¹³⁰ Pm	-57.780	¹³⁴ Sm	-62.960	¹⁴² Eu	-71.470
¹⁸⁰ La	102.760	¹⁸⁴ Ce	109.440	¹²² Nd	-37.620	¹³¹ Pm	-61.810	¹³⁵ Sm	-64.450	¹⁴³ Eu	-74.420
¹⁸¹ La	108.530	¹⁸⁵ Ce	120.760 †	¹²³ Nd	-41.550	¹³² Pm	-63.480	¹³⁶ Sm	-67.810	¹⁴⁴ Eu	-75.990
¹⁸² La	116.180	¹⁸⁶ Ce	129.060 †	¹²⁴ Nd	-47.270	¹³³ Pm	-67.000	¹³⁷ Sm	-68.930	¹⁴⁵ Eu	-79.530
¹⁸³ La	122.130	¹²⁰ Pr	-37.580 †	¹²⁵ Nd	-50.470	¹³⁴ Pm	-68.210	¹³⁸ Sm	-71.940	¹⁴⁶ Eu	-76.330
¹⁸⁴ La	133.700 †	¹²¹ Pr	-43.690 †	¹²⁶ Nd	-55.460	¹³⁵ Pm	-71.300	¹³⁹ Sm	-72.770	¹⁴⁷ Eu	-76.560
¹⁸⁵ La	142.220 †	¹²² Pr	-47.250 †	¹²⁷ Nd	-57.980	¹³⁶ Pm	-72.150	¹⁴⁰ Sm	-75.520	¹⁴⁸ Eu	-75.440
¹¹⁵ Ce	-21.340 †	¹²³ Pr	-52.620	¹²⁸ Nd	-62.310	¹³⁷ Pm	-74.890	¹⁴¹ Sm	-76.140	¹⁴⁹ Eu	-76.210
¹¹⁶ Ce	-30.770 ‡	¹²⁴ Pr	-55.480	¹²⁹ Nd	-64.220	¹³⁸ Pm	-75.450	¹⁴² Sm	-78.860	¹⁵⁰ Eu	-74.890
¹¹⁷ Ce	-35.340	¹²⁵ Pr	-60.150	¹³⁰ Nd	-67.960	¹³⁹ Pm	-77.930	¹⁴³ Sm	-80.120	¹⁵¹ Eu	-75.390
¹¹⁸ Ce	-41.790	¹²⁶ Pr	-62.350	¹³¹ Nd	-69.340	¹⁴⁰ Pm	-78.260	¹⁴⁴ Sm	-83.350	¹⁵² Eu	-73.780

Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess
¹⁵³ Eu	-73.960	¹⁵⁷ Gd	-70.710	¹⁶⁵ Tb	-60.100	¹⁶⁹ Dy	-54.830	¹⁷⁷ Ho	-37.240	¹⁸¹ Er	-30.350
¹⁵⁴ Eu	-72.030	¹⁵⁸ Gd	-70.470	¹⁶⁶ Tb	-56.950	¹⁷⁰ Dy	-53.260	¹⁷⁸ Ho	-33.030	¹⁸² Er	-27.800
¹⁵⁵ Eu	-71.860	¹⁵⁹ Gd	-68.140	¹⁶⁷ Tb	-55.480	¹⁷¹ Dy	-49.690	¹⁷⁹ Ho	-30.490	¹⁸³ Er	-23.350
¹⁵⁶ Eu	-69.590	¹⁶⁰ Gd	-67.530	¹⁶⁸ Tb	-51.970	¹⁷² Dy	-47.780	¹⁸⁰ Ho	-26.020	¹⁸⁴ Er	-20.570
¹⁵⁷ Eu	-69.050	¹⁶¹ Gd	-64.820	¹⁶⁹ Tb	-50.140	¹⁷³ Dy	-43.880	¹⁸¹ Ho	-23.220	¹⁸⁵ Er	-15.910
¹⁵⁸ Eu	-66.420	¹⁶² Gd	-63.820	¹⁷⁰ Tb	-46.300	¹⁷⁴ Dy	-41.650	¹⁸² Ho	-18.530	¹⁸⁶ Er	-12.910
¹⁵⁹ Eu	-65.510	¹⁶³ Gd	-60.750	¹⁷¹ Tb	-44.130	¹⁷⁵ Dy	-37.460	¹⁸³ Ho	-15.500	¹⁸⁷ Er	-8.060
¹⁶⁰ Eu	-62.520	¹⁶⁴ Gd	-59.370	¹⁷² Tb	-39.970	¹⁷⁶ Dy	-34.930	¹⁸⁴ Ho	-10.600	¹⁸⁸ Er	-4.860
¹⁶¹ Eu	-61.230	¹⁶⁵ Gd	-55.940	¹⁷³ Tb	-37.490	¹⁷⁷ Dy	-30.460	¹⁸⁵ Ho	-7.360	¹⁸⁹ Er	0.170
¹⁶² Eu	-57.870	¹⁶⁶ Gd	-54.190	¹⁷⁴ Tb	-33.040	¹⁷⁸ Dy	-27.660	¹⁸⁶ Ho	-2.260	¹⁹⁰ Er	3.550
¹⁶³ Eu	-56.210	¹⁶⁷ Gd	-50.410	¹⁷⁵ Tb	-30.260	¹⁷⁹ Dy	-22.940	¹⁸⁷ Ho	1.170	¹⁹¹ Er	8.520
¹⁶⁴ Eu	-52.500	¹⁶⁸ Gd	-48.310	¹⁷⁶ Tb	-25.540	¹⁸⁰ Dy	-19.900	¹⁸⁸ Ho	6.450	¹⁹² Er	11.540
¹⁶⁵ Eu	-50.490	¹⁶⁹ Gd	-44.190	¹⁷⁷ Tb	-22.500	¹⁸¹ Dy	-14.950	¹⁸⁹ Ho	10.070	¹⁹³ Er	16.350
¹⁶⁶ Eu	-46.430	¹⁷⁰ Gd	-41.770	¹⁷⁸ Tb	-17.530	¹⁸² Dy	-11.680	¹⁹⁰ Ho	15.390	¹⁹⁴ Er	19.510
¹⁶⁷ Eu	-44.070	¹⁷¹ Gd	-37.340	¹⁷⁹ Tb	-14.240	¹⁸³ Dy	-6.520	¹⁹¹ Ho	18.640	¹⁹⁵ Er	28.380 †
¹⁶⁸ Eu	-39.690	¹⁷² Gd	-34.600	¹⁸⁰ Tb	-9.050	¹⁸⁴ Dy	-3.040	¹⁹² Ho	23.690	¹⁹⁶ Er	34.280
¹⁶⁹ Eu	-37.010	¹⁷³ Gd	-29.890	¹⁸¹ Tb	-5.540	¹⁸⁵ Dy	2.310	¹⁹³ Ho	27.080	¹⁹⁷ Er	41.960
¹⁷⁰ Eu	-32.330	¹⁷⁴ Gd	-26.860	¹⁸² Tb	-0.140	¹⁸⁶ Dy	5.980	¹⁹⁴ Ho	36.190 †	¹⁹⁸ Er	47.550
¹⁷¹ Eu	-29.340	¹⁷⁵ Gd	-21.890	¹⁸³ Tb	3.580	¹⁸⁷ Dy	11.510	¹⁹⁵ Ho	42.340	¹⁹⁹ Er	54.880
¹⁷² Eu	-24.370	¹⁷⁶ Gd	-18.600	¹⁸⁴ Tb	9.170	¹⁸⁸ Dy	15.370	¹⁹⁶ Ho	50.230	²⁰⁰ Er	60.600
¹⁷³ Eu	-21.100	¹⁷⁷ Gd	-13.380	¹⁸⁵ Tb	13.080	¹⁸⁹ Dy	21.020	¹⁹⁷ Ho	56.010	²⁰¹ Er	68.120
¹⁷⁴ Eu	-15.880	¹⁷⁸ Gd	-9.850	¹⁸⁶ Tb	18.850	¹⁹⁰ Dy	24.510	¹⁹⁸ Ho	63.590	²⁰² Er	74.050
¹⁷⁵ Eu	-12.350	¹⁷⁹ Gd	-4.400	¹⁸⁷ Tb	22.940	¹⁹¹ Dy	29.800	¹⁹⁹ Ho	69.560	²⁰³ Er	81.760
¹⁷⁶ Eu	-6.880	¹⁸⁰ Gd	-0.650	¹⁸⁸ Tb	28.880	¹⁹² Dy	33.430	²⁰⁰ Ho	77.330	²⁰⁴ Er	87.900
¹⁷⁷ Eu	-3.110	¹⁸¹ Gd	5.000	¹⁸⁹ Tb	32.610	¹⁹³ Dy	42.780 †	²⁰¹ Ho	83.500	²⁰⁵ Er	95.820
¹⁷⁸ Eu	2.570	¹⁸² Gd	8.960	¹⁹⁰ Tb	38.150	¹⁹⁴ Dy	49.180	²⁰² Ho	91.460	²⁰⁶ Er	102.160
¹⁷⁹ Eu	6.570	¹⁸³ Gd	14.790	¹⁹¹ Tb	42.010	¹⁹⁵ Dy	57.260 †	²⁰³ Ho	97.840	²⁰⁷ Er	110.290 †
¹⁸⁰ Eu	12.450	¹⁸⁴ Gd	18.950	¹⁹² Tb	51.610 †	¹⁹⁶ Dy	63.290	²⁰⁴ Ho	106.010 †	²⁰⁸ Er	116.850
¹⁸¹ Eu	16.650	¹⁸⁵ Gd	24.960	¹⁹³ Tb	58.260 ‡	¹⁹⁷ Dy	71.120	²⁰⁵ Ho	112.590	²⁰⁹ Er	125.190 †
¹⁸² Eu	22.730	¹⁸⁶ Gd	29.290	¹⁹⁴ Tb	66.530 †	¹⁹⁸ Dy	77.340	²⁰⁶ Ho	120.960 †	²¹⁰ Er	131.970
¹⁸³ Eu	27.110	¹⁸⁷ Gd	35.470	¹⁹⁵ Tb	72.810	¹⁹⁹ Dy	85.360	²⁰⁷ Ho	127.770	²¹¹ Er	140.510 †
¹⁸⁴ Eu	33.370	¹⁸⁸ Gd	39.470	¹⁹⁶ Tb	80.890 †	²⁰⁰ Dy	91.790	²⁰⁸ Ho	136.340 †	¹⁴⁵ Tm	-28.110 †
¹⁸⁵ Eu	37.940	¹⁸⁹ Gd	45.260	¹⁹⁷ Tb	87.360	²⁰¹ Dy	100.000 †	¹³⁸ Er	-11.290 †	¹⁴⁶ Tm	-31.050 †
¹⁸⁶ Eu	44.360	¹⁹⁰ Gd	49.370	¹⁹⁸ Tb	95.630 †	²⁰² Dy	106.630	¹³⁹ Er	-15.110 †	¹⁴⁷ Tm	-35.860 †
¹⁸⁷ Eu	48.580	¹⁹¹ Gd	59.210 †	¹⁹⁹ Tb	102.300	²⁰³ Dy	115.040 †	¹⁴⁰ Er	-20.700 †	¹⁴⁸ Tm	-38.600 †
¹⁸⁸ Eu	54.620	¹⁹² Gd	66.110 ‡	²⁰⁰ Tb	110.760 †	²⁰⁴ Dy	121.880	¹⁴¹ Er	-24.010 ‡	¹⁴⁹ Tm	-43.770
¹⁸⁹ Eu	58.980	¹⁹³ Gd	74.620 †	²⁰¹ Tb	117.630	²⁰⁵ Dy	130.500 †	¹⁴² Er	-29.140 ‡	¹⁵⁰ Tm	-47.170
¹⁹⁰ Eu	69.060 †	¹⁹⁴ Gd	81.140	²⁰² Tb	126.300 †	¹³⁹ Ho	-28.130 †	¹⁴³ Er	-32.060	¹⁵¹ Tm	-52.500
¹⁹¹ Eu	76.200 ‡	¹⁹⁵ Gd	89.480 †	¹³² Dy	-8.920 †	¹⁴⁰ Ho	-31.130 †	¹⁴⁴ Er	-36.820	¹⁵² Tm	-51.140
¹⁹² Eu	84.970 †	¹⁹⁶ Gd	96.200	¹³³ Dy	-13.400 †	¹⁴¹ Ho	-35.940 †	¹⁴⁵ Er	-39.440	¹⁵³ Tm	-53.200
¹⁹³ Eu	91.740	¹⁹⁷ Gd	104.730 †	¹³⁴ Dy	-19.600 †	¹⁴² Ho	-38.550 †	¹⁴⁶ Er	-43.930	¹⁵⁴ Tm	-53.560
¹⁹⁴ Eu	100.330 †	¹⁹⁸ Gd	111.640	¹³⁵ Dy	-23.370 ‡	¹⁴³ Ho	-43.000 †	¹⁴⁷ Er	-46.340	¹⁵⁵ Tm	-56.180
¹⁹⁵ Eu	107.290	¹⁹⁹ Gd	120.360 †	¹³⁶ Dy	-28.900 ‡	¹⁴⁴ Ho	-45.310 †	¹⁴⁸ Er	-51.050	¹⁵⁶ Tm	-56.730
¹⁹⁶ Eu	116.060 †	²⁰⁰ Gd	127.480	¹³⁷ Dy	-32.080 ‡	¹⁴⁵ Ho	-49.510	¹⁴⁹ Er	-54.140	¹⁵⁷ Tm	-59.060
¹⁹⁷ Eu	123.220	²⁰¹ Gd	136.390 †	¹³⁸ Dy	-37.040	¹⁴⁶ Ho	-51.610	¹⁵⁰ Er	-59.180	¹⁵⁸ Tm	-59.320
¹⁹⁸ Eu	132.190 †	¹³⁵ Tb	-35.810 †	¹³⁹ Dy	-39.720	¹⁴⁷ Ho	-55.890	¹⁵¹ Er	-57.510	¹⁵⁹ Tm	-61.310
¹²⁸ Gd	-15.900 †	¹³⁶ Tb	-38.680 †	¹⁴⁰ Dy	-44.230	¹⁴⁸ Ho	-58.680	¹⁵² Er	-59.260	¹⁶⁰ Tm	-61.230
¹²⁹ Gd	-20.470 †	¹³⁷ Tb	-43.340 †	¹⁴¹ Dy	-46.520	¹⁴⁹ Ho	-63.420	¹⁵³ Er	-59.460	¹⁶¹ Tm	-62.860
¹³⁰ Gd	-26.770 ‡	¹³⁸ Tb	-45.720 †	¹⁴² Dy	-50.670	¹⁵⁰ Ho	-61.450	¹⁵⁴ Er	-61.770	¹⁶² Tm	-62.400
¹³¹ Gd	-30.590 ‡	¹³⁹ Tb	-49.930	¹⁴³ Dy	-52.670	¹⁵¹ Ho	-62.910	¹⁵⁵ Er	-62.020	¹⁶³ Tm	-63.640
¹³² Gd	-36.150	¹⁴⁰ Tb	-51.920	¹⁴⁴ Dy	-56.560	¹⁵² Ho	-62.910	¹⁵⁶ Er	-64.050	¹⁶⁴ Tm	-62.790
¹³³ Gd	-39.290	¹⁴¹ Tb	-55.780	¹⁴⁵ Dy	-58.350	¹⁵³ Ho	-64.920	¹⁵⁷ Er	-64.010	¹⁶⁵ Tm	-63.620
¹³⁴ Gd	-44.210	¹⁴² Tb	-57.480	¹⁴⁶ Dy	-62.240	¹⁵⁴ Ho	-64.870	¹⁵⁸ Er	-65.710	¹⁶⁶ Tm	-62.380
¹³⁵ Gd	-46.760	¹⁴³ Tb	-61.080	¹⁴⁷ Dy	-64.720	¹⁵⁵ Ho	-66.600	¹⁵⁹ Er	-65.320	¹⁶⁷ Tm	-62.800
¹³⁶ Gd	-51.130	¹⁴⁴ Tb	-62.580	¹⁴⁸ Dy	-69.150	¹⁵⁶ Ho	-66.260	¹⁶⁰ Er	-66.650	¹⁶⁸ Tm	-61.160
¹³⁷ Gd	-53.200	¹⁴⁵ Tb	-66.120	¹⁴⁹ Dy	-66.880	¹⁵⁷ Ho	-67.660	¹⁶¹ Er	-65.900	¹⁶⁹ Tm	-61.180
¹³⁸ Gd	-57.120	¹⁴⁶ Tb	-68.290	¹⁵⁰ Dy	-68.020	¹⁵⁸ Ho	-66.980	¹⁶² Er	-66.850	¹⁷⁰ Tm	-59.150
¹³⁹ Gd	-58.810	¹⁴⁷ Tb	-72.430	¹⁵¹ Dy	-67.790	¹⁵⁹ Ho	-68.020	¹⁶³ Er	-65.710	¹⁷¹ Tm	-58.770
¹⁴⁰ Gd	-62.380	¹⁴⁸ Tb	-69.860	¹⁵² Dy	-69.500	¹⁶⁰ Ho	-66.970	¹⁶⁴ Er	-66.250	¹⁷² Tm	-56.360
¹⁴¹ Gd	-63.780	¹⁴⁹ Tb	-70.700	¹⁵³ Dy	-69.130	¹⁶¹ Ho	-67.630	¹⁶⁵ Er	-64.720	¹⁷³ Tm	-55.610
¹⁴² Gd	-67.090	¹⁵⁰ Tb	-70.210	¹⁵⁴ Dy	-70.560	¹⁶² Ho	-66.200	¹⁶⁶ Er	-64.860	¹⁷⁴ Tm	-52.850
¹⁴³ Gd	-68.290	¹⁵¹ Tb	-71.610	¹⁵⁵ Dy	-69.900	¹⁶³ Ho	-66.460	¹⁶⁷ Er	-62.930	¹⁷⁵ Tm	-51.730
¹⁴⁴ Gd	-71.510	¹⁵² Tb	-70.930	¹⁵⁶ Dy	-71.000	¹⁶⁴ Ho	-64.640	¹⁶⁸ Er	-62.670	¹⁷⁶ Tm	-48.640
¹⁴⁵ Gd	-73.380	¹⁵³ Tb	-72.050	¹⁵⁷ Dy	-70.010	¹⁶⁵ Ho	-64.500	¹⁶⁹ Er	-60.360	¹⁷⁷ Tm	-47.190
¹⁴⁶ Gd	-77.210	¹⁵⁴ Tb	-71.080	¹⁵⁸ Dy	-70.750	¹⁶⁶ Ho	-62.290	¹⁷⁰ Er	-59.700	¹⁷⁸ Tm	-43.790
¹⁴⁷ Gd	-74.330	¹⁵⁵ Tb	-71.880	¹⁵⁹ Dy	-69.400	¹⁶⁷ Ho	-61.750	¹⁷¹ Er	-57.020	¹⁷⁹ Tm	-42.030
¹⁴⁸ Gd	-74.860	¹⁵⁶ Tb	-70.580	¹⁶⁰ Dy	-69.760	¹⁶⁸ Ho	-59.160	¹⁷² Er	-55.990	¹⁸⁰ Tm	-38.340
¹⁴⁹ Gd	-74.070	¹⁵⁷ Tb	-71.030	¹⁶¹ Dy	-68.030	¹⁶⁹ Ho	-58.240	¹⁷³ Er	-52.950	¹⁸¹ Tm	-36.300
¹⁵⁰ Gd	-75.150	¹⁵⁸ Tb	-69.370	¹⁶² Dy	-68.000	¹⁷⁰ Ho	-55.280	¹⁷⁴ Er	-51.570	¹⁸² Tm	-32.350
¹⁵¹ Gd	-74.150	¹⁵⁹ Tb	-69.440	¹⁶³ Dy	-65.880	¹⁷¹ Ho	-53.990	¹⁷⁵ Er	-48.210	¹⁸³ Tm	-30.050
¹⁵² Gd	-74.960	¹⁶⁰ Tb	-67.410	¹⁶⁴ Dy	-65.450	¹⁷² Ho	-50.680	¹⁷⁶ Er	-46.500	¹⁸⁴ Tm	-25.870
¹⁵³ Gd	-73.670	¹⁶¹ Tb	-67.090	¹⁶⁵ Dy	-62.960	¹⁷³ Ho	-49.040	¹⁷⁷ Er	-42.820	¹⁸⁵ Tm	-23.330
¹⁵⁴ Gd	-74.160	¹⁶² Tb	-64.690	¹⁶⁶ Dy	-62.140	¹⁷⁴ Ho	-45.410	¹⁷⁸ Er	-40.810	¹⁸⁶ Tm	-18.930
¹⁵⁵ Gd	-72.540	¹⁶³ Tb	-63.980	¹⁶⁷ Dy	-59.260	¹⁷⁵ Ho	-43.440	¹⁷⁹ Er	-36.850	¹⁸⁷ Tm	-16.180
¹⁵⁶ Gd	-72.680	¹⁶⁴ Tb	-61.200	¹⁶⁸ Dy	-58.060	¹⁷⁶ Ho	-39.510	¹⁸⁰ Er	-34.560	¹⁸⁸ Tm	-11.570

Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess
²⁰⁷ Re	19.130	²⁰⁷ Os	9.870	²¹² Ir	26.300	²¹⁰ Pt	6.870	²¹⁵ Au	22.510	²¹² Hg	1.610		
²⁰⁸ Re	25.050	²⁰⁸ Os	14.010	²¹³ Ir	30.260	²¹¹ Pt	12.240	²¹⁶ Au	27.980	²¹³ Hg	6.450		
²⁰⁹ Re	29.260	²⁰⁹ Os	19.900	²¹⁴ Ir	35.970	²¹² Pt	16.050	²¹⁷ Au	31.750	²¹⁴ Hg	9.750		
²¹⁰ Re	35.240	²¹⁰ Os	23.960	²¹⁵ Ir	40.150	²¹³ Pt	21.590	²¹⁸ Au	37.210	²¹⁵ Hg	14.780		
²¹¹ Re	39.670	²¹¹ Os	29.700	²¹⁶ Ir	46.080	²¹⁴ Pt	25.470	²¹⁹ Au	41.150	²¹⁶ Hg	18.270		
²¹² Re	45.870	²¹² Os	33.890	²¹⁷ Ir	50.500	²¹⁵ Pt	30.940	²²⁰ Au	46.840	²¹⁷ Hg	23.480		
²¹³ Re	50.520	²¹³ Os	39.840	²¹⁸ Ir	56.660	²¹⁶ Pt	34.890	²²¹ Au	51.020	²¹⁸ Hg	27.170		
²¹⁴ Re	56.940	²¹⁴ Os	44.270	²¹⁹ Ir	61.300	²¹⁷ Pt	40.590	²²² Au	56.930	²¹⁹ Hg	32.580		
²¹⁵ Re	61.820	²¹⁵ Os	50.440	²²⁰ Ir	67.690	²¹⁸ Pt	44.770	²²³ Au	61.350	²²⁰ Hg	36.400		
²¹⁶ Re	68.460	²¹⁶ Os	55.090	²²¹ Ir	72.570	²¹⁹ Pt	50.690	²²⁴ Au	67.490	²²¹ Hg	41.850		
²¹⁷ Re	73.580	²¹⁷ Os	61.490	²²² Ir	79.180	²²⁰ Pt	55.110	²²⁵ Au	72.150	²²² Hg	45.800		
²¹⁸ Re	80.440	²¹⁸ Os	66.380	²²³ Ir	84.300	²²¹ Pt	61.260	²²⁶ Au	78.520	²²³ Hg	51.480		
²¹⁹ Re	85.780	²¹⁹ Os	73.000	²²⁴ Ir	91.130	²²² Pt	65.910	²²⁷ Au	83.410	²²⁴ Hg	55.670		
²²⁰ Re	92.870	²²⁰ Os	78.110	²²⁵ Ir	96.480	²²³ Pt	72.290	²²⁸ Au	90.000	²²⁵ Hg	61.580		
²²¹ Re	98.440	²²¹ Os	84.960	²²⁶ Ir	103.540	²²⁴ Pt	77.180	²²⁹ Au	95.120	²²⁶ Hg	66.000		
²²² Re	105.750	²²² Os	90.310	²²⁷ Ir	109.120	²²⁵ Pt	83.780	²³⁰ Au	101.940	²²⁷ Hg	72.140		
²²³ Re	111.560	²²³ Os	97.380	²²⁸ Ir	116.400	²²⁶ Pt	88.900	²³¹ Au	107.300	²²⁸ Hg	76.810		
²²⁴ Re	119.080	²²⁴ Os	102.960	²²⁹ Ir	122.200	²²⁷ Pt	95.730	²³² Au	114.340	²²⁹ Hg	83.170		
²²⁵ Re	125.120	²²⁵ Os	110.260	²³⁰ Ir	129.700	²²⁸ Pt	101.080	²³³ Au	119.910	²³⁰ Hg	88.070		
²²⁶ Re	132.860	²²⁶ Os	116.070	²³¹ Ir	135.730	²²⁹ Pt	108.130	²³⁴ Au	127.170	²³¹ Hg	94.660		
²²⁷ Re	139.120	²²⁷ Os	123.580	²³² Ir	143.440	²³⁰ Pt	113.710	²³⁵ Au	132.970	²³² Hg	99.790		
²²⁸ Re	147.080	²²⁸ Os	129.610	²³³ Ir	149.690	²³¹ Pt	120.980	²³⁶ Au	140.450	²³³ Hg	106.600		
²²⁹ Re	153.550	²²⁹ Os	137.340	²³⁴ Ir	157.620	²³² Pt	126.790	²³⁷ Au	146.470	²³⁴ Hg	111.960		
²³⁰ Re	161.720 †	²³⁰ Os	143.600	²³⁵ Ir	164.080	²³³ Pt	134.270	²³⁸ Au	154.150	²³⁵ Hg	118.990		
²³¹ Re	168.420	²³¹ Os	151.540	²³⁶ Ir	172.210 †	²³⁴ Pt	140.300	²³⁹ Au	160.390	²³⁶ Hg	124.570		
²³² Re	176.790 †	²³² Os	158.010	²³⁷ Ir	178.890	²³⁵ Pt	148.000	²⁴⁰ Au	168.290	²³⁷ Hg	131.820		
²³³ Re	183.700	²³³ Os	166.160 †	²³⁸ Ir	187.220 †	²³⁶ Pt	154.240	²⁴¹ Au	174.740	²³⁸ Hg	137.620		
²³⁴ Re	192.280 †	²³⁴ Os	172.850	²³⁹ Ir	194.110	²³⁷ Pt	162.160	²⁴² Au	182.850 †	²³⁹ Hg	145.090		
¹⁶⁰ Os	-5.540 †	²³⁵ Os	181.210 †	²⁴⁰ Ir	202.650 †	²³⁸ Pt	168.610	²⁴³ Au	189.510	²⁴⁰ Hg	151.110		
¹⁶¹ Os	-7.730 ‡	²³⁶ Os	188.110	¹⁶⁴ Pt	5.010 †	²³⁹ Pt	176.730 †	²⁴⁴ Au	197.820 †	²⁴¹ Hg	158.790		
¹⁶² Os	-11.730 ‡	²³⁷ Os	196.670 †	¹⁶⁵ Pt	2.420 †	²⁴⁰ Pt	183.400	²⁴⁵ Au	204.700	²⁴² Hg	165.030		
¹⁶³ Os	-13.730 ‡	¹⁶⁸ Ir	-17.690 †	¹⁶⁶ Pt	-1.930 ‡	²⁴¹ Pt	191.730 †	²⁴⁶ Au	213.210 †	²⁴³ Hg	172.910		
¹⁶⁴ Os	-17.730	¹⁶⁹ Ir	-21.500 †	¹⁶⁷ Pt	-4.270 ‡	²⁴² Pt	198.610	¹⁶⁹ Hg	12.420 †	²⁴⁴ Hg	179.360		
¹⁶⁵ Os	-19.970	¹⁷⁰ Ir	-23.270 †	¹⁶⁸ Pt	-8.590 ‡	²⁴³ Pt	207.130 †	¹⁷⁰ Hg	7.800 †	²⁴⁵ Hg	187.310		
¹⁶⁶ Os	-23.890	¹⁷¹ Ir	-26.680	¹⁶⁹ Pt	-11.000 ‡	¹⁷⁴ Au	-14.490 †	¹⁷¹ Hg	5.170 ‡	²⁴⁶ Hg	193.830		
¹⁶⁷ Os	-25.770	¹⁷² Ir	-28.050	¹⁷⁰ Pt	-15.070	¹⁷⁵ Au	-18.020 †	¹⁷² Hg	0.860 ‡	²⁴⁷ Hg	201.970 †		
¹⁶⁸ Os	-29.320	¹⁷³ Ir	-31.050	¹⁷¹ Pt	-17.100	¹⁷⁶ Au	-19.530 †	¹⁷³ Hg	-1.600 ‡	²⁴⁸ Hg	208.680		
¹⁶⁹ Os	-30.810	¹⁷⁴ Ir	-32.030	¹⁷² Pt	-20.770	¹⁷⁷ Au	-22.650	¹⁷⁴ Hg	-5.790 ‡	²⁴⁹ Hg	217.020 †		
¹⁷⁰ Os	-33.960	¹⁷⁵ Ir	-34.620	¹⁷³ Pt	-22.410	¹⁷⁸ Au	-23.770	¹⁷⁵ Hg	-7.960	²⁵⁰ Hg	223.930		
¹⁷¹ Os	-35.060	¹⁷⁶ Ir	-35.200	¹⁷⁴ Pt	-25.670	¹⁷⁹ Au	-26.490	¹⁷⁶ Hg	-11.740	²⁵¹ Hg	232.450 †		
¹⁷² Os	-37.800	¹⁷⁷ Ir	-37.380	¹⁷⁵ Pt	-26.910	¹⁸⁰ Au	-27.220	¹⁷⁷ Hg	-13.520	¹⁷⁹ Tl	-8.930 †		
¹⁷³ Os	-38.500	¹⁷⁸ Ir	-37.570	¹⁷⁶ Pt	-29.760	¹⁸¹ Au	-29.550	¹⁷⁸ Hg	-16.900	¹⁸⁰ Tl	-10.590 †		
¹⁷⁴ Os	-40.820	¹⁷⁹ Ir	-39.360	¹⁷⁷ Pt	-30.610	¹⁸² Au	-29.910	¹⁷⁹ Hg	-18.280	¹⁸¹ Tl	-13.850 †		
¹⁷⁵ Os	-41.130	¹⁸⁰ Ir	-39.170	¹⁷⁸ Pt	-33.060	¹⁸³ Au	-31.860	¹⁸⁰ Hg	-21.270	¹⁸² Tl	-15.120		
¹⁷⁶ Os	-43.040	¹⁸¹ Ir	-40.580	¹⁷⁹ Pt	-33.520	¹⁸⁴ Au	-31.860	¹⁸¹ Hg	-22.270	¹⁸³ Tl	-19.990		
¹⁷⁷ Os	-42.950	¹⁸² Ir	-40.030	¹⁸⁰ Pt	-35.580	¹⁸⁵ Au	-33.460	¹⁸² Hg	-24.870	¹⁸⁴ Tl	-18.900		
¹⁷⁸ Os	-44.470	¹⁸³ Ir	-41.070	¹⁸¹ Pt	-35.660	¹⁸⁶ Au	-33.120	¹⁸³ Hg	-25.500	¹⁸⁵ Tl	-21.400		
¹⁷⁹ Os	-44.000	¹⁸⁴ Ir	-40.180	¹⁸² Pt	-37.340	¹⁸⁷ Au	-34.370	¹⁸⁴ Hg	-27.730	¹⁸⁶ Tl	-21.950		
¹⁸⁰ Os	-45.140	¹⁸⁵ Ir	-40.880	¹⁸³ Pt	-37.060	¹⁸⁸ Au	-33.700	¹⁸⁵ Hg	-28.000	¹⁸⁷ Tl	-22.090		
¹⁸¹ Os	-44.300	¹⁸⁶ Ir	-39.660	¹⁸⁴ Pt	-38.380	¹⁸⁹ Au	-34.620	¹⁸⁶ Hg	-29.860	¹⁸⁸ Tl	-24.330		
¹⁸² Os	-45.070	¹⁸⁷ Ir	-40.040	¹⁸⁵ Pt	-37.750	¹⁹⁰ Au	-33.640	¹⁸⁷ Hg	-29.800	¹⁸⁹ Tl	-26.260		
¹⁸³ Os	-43.900	¹⁸⁸ Ir	-38.510	¹⁸⁶ Pt	-38.730	¹⁹¹ Au	-34.260	¹⁸⁸ Hg	-31.320	¹⁹⁰ Tl	-26.300		
¹⁸⁴ Os	-44.330	¹⁸⁹ Ir	-38.590	¹⁸⁷ Pt	-37.780	¹⁹² Au	-32.990	¹⁸⁹ Hg	-30.920	¹⁹¹ Tl	-27.930		
¹⁸⁵ Os	-42.820	¹⁹⁰ Ir	-36.770	¹⁸⁸ Pt	-38.430	¹⁹³ Au	-33.500	¹⁹⁰ Hg	-32.110	¹⁹² Tl	-27.690		
¹⁸⁶ Os	-42.930	¹⁹¹ Ir	-36.560	¹⁸⁹ Pt	-37.180	¹⁹⁴ Au	-32.220	¹⁹¹ Hg	-31.470	¹⁹³ Tl	-29.040		
¹⁸⁷ Os	-41.120	¹⁹² Ir	-34.480	¹⁹⁰ Pt	-37.520	¹⁹⁵ Au	-32.550	¹⁹² Hg	-32.560	¹⁹⁴ Tl	-28.520		
¹⁸⁸ Os	-40.930	¹⁹³ Ir	-34.000	¹⁹¹ Pt	-35.970	¹⁹⁶ Au	-31.030	¹⁹³ Hg	-31.790	¹⁹⁵ Tl	-29.590		
¹⁸⁹ Os	-38.840	¹⁹⁴ Ir	-31.780	¹⁹² Pt	-36.030	¹⁹⁷ Au	-31.110	¹⁹⁴ Hg	-32.610	¹⁹⁶ Tl	-28.810		
¹⁹⁰ Os	-38.360	¹⁹⁵ Ir	-31.390	¹⁹³ Pt	-34.210	¹⁹⁸ Au	-29.360	¹⁹⁵ Hg	-31.580	¹⁹⁷ Tl	-29.600		
¹⁹¹ Os	-36.010	¹⁹⁶ Ir	-29.180	¹⁹⁴ Pt	-34.240	¹⁹⁹ Au	-29.200	¹⁹⁶ Hg	-32.140	¹⁹⁸ Tl	-28.560		
¹⁹² Os	-35.270	¹⁹⁷ Ir	-28.570	¹⁹⁵ Pt	-32.480	²⁰⁰ Au	-27.230	¹⁹⁷ Hg	-30.860	¹⁹⁹ Tl	-29.090		
¹⁹³ Os	-32.670	¹⁹⁸ Ir	-26.150	¹⁹⁶ Pt	-32.330	²⁰¹ Au	-26.830	¹⁹⁸ Hg	-31.170	²⁰⁰ Tl	-27.800		
¹⁹⁴ Os	-31.730	¹⁹⁹ Ir	-25.340	¹⁹⁷ Pt	-30.350	²⁰² Au	-24.630	¹⁹⁹ Hg	-29.640	²⁰¹ Tl	-28.070		
¹⁹⁵ Os	-29.270	²⁰⁰ Ir	-22.720	¹⁹⁸ Pt	-29.960	²⁰³ Au	-24.010	²⁰⁰ Hg	-29.700	²⁰² Tl	-26.520		
¹⁹⁶ Os	-28.440	²⁰¹ Ir	-21.690	¹⁹⁹ Pt	-27.770	²⁰⁴ Au	-21.580	²⁰¹ Hg	-27.940	²⁰³ Tl	-26.530		
¹⁹⁷ Os	-25.790	²⁰² Ir	-18.870	²⁰⁰ Pt	-27.160	²⁰⁵ Au	-20.720	²⁰² Hg	-27.750	²⁰⁴ Tl	-24.720		
¹⁹⁸ Os	-24.750	²⁰³ Ir	-17.640	²⁰¹ Pt	-24.750	²⁰⁶ Au	-14.460	²⁰³ Hg	-25.750	²⁰⁵ Tl	-24.470		
¹⁹⁹ Os	-21.910	²⁰⁴ Ir	-10.910	²⁰² Pt	-23.930	²⁰⁷ Au	-11.430	²⁰⁴ Hg	-25.310	²⁰⁶ Tl	-22.410		
²⁰⁰ Os	-20.680	²⁰⁵ Ir	-7.350	²⁰³ Pt	-21.310	²⁰⁸ Au	-6.660	²⁰⁵ Hg	-23.070	²⁰⁷ Tl	-21.890		
²⁰¹ Os	-17.650	²⁰⁶ Ir	-2.040	²⁰⁴ Pt	-20.260	²⁰⁹ Au	-3.470	²⁰⁶ Hg	-22.380	²⁰⁸ Tl	-16.090		
²⁰² Os	-16.220	²⁰⁷ Ir	1.680	²⁰⁵ Pt	-13.760	²¹⁰ Au	1.460	²⁰⁷ Hg	-16.350	²⁰⁹ Tl	-13.620		
²⁰³ Os	-9.260	²⁰⁸ Ir	7.150	²⁰⁶ Pt	-10.470	²¹¹ Au	4.830	²⁰⁸ Hg	-13.590	²¹⁰ Tl	-9.390		
²⁰⁴ Os	-5.430	²⁰⁹ Ir	11.030	²⁰⁷ Pt	-5.420	²¹² Au	9.940	²⁰⁹ Hg	-9.090	²¹¹ Tl	-6.740		
²⁰⁵ Os	0.150	²¹⁰ Ir	16.660	²⁰⁸ Pt	-1.960	²¹³ Au	13.490	²¹⁰ Hg	-6.170	²¹² Tl	-2.340		
²⁰⁶ Os	4.14												

Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess
²¹⁴ Tl	5.080	²⁰⁸ Pb	-22.590	²¹² Bi	-7.500	²⁰⁵ Po	-17.260	²⁰⁸ At	-12.080	²⁰³ Rn	-5.590
²¹⁵ Tl	8.110	²⁰⁹ Pb	-17.030	²¹³ Bi	-5.340	²⁰⁶ Po	-17.960	²⁰⁹ At	-12.780	²⁰⁴ Rn	-7.130
²¹⁶ Tl	12.880	²¹⁰ Pb	-14.830	²¹⁴ Bi	-1.450	²⁰⁷ Po	-16.860	²¹⁰ At	-11.700	²⁰⁵ Rn	-7.000
²¹⁷ Tl	16.110	²¹¹ Pb	-10.880	²¹⁵ Bi	0.900	²⁰⁸ Po	-17.300	²¹¹ At	-12.160	²⁰⁶ Rn	-8.420
²¹⁸ Tl	21.070	²¹² Pb	-8.500	²¹⁶ Bi	4.980	²⁰⁹ Po	-15.950	²¹² At	-7.770	²⁰⁷ Rn	-8.060
²¹⁹ Tl	24.500	²¹³ Pb	-4.370	²¹⁷ Bi	7.530	²¹⁰ Po	-16.130	²¹³ At	-6.210	²⁰⁸ Rn	-9.240
²²⁰ Tl	29.660	²¹⁴ Pb	-1.800	²¹⁸ Bi	11.810	²¹¹ Po	-11.470	²¹⁴ At	-2.930	²⁰⁹ Rn	-8.650
²²¹ Tl	33.300	²¹⁵ Pb	2.520	²¹⁹ Bi	14.570	²¹² Po	-9.700	²¹⁵ At	-1.200	²¹⁰ Rn	-9.600
²²² Tl	38.660	²¹⁶ Pb	5.290	²²⁰ Bi	19.050	²¹³ Po	-6.210	²¹⁶ At	2.260	²¹¹ Rn	-8.780
²²³ Tl	42.510	²¹⁷ Pb	9.800	²²¹ Bi	22.020	²¹⁴ Po	-4.260	²¹⁷ At	4.180	²¹² Rn	-9.500
²²⁴ Tl	48.060	²¹⁸ Pb	12.780	²²² Bi	26.700	²¹⁵ Po	-0.580	²¹⁸ At	7.830	²¹³ Rn	-5.360
²²⁵ Tl	52.060	²¹⁹ Pb	17.480	²²³ Bi	29.880	²¹⁶ Po	1.560	²¹⁹ At	9.950	²¹⁴ Rn	-4.020
²²⁶ Tl	57.740	²²⁰ Pb	20.670	²²⁴ Bi	34.770	²¹⁷ Po	5.430	²²⁰ At	13.790	²¹⁵ Rn	-0.960
²²⁷ Tl	61.930	²²¹ Pb	25.570	²²⁵ Bi	38.090	²¹⁸ Po	7.770	²²¹ At	15.870	²¹⁶ Rn	0.550
²²⁸ Tl	67.840	²²² Pb	28.970	²²⁶ Bi	43.080	²¹⁹ Po	11.840	²²² At	19.680	²¹⁷ Rn	3.790
²²⁹ Tl	72.270	²²³ Pb	34.080	²²⁷ Bi	46.590	²²⁰ Po	14.380	²²³ At	22.010	²¹⁸ Rn	5.490
²³⁰ Tl	78.400	²²⁴ Pb	37.680	²²⁸ Bi	51.810	²²¹ Po	18.650	²²⁴ At	26.060	²¹⁹ Rn	8.920
²³¹ Tl	83.070	²²⁵ Pb	42.990	²²⁹ Bi	55.570	²²² Po	21.290	²²⁵ At	28.630	²²⁰ Rn	10.630
²³² Tl	89.430	²²⁶ Pb	46.810	²³⁰ Bi	61.020	²²³ Po	25.580	²²⁶ At	32.920	²²¹ Rn	13.960
²³³ Tl	94.330	²²⁷ Pb	52.330	²³¹ Bi	65.020	²²⁴ Po	28.380	²²⁷ At	35.750	²²² Rn	15.800
²³⁴ Tl	100.910	²²⁸ Pb	56.360	²³² Bi	70.710	²²⁵ Po	32.910	²²⁸ At	40.290	²²³ Rn	19.370
²³⁵ Tl	106.040	²²⁹ Pb	62.090	²³³ Bi	74.940	²²⁶ Po	35.950	²²⁹ At	43.360	²²⁴ Rn	21.470
²³⁶ Tl	112.850	²³⁰ Pb	66.330	²³⁴ Bi	80.860	²²⁷ Po	40.720	²³⁰ At	48.140	²²⁵ Rn	25.280
²³⁷ Tl	118.210	²³¹ Pb	72.260	²³⁵ Bi	85.320	²²⁸ Po	44.010	²³¹ At	51.460	²²⁶ Rn	27.630
²³⁸ Tl	125.230	²³² Pb	76.710	²³⁶ Bi	91.470	²²⁹ Po	49.020	²³² At	56.490	²²⁷ Rn	31.690
²³⁹ Tl	130.810	²³³ Pb	82.840	²³⁷ Bi	96.170	²³⁰ Po	52.560	²³³ At	60.060	²²⁸ Rn	34.290
²⁴⁰ Tl	138.040	²³⁴ Pb	87.510	²³⁸ Bi	102.540	²³¹ Po	57.800	²³⁴ At	65.320	²²⁹ Rn	38.600
²⁴¹ Tl	143.750	²³⁵ Pb	93.840	²³⁹ Bi	107.470	²³² Po	61.590	²³⁵ At	69.130	²³⁰ Rn	41.460
²⁴² Tl	151.100	²³⁶ Pb	98.720	²⁴⁰ Bi	114.070	²³³ Po	67.060	²³⁶ At	74.630	²³¹ Rn	46.020
²⁴³ Tl	157.010	²³⁷ Pb	105.260	²⁴¹ Bi	119.220	²³⁴ Po	71.090	²³⁷ At	78.690	²³² Rn	49.120
²⁴⁴ Tl	164.560	²³⁸ Pb	110.340	²⁴² Bi	126.040	²³⁵ Po	76.800	²³⁸ At	84.420	²³³ Rn	53.930
²⁴⁵ Tl	170.670	²³⁹ Pb	117.080	²⁴³ Bi	131.420	²³⁶ Po	81.060	²³⁹ At	88.710	²³⁴ Rn	57.290
²⁴⁶ Tl	178.420	²⁴⁰ Pb	122.370	²⁴⁴ Bi	138.450	²³⁷ Po	87.000	²⁴⁰ At	94.670	²³⁵ Rn	62.340
²⁴⁷ Tl	184.730	²⁴¹ Pb	129.310	²⁴⁵ Bi	143.960	²³⁸ Po	91.500	²⁴¹ At	99.200	²³⁶ Rn	65.940
²⁴⁸ Tl	192.670	²⁴² Pb	134.810	²⁴⁶ Bi	151.090	²³⁹ Po	97.670	²⁴² At	105.390	²³⁷ Rn	71.230
²⁴⁹ Tl	199.190	²⁴³ Pb	141.950	²⁴⁷ Bi	156.800	²⁴⁰ Po	102.400	²⁴³ At	110.140	²³⁸ Rn	75.080
²⁵⁰ Tl	207.330 †	²⁴⁴ Pb	147.660	²⁴⁸ Bi	164.130	²⁴¹ Po	108.790	²⁴⁴ At	116.550	²³⁹ Rn	80.610
²⁵¹ Tl	214.050	²⁴⁵ Pb	155.000	²⁴⁹ Bi	170.030	²⁴² Po	113.750	²⁴⁵ At	121.540	²⁴⁰ Rn	84.700
²⁵² Tl	222.390 †	²⁴⁶ Pb	160.910	²⁵⁰ Bi	177.560	²⁴³ Po	120.360	²⁴⁶ At	128.160	²⁴¹ Rn	90.460
²⁵³ Tl	229.310	²⁴⁷ Pb	168.450	²⁵¹ Bi	183.680	²⁴⁴ Po	125.540	²⁴⁷ At	133.370	²⁴² Rn	94.790
²⁵⁴ Tl	237.850 †	²⁴⁸ Pb	174.570	²⁵² Bi	191.410	²⁴⁵ Po	132.370	²⁴⁸ At	140.210	²⁴³ Rn	100.780
¹⁷⁴ Pb	17.470 †	²⁴⁹ Pb	182.320	²⁵³ Bi	197.730	²⁴⁶ Po	137.780	²⁴⁹ At	145.640	²⁴⁴ Rn	105.340
¹⁷⁵ Pb	14.580 †	²⁵⁰ Pb	188.640	²⁵⁴ Bi	205.660	²⁴⁷ Po	144.820	²⁵⁰ At	152.700	²⁴⁵ Rn	111.550
¹⁷⁶ Pb	10.060 ‡	²⁵¹ Pb	196.590	²⁵⁵ Bi	212.190	²⁴⁸ Po	150.450	²⁵¹ At	158.340	²⁴⁶ Rn	116.340
¹⁷⁷ Pb	7.510 ‡	²⁵² Pb	203.120	²⁵⁶ Bi	220.320 †	²⁴⁹ Po	157.710	²⁵² At	165.600	²⁴⁷ Rn	122.770
¹⁷⁸ Pb	3.320 ‡	²⁵³ Pb	211.270 †	²⁵⁷ Bi	227.060	²⁵⁰ Po	163.550	²⁵³ At	171.460	²⁴⁸ Rn	127.780
¹⁷⁹ Pb	1.110 ‡	²⁵⁴ Pb	218.020	²⁵⁸ Bi	235.390 †	²⁵¹ Po	170.970	²⁵⁴ At	178.940	²⁴⁹ Rn	134.430
¹⁸⁰ Pb	-2.730	²⁵⁵ Pb	226.380 †	²⁵⁹ Bi	242.340	²⁵² Po	176.870	²⁵⁵ At	185.010	²⁵⁰ Rn	139.660
¹⁸¹ Pb	-4.600	²⁵⁶ Pb	233.340	²⁶⁰ Bi	250.890 †	²⁵³ Po	184.380	²⁵⁶ At	192.540	²⁵¹ Rn	146.520
¹⁸² Pb	-8.100	²⁵⁷ Pb	241.900 †	¹⁷⁹ Po	28.110 †	²⁵⁴ Po	190.480	²⁵⁷ At	198.630	²⁵² Rn	151.970
¹⁸³ Pb	-9.640	¹⁸⁷ Bi	-7.560 †	¹⁸⁰ Po	23.260 †	²⁵⁵ Po	198.190	²⁵⁸ At	206.310	²⁵³ Rn	159.040
¹⁸⁴ Pb	-12.800	¹⁸⁸ Bi	-8.630 †	¹⁸¹ Po	20.400 †	²⁵⁶ Po	204.490	²⁵⁹ At	212.600	²⁵⁴ Rn	164.700
¹⁸⁵ Pb	-14.020	¹⁸⁹ Bi	-11.280 †	¹⁸² Po	15.960 †	²⁵⁷ Po	212.400	²⁶⁰ At	220.470	²⁵⁵ Rn	171.980
¹⁸⁶ Pb	-16.850	¹⁹⁰ Bi	-12.000 †	¹⁸³ Po	13.500 †	²⁵⁸ Po	218.910	²⁶¹ At	226.960	²⁵⁶ Rn	177.850
¹⁸⁷ Pb	-17.750	¹⁹¹ Bi	-14.300 †	¹⁸⁴ Po	9.470 †	²⁵⁹ Po	227.020 †	²⁶² At	235.030 †	²⁵⁷ Rn	185.330
¹⁸⁸ Pb	-20.260	¹⁹² Bi	-14.770 †	¹⁸⁵ Po	7.410 ‡	²⁶⁰ Po	233.730	²⁶³ At	241.720	²⁵⁸ Rn	191.420
¹⁸⁹ Pb	-20.860	¹⁹³ Bi	-16.890 †	¹⁸⁶ Po	3.790 ‡	²⁶¹ Po	242.040 †	²⁶⁴ At	250.000 †	²⁵⁹ Rn	199.060
¹⁹⁰ Pb	-23.050	¹⁹⁴ Bi	-17.140 †	¹⁸⁷ Po	2.110 ‡	²⁶² Po	248.970	²⁶⁵ At	256.890	²⁶⁰ Rn	205.130
¹⁹¹ Pb	-23.350	¹⁹⁵ Bi	-18.960 †	¹⁸⁸ Po	-1.130 ‡	²⁶³ Po	257.480 †	²⁶⁶ At	265.370 †	²⁶¹ Rn	212.780
¹⁹² Pb	-25.240	¹⁹⁶ Bi	-18.930 †	¹⁸⁹ Po	-2.430 ‡	¹⁹² At	1.490 †	¹⁸⁷ Rn	24.240 †	²⁶² Rn	219.050
¹⁹³ Pb	-25.250	¹⁹⁷ Bi	-20.470 †	¹⁹⁰ Po	-5.300 ‡	¹⁹³ At	-1.240 †	¹⁸⁸ Rn	20.120 †	²⁶³ Rn	226.900
¹⁹⁴ Pb	-26.850	¹⁹⁸ Bi	-20.160	¹⁹¹ Po	-6.250 ‡	¹⁹⁴ At	-2.060 †	¹⁸⁹ Rn	17.960 ‡	²⁶⁴ Rn	233.360
¹⁹⁵ Pb	-26.580	¹⁹⁹ Bi	-21.420	¹⁹² Po	-8.760	¹⁹⁵ At	-4.450	¹⁹⁰ Rn	14.250 ‡	²⁶⁵ Rn	241.400
¹⁹⁶ Pb	-27.890	²⁰⁰ Bi	-20.840	¹⁹³ Po	-9.370	¹⁹⁶ At	-4.940	¹⁹¹ Rn	12.490 ‡	²⁶⁶ Rn	248.070
¹⁹⁷ Pb	-27.340	²⁰¹ Bi	-21.820	¹⁹⁴ Po	-11.540	¹⁹⁷ At	-6.990	¹⁹² Rn	9.170	²⁶⁷ Rn	256.310 †
¹⁹⁸ Pb	-28.370	²⁰² Bi	-20.980	¹⁹⁵ Po	-11.830	¹⁹⁸ At	-7.180	¹⁹³ Rn	7.780	²⁶⁸ Rn	263.180
¹⁹⁹ Pb	-27.560	²⁰³ Bi	-21.690	¹⁹⁶ Po	-13.670	¹⁹⁹ At	-8.920	¹⁹⁴ Rn	4.840	²⁶⁹ Rn	271.610 †
²⁰⁰ Pb	-28.310	²⁰⁴ Bi	-20.590	¹⁹⁷ Po	-13.710	²⁰⁰ At	-8.810	¹⁹⁵ Rn	3.810	¹⁹⁶ Fr	11.700 †
²⁰¹ Pb	-27.220	²⁰⁵ Bi	-21.030	¹⁹⁸ Po	-15.470	²⁰¹ At	-10.400	¹⁹⁶ Rn	1.220	¹⁹⁷ Fr	8.920 †
²⁰² Pb	-27.700	²⁰⁶ Bi	-19.660	¹⁹⁹ Po	-15.390	²⁰² At	-10.290	¹⁹⁷ Rn	0.520	¹⁹⁸ Fr	8.010 †
²⁰³ Pb	-26.350	²⁰⁷ Bi	-19.840	²⁰⁰ Po	-16.880	²⁰³ At	-11.740	¹⁹⁸ Rn	-1.730	¹⁹⁹ Fr	5.560
²⁰⁴ Pb	-26.540	²⁰⁸ Bi	-18.210	²⁰¹ Po	-16.530	²⁰⁴ At	-11.380	¹⁹⁹ Rn	-2.120	²⁰⁰ Fr	4.970
²⁰⁵ Pb	-24.930	²⁰⁹ Bi	-18.100	²⁰² Po	-17.750	²⁰⁵ At	-12.580	²⁰⁰ Rn	-4.050	²⁰¹ Fr	2.840
²⁰⁶ Pb	-24.850	²¹⁰ Bi	-13.170	²⁰³ Po	-17.160	²⁰⁶ At	-11.970	²⁰¹ Rn	-4.140	²⁰² Fr	2.540
²⁰⁷ Pb	-22.960	²¹¹ Bi	-11.210	²⁰⁴ Po	-18.110	²⁰⁷ At	-12.920	²⁰² Rn	-5.780	²⁰³ Fr	0.710

Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess
²⁰⁴ Fr	0.700	¹⁹⁹ Ra	14.120	²⁰³ Ac	15.960 †	²⁰¹ Th	29.150 ‡	²⁰⁹ Pa	23.810 †	²¹¹ U	29.400
²⁰⁵ Fr	-0.860	²⁰⁰ Ra	11.480	²⁰⁴ Ac	15.280 †	²⁰² Th	26.120 ‡	²¹⁰ Pa	23.280 †	²¹² U	27.130
²⁰⁶ Fr	-0.650	²⁰¹ Ra	10.700	²⁰⁵ Ac	13.060	²⁰³ Th	24.940	²¹¹ Pa	21.200	²¹³ U	26.620
²⁰⁷ Fr	-2.300	²⁰² Ra	8.370	²⁰⁶ Ac	12.660	²⁰⁴ Th	22.240	²¹² Pa	20.890	²¹⁴ U	24.580
²⁰⁸ Fr	-2.170	²⁰³ Ra	7.890	²⁰⁷ Ac	10.710	²⁰⁵ Th	21.370	²¹³ Pa	19.040	²¹⁵ U	24.000
²⁰⁹ Fr	-3.590	²⁰⁴ Ra	5.860	²⁰⁸ Ac	10.570	²⁰⁶ Th	18.960	²¹⁴ Pa	18.500	²¹⁶ U	21.680
²¹⁰ Fr	-3.230	²⁰⁵ Ra	5.660	²⁰⁹ Ac	8.880	²⁰⁷ Th	18.370	²¹⁵ Pa	16.390	²¹⁷ U	21.060
²¹¹ Fr	-4.430	²⁰⁶ Ra	3.910	²¹⁰ Ac	8.910	²⁰⁸ Th	16.240	²¹⁶ Pa	16.000	²¹⁸ U	18.900
²¹² Fr	-3.870	²⁰⁷ Ra	3.960	²¹¹ Ac	7.050	²⁰⁹ Th	15.890	²¹⁷ Pa	14.070	²¹⁹ U	21.580
²¹³ Fr	-4.840	²⁰⁸ Ra	2.470	²¹² Ac	6.940	²¹⁰ Th	14.010	²¹⁸ Pa	16.980	²²⁰ U	21.560
²¹⁴ Fr	-0.960	²⁰⁹ Ra	2.380	²¹³ Ac	5.280	²¹¹ Th	13.900	²¹⁹ Pa	17.190	²²¹ U	23.230
²¹⁵ Fr	0.160	²¹⁰ Ra	0.740	²¹⁴ Ac	5.350	²¹² Th	12.050	²²⁰ Pa	19.100	²²² U	22.980
²¹⁶ Fr	2.990	²¹¹ Ra	0.860	²¹⁵ Ac	3.890	²¹³ Th	11.720	²²¹ Pa	19.230	²²³ U	24.370
²¹⁷ Fr	4.280	²¹² Ra	-0.570	²¹⁶ Ac	7.280	²¹⁴ Th	9.830	²²² Pa	20.870	²²⁴ U	24.260
²¹⁸ Fr	7.290	²¹³ Ra	-0.250	²¹⁷ Ac	7.950	²¹⁵ Th	9.680	²²³ Pa	21.010	²²⁵ U	25.880
²¹⁹ Fr	8.760	²¹⁴ Ra	-1.480	²¹⁸ Ac	10.320	²¹⁶ Th	7.980	²²⁴ Pa	22.870	²²⁶ U	26.020
²²⁰ Fr	11.660	²¹⁵ Ra	2.160	²¹⁹ Ac	11.160	²¹⁷ Th	11.130	²²⁵ Pa	23.250	²²⁷ U	27.870
²²¹ Fr	13.020	²¹⁶ Ra	3.060	²²⁰ Ac	13.480	²¹⁸ Th	11.570	²²⁶ Pa	25.350	²²⁸ U	28.800
²²² Fr	16.110	²¹⁷ Ra	5.670	²²¹ Ac	14.110	²¹⁹ Th	13.720	²²⁷ Pa	25.980	²²⁹ U	30.370
²²³ Fr	17.710	²¹⁸ Ra	6.730	²²² Ac	16.470	²²⁰ Th	14.280	²²⁸ Pa	28.330	²³⁰ U	31.030
²²⁴ Fr	21.040	²¹⁹ Ra	9.510	²²³ Ac	17.340	²²¹ Th	16.170	²²⁹ Pa	29.230	²³¹ U	33.400
²²⁵ Fr	22.890	²²⁰ Ra	10.460	²²⁴ Ac	19.940	²²² Th	16.550	²³⁰ Pa	31.840	²³² U	34.330
²²⁶ Fr	26.470	²²¹ Ra	13.070	²²⁵ Ac	21.060	²²³ Th	18.670	²³¹ Pa	33.010	²³³ U	36.970
²²⁷ Fr	28.580	²²² Ra	14.180	²²⁶ Ac	23.900	²²⁴ Th	19.290	²³² Pa	35.890	²³⁴ U	38.180
²²⁸ Fr	32.410	²²³ Ra	17.030	²²⁷ Ac	25.280	²²⁵ Th	21.640	²³³ Pa	37.330	²³⁵ U	41.100
²²⁹ Fr	34.780	²²⁴ Ra	18.390	²²⁸ Ac	28.370	²²⁶ Th	22.520	²³⁴ Pa	40.480	²³⁶ U	42.600
²³⁰ Fr	38.860	²²⁵ Ra	21.480	²²⁹ Ac	30.010	²²⁷ Th	25.120	²³⁵ Pa	42.200	²³⁷ U	45.790
²³¹ Fr	41.490	²²⁶ Ra	23.100	²³⁰ Ac	33.370	²²⁸ Th	26.260	²³⁶ Pa	45.620	²³⁸ U	47.570
²³² Fr	45.820	²²⁷ Ra	26.440	²³¹ Ac	35.280	²²⁹ Th	29.120	²³⁷ Pa	47.620	²³⁹ U	51.040
²³³ Fr	48.710	²²⁸ Ra	28.310	²³² Ac	38.900	²³⁰ Th	30.520	²³⁸ Pa	51.310	²⁴⁰ U	53.100
²³⁴ Fr	53.290	²²⁹ Ra	31.910	²³³ Ac	41.070	²³¹ Th	33.640	²³⁹ Pa	53.590	²⁴¹ U	56.840
²³⁵ Fr	56.430	²³⁰ Ra	34.050	²³⁴ Ac	44.950	²³² Th	35.320	²⁴⁰ Pa	57.550	²⁴² U	59.180
²³⁶ Fr	61.260	²³¹ Ra	37.900	²³⁵ Ac	47.390	²³³ Th	38.700	²⁴¹ Pa	60.100	²⁴³ U	63.190
²³⁷ Fr	64.660	²³² Ra	40.300	²³⁶ Ac	51.530	²³⁴ Th	40.650	²⁴² Pa	64.330	²⁴⁴ U	65.800
²³⁸ Fr	69.740	²³³ Ra	44.410	²³⁷ Ac	54.240	²³⁵ Th	44.300	²⁴³ Pa	67.140	²⁴⁵ U	70.080
²³⁹ Fr	73.380	²³⁴ Ra	47.080	²³⁸ Ac	58.640	²³⁶ Th	46.530	²⁴⁴ Pa	71.630	²⁴⁶ U	72.960
²⁴⁰ Fr	78.700	²³⁵ Ra	51.440	²³⁹ Ac	61.610	²³⁷ Th	50.450	²⁴⁵ Pa	74.710	²⁴⁷ U	77.500
²⁴¹ Fr	82.590	²³⁶ Ra	54.370	²⁴⁰ Ac	66.260	²³⁸ Th	52.940	²⁴⁶ Pa	79.450	²⁴⁸ U	80.640
²⁴² Fr	88.140	²³⁷ Ra	58.990	²⁴¹ Ac	69.500	²³⁹ Th	57.120	²⁴⁷ Pa	82.780	²⁴⁹ U	85.420
²⁴³ Fr	92.270	²³⁸ Ra	62.170	²⁴² Ac	74.400	²⁴⁰ Th	59.880	²⁴⁸ Pa	87.770	²⁵⁰ U	88.820
²⁴⁴ Fr	98.050	²³⁹ Ra	67.040	²⁴³ Ac	77.880	²⁴¹ Th	64.320	²⁴⁹ Pa	91.350	²⁵¹ U	93.850
²⁴⁵ Fr	102.420	²⁴⁰ Ra	70.480	²⁴⁴ Ac	83.030	²⁴² Th	67.350	²⁵⁰ Pa	96.580	²⁵² U	97.480
²⁴⁶ Fr	108.430	²⁴¹ Ra	75.590	²⁴⁵ Ac	86.760	²⁴³ Th	72.050	²⁵¹ Pa	100.400	²⁵³ U	102.750
²⁴⁷ Fr	113.020	²⁴² Ra	79.280	²⁴⁶ Ac	92.150	²⁴⁴ Th	75.330	²⁵² Pa	105.860	²⁵⁴ U	106.620
²⁴⁸ Fr	119.250	²⁴³ Ra	84.630	²⁴⁷ Ac	96.120	²⁴⁵ Th	80.270	²⁵³ Pa	109.920	²⁵⁵ U	112.110
²⁴⁹ Fr	124.070	²⁴⁴ Ra	88.560	²⁴⁸ Ac	101.740	²⁴⁶ Th	83.810	²⁵⁴ Pa	115.600	²⁵⁶ U	116.210
²⁵⁰ Fr	130.520	²⁴⁵ Ra	94.150	²⁴⁹ Ac	105.950	²⁴⁷ Th	89.000	²⁵⁵ Pa	119.880	²⁵⁷ U	121.920
²⁵¹ Fr	135.560	²⁴⁶ Ra	98.320	²⁵⁰ Ac	111.790	²⁴⁸ Th	92.780	²⁵⁶ Pa	125.780	²⁵⁸ U	126.240
²⁵² Fr	142.220	²⁴⁷ Ra	104.130	²⁵¹ Ac	116.230	²⁴⁹ Th	98.200	²⁵⁷ Pa	130.290	²⁵⁹ U	132.160
²⁵³ Fr	147.480	²⁴⁸ Ra	108.540	²⁵² Ac	122.290	²⁵⁰ Th	102.220	²⁵⁸ Pa	136.390	²⁶⁰ U	136.690
²⁵⁴ Fr	154.350	²⁴⁹ Ra	114.570	²⁵³ Ac	126.950	²⁵¹ Th	107.870	²⁵⁹ Pa	141.110	²⁶¹ U	142.810
²⁵⁵ Fr	159.820	²⁵⁰ Ra	119.200	²⁵⁴ Ac	133.230	²⁵² Th	112.120	²⁶⁰ Pa	147.420	²⁶² U	147.550
²⁵⁶ Fr	166.890	²⁵¹ Ra	125.460	²⁵⁵ Ac	138.100	²⁵³ Th	117.990	²⁶¹ Pa	152.340	²⁶³ U	153.870
²⁵⁷ Fr	172.570	²⁵² Ra	130.310	²⁵⁶ Ac	144.590	²⁵⁴ Th	122.470	²⁶² Pa	158.850	²⁶⁴ U	158.810
²⁵⁸ Fr	179.850	²⁵³ Ra	136.780	²⁵⁷ Ac	149.680	²⁵⁵ Th	128.550	²⁶³ Pa	163.980	²⁶⁵ U	165.330
²⁵⁹ Fr	185.740	²⁵⁴ Ra	141.850	²⁵⁸ Ac	156.370	²⁵⁶ Th	133.250	²⁶⁴ Pa	170.680	²⁶⁶ U	170.460
²⁶⁰ Fr	193.220	²⁵⁵ Ra	148.530	²⁵⁹ Ac	161.670	²⁵⁷ Th	139.540	²⁶⁵ Pa	176.000	²⁶⁷ U	177.170
²⁶¹ Fr	199.310	²⁵⁶ Ra	153.810	²⁶⁰ Ac	168.560	²⁵⁸ Th	144.450	²⁶⁶ Pa	182.900	²⁶⁸ U	182.500
²⁶² Fr	206.920	²⁵⁷ Ra	160.690	²⁶¹ Ac	174.060	²⁵⁹ Th	150.950	²⁶⁷ Pa	188.410	²⁶⁹ U	189.380
²⁶³ Fr	212.970	²⁵⁸ Ra	166.180	²⁶² Ac	181.150	²⁶⁰ Th	156.060	²⁶⁸ Pa	195.490	²⁷⁰ U	194.900
²⁶⁴ Fr	220.600	²⁵⁹ Ra	173.260	²⁶³ Ac	186.850	²⁶¹ Th	162.760	²⁶⁹ Pa	201.200	²⁷¹ U	201.970
²⁶⁵ Fr	226.840	²⁶⁰ Ra	178.960	²⁶⁴ Ac	194.130	²⁶² Th	168.070	²⁷⁰ Pa	208.430	²⁷² U	207.470
²⁶⁶ Fr	234.650	²⁶¹ Ra	186.240	²⁶⁵ Ac	200.030	²⁶³ Th	174.970	²⁷¹ Pa	214.010	²⁷³ U	214.390
²⁶⁷ Fr	241.090	²⁶² Ra	192.140	²⁶⁶ Ac	207.510	²⁶⁴ Th	180.480	²⁷² Pa	221.130	²⁷⁴ U	219.940
²⁶⁸ Fr	249.090	²⁶³ Ra	199.620	²⁶⁷ Ac	213.410	²⁶⁵ Th	187.570	²⁷³ Pa	226.890	²⁷⁵ U	227.030
²⁶⁹ Fr	255.730	²⁶⁴ Ra	205.720	²⁶⁸ Ac	220.790	²⁶⁶ Th	193.280	²⁷⁴ Pa	234.190	²⁷⁶ U	232.750
²⁷⁰ Fr	263.930 †	²⁶⁵ Ra	213.180	²⁶⁹ Ac	226.790	²⁶⁷ Th	200.560	²⁷⁵ Pa	240.130	²¹⁴ Np	34.420 †
²⁷¹ Fr	270.770	²⁶⁶ Ra	219.210	²⁷⁰ Ac	234.340	²⁶⁸ Th	206.460	²⁰³ U	45.760 †	²¹⁵ Np	32.170 †
¹⁹² Ra	30.840 †	²⁶⁷ Ra	226.800	²⁷¹ Ac	240.530	²⁶⁹ Th	213.690	²⁰⁴ U	42.340 †	²¹⁶ Np	31.510 †
¹⁹³ Ra	28.610 †	²⁶⁸ Ra	233.020	²⁷² Ac	248.270	²⁷⁰ Th	219.480	²⁰⁵ U	40.770 ‡	²¹⁷ Np	28.960
¹⁹⁴ Ra	24.860 ‡	²⁶⁹ Ra	240.790	²⁷³ Ac	254.650	²⁷¹ Th	226.820	²⁰⁶ U	37.680 ‡	²¹⁸ Np	28.120
¹⁹⁵ Ra	23.030 ‡	²⁷⁰ Ra	247.210	¹⁹⁷ Th	39.700 †	²⁷² Th	232.790	²⁰⁷ U	36.420 ‡	²¹⁹ Np	25.730
¹⁹⁶ Ra	19.680 ‡	²⁷¹ Ra	255.170	¹⁹⁸ Th	35.920 †	²⁷³ Th	240.300	²⁰⁸ U	33.640 ‡	²²⁰ Np	28.180
¹⁹⁷ Ra	18.220	²⁷² Ra	261.780	¹⁹⁹ Th	34.050 ‡	²⁷⁴ Th	246.460	²⁰⁹ U	32.650	²²¹ Np	27.930
¹⁹⁸ Ra	15.230	²⁰² Ac	18.480 †	²⁰⁰ Th	30.660 ‡	²⁰⁸ Pa	26.140 †	²¹⁰ U	30.140	²²² Np	29.320

Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess
223Np	28.750	230Pu	35.670	245Am	62.080	255Cm	90.250	274Bk	169.620	234Es	63.800		
224Np	29.890	231Pu	37.300	246Am	65.460	256Cm	93.110	275Bk	174.190	235Es	62.550		
225Np	29.540	232Pu	37.470	247Am	67.440	257Cm	97.590	276Bk	180.290	236Es	62.990		
226Np	30.900	233Pu	39.360	248Am	71.090	258Cm	100.700	277Bk	185.030	237Es	62.010		
227Np	30.790	234Pu	39.820	249Am	73.360	259Cm	105.420	278Bk	190.980	238Es	62.730		
228Np	32.400	235Pu	41.990	250Am	77.280	260Cm	108.770	279Bk	195.530	239Es	62.050		
229Np	32.550	236Pu	42.740	251Am	79.810	261Cm	113.710	280Bk	201.600	240Es	63.060		
230Np	34.410	237Pu	45.190	252Am	84.000	262Cm	117.280	281Bk	206.310	241Es	62.670		
231Np	34.830	238Pu	46.230	253Am	86.800	263Cm	122.450			242Es	63.990		
232Np	36.960	239Pu	48.970	254Am	91.240	264Cm	126.230	221Cf	69.800 †	243Es	63.910		
233Np	37.650	240Pu	50.300	255Am	94.290	265Cm	131.600	222Cf	66.170 †	244Es	65.530		
234Np	40.050	241Pu	53.320	256Am	98.970	266Cm	135.600	223Cf	64.210 †	245Es	65.760		
235Np	41.030	242Pu	54.950	257Am	102.270	267Cm	141.160	224Cf	60.710 ‡	246Es	67.680		
236Np	43.710	243Pu	58.250	258Am	107.180	268Cm	145.360	225Cf	62.020 ‡	247Es	68.220		
237Np	44.980	244Pu	60.160	259Am	110.720	269Cm	151.110	226Cf	60.610	248Es	70.440		
238Np	47.940	245Pu	63.750	260Am	115.850	270Cm	155.500	227Cf	60.760	249Es	71.290		
239Np	49.490	246Pu	65.950	261Am	119.610	271Cm	161.440	228Cf	59.010	250Es	73.810		
240Np	52.740	247Pu	69.810	262Am	124.960	272Cm	166.010	229Cf	58.950	251Es	74.960		
241Np	54.580	248Pu	72.280	263Am	128.940	273Cm	172.130	230Cf	57.420	252Es	77.770		
242Np	58.100	249Pu	76.410	264Am	134.490	274Cm	176.890	231Cf	57.580	253Es	79.210		
243Np	60.220	250Pu	79.140	265Am	138.670	275Cm	183.180	232Cf	56.290	254Es	82.310		
244Np	64.020	251Pu	83.530	266Am	144.430	276Cm	188.120	233Cf	56.700	255Es	84.030		
245Np	66.420	252Pu	86.530	267Am	148.810	277Cm	194.290	234Cf	55.670	256Es	87.400		
246Np	70.490	253Pu	91.170	268Am	154.750	278Cm	199.030	235Cf	56.340	257Es	89.410		
247Np	73.170	254Pu	94.420	269Am	159.330	279Cm	205.300	236Cf	55.590	258Es	93.040		
248Np	77.500	255Pu	99.290	270Am	165.460	280Cm	210.210	237Cf	56.540	259Es	95.300		
249Np	80.440	256Pu	102.790	271Am	170.220			238Cf	56.080	260Es	99.190		
250Np	85.020	257Pu	107.890	272Am	176.530	225Bk	53.950 †	239Cf	57.320	261Es	101.710		
251Np	88.210	258Pu	111.620	273Am	181.470	226Bk	54.280 †	240Cf	57.160	262Es	105.840		
252Np	93.050	259Pu	116.950	274Am	187.960	227Bk	52.760 †	241Cf	58.700	263Es	108.600		
253Np	96.490	260Pu	120.900	275Am	193.090	228Bk	52.930	242Cf	58.840	264Es	112.950		
254Np	101.560	261Pu	126.440	276Am	199.430	229Bk	51.630	243Cf	60.680	265Es	115.950		
255Np	105.240	262Pu	130.600	277Am	204.380	230Bk	52.030	244Cf	61.130	266Es	120.520		
256Np	110.540	263Pu	136.350	278Am	210.840	231Bk	50.960	245Cf	63.270	267Es	123.740		
257Np	114.450	264Pu	140.710	279Am	215.950	232Bk	51.600	246Cf	64.030	268Es	128.520		
258Np	119.970	265Pu	146.660			233Bk	50.800	247Cf	66.470	269Es	131.940		
259Np	124.100	266Pu	151.230	215Cm	61.410 †	234Bk	51.710	248Cf	67.530	270Es	136.930		
260Np	129.830	267Pu	157.360	216Cm	58.340 †	235Bk	51.180	249Cf	70.260	271Es	140.550		
261Np	134.180	268Pu	162.130	217Cm	57.010 †	236Bk	52.360	250Cf	71.620	272Es	145.730		
262Np	140.110	269Pu	168.450	218Cm	54.140 ‡	237Bk	52.120	251Cf	74.640	273Es	149.550		
263Np	144.660	270Pu	173.400	219Cm	53.000 ‡	238Bk	53.590	252Cf	76.290	274Es	154.910		
264Np	150.790	271Pu	179.900	220Cm	49.820 ‡	239Bk	53.650	253Cf	79.600	275Es	158.910		
265Np	155.550	272Pu	185.040	221Cm	48.310	240Bk	55.410	254Cf	81.530	276Es	164.450		
266Np	161.870	273Pu	191.720	222Cm	45.250	241Bk	55.780	255Cf	85.100	277Es	168.630		
267Np	166.820	274Pu	197.030	223Cm	47.010	242Bk	57.840	256Cf	87.310	278Es	174.350		
268Np	173.330	275Pu	203.540	224Cm	46.070	243Bk	58.500	257Cf	91.150	279Es	178.630		
269Np	178.470	276Pu	208.680	225Cm	46.620	244Bk	60.860	258Cf	93.610	280Es	184.150		
270Np	185.160	277Pu	215.350	226Cm	45.330	245Bk	61.830	259Cf	97.700	281Es	188.310		
271Np	190.480	278Pu	220.660	227Cm	45.750	246Bk	64.480	260Cf	100.420	282Es	193.990		
272Np	197.360			228Cm	44.680	247Bk	65.760	261Cf	104.750	283Es	198.320		
273Np	202.780	219Am	43.030 †	229Cm	45.310	248Bk	68.700	262Cf	107.710				
274Np	209.490	220Am	41.740 †	230Cm	44.490	249Bk	70.270	263Cf	112.260	227Fm	78.560 †		
275Np	214.830	221Am	38.900 †	231Cm	45.370	250Bk	73.500	264Cf	115.450	228Fm	76.700 †		
276Np	221.710	222Am	40.890 †	232Cm	44.800	251Bk	75.350	265Cf	120.220	229Fm	76.500 ‡		
277Np	227.230	223Am	40.170	233Cm	45.940	252Bk	78.860	266Cf	123.630	230Fm	74.360 ‡		
		224Am	40.970	234Cm	45.650	253Bk	81.000	267Cf	128.610	231Fm	73.840 ‡		
210Pu	49.980 †	225Am	39.920	235Cm	47.070	254Bk	84.770	268Cf	132.230	232Fm	71.860		
211Pu	48.600 †	226Am	40.570	236Cm	47.060	255Bk	87.180	269Cf	137.410	233Fm	71.560		
212Pu	45.690 ‡	227Am	39.740	237Cm	48.760	256Bk	91.220	270Cf	141.230	234Fm	69.820		
213Pu	44.560 ‡	228Am	40.610	238Cm	49.050	257Bk	93.880	271Cf	146.600	235Fm	69.770		
214Pu	41.900 ‡	229Am	40.020	239Cm	51.040	258Bk	98.170	272Cf	150.610	236Fm	68.290		
215Pu	40.980	230Am	41.140	240Cm	51.630	259Bk	101.080	273Cf	156.170	237Fm	68.510		
216Pu	38.530	231Am	40.810	241Cm	53.910	260Bk	105.600	274Cf	160.360	238Fm	67.310		
217Pu	37.750	232Am	42.190	242Cm	54.800	261Bk	108.750	275Cf	166.100	239Fm	67.810		
218Pu	34.990	233Am	42.130	243Cm	57.380	262Bk	113.500	276Cf	170.470	240Fm	66.910		
219Pu	33.930	234Am	43.780	244Cm	58.570	263Bk	116.880	277Cf	176.380	241Fm	67.700		
220Pu	31.320	235Am	44.000	245Cm	61.440	264Bk	121.850	278Cf	180.930	242Fm	67.100		
221Pu	33.540	236Am	45.940	246Cm	62.930	265Bk	125.450	279Cf	186.640	243Fm	68.190		
222Pu	33.050	237Am	46.450	247Cm	66.090	266Bk	130.620	280Cf	191.000	244Fm	67.900		
223Pu	34.130	238Am	48.670	248Cm	67.860	267Bk	134.430	281Cf	196.870	245Fm	69.300		
224Pu	33.320	239Am	49.480	249Cm	71.300	268Bk	139.800	282Cf	201.390	246Fm	69.320		
225Pu	34.220	240Am	51.990	250Cm	73.370	269Bk	143.800			247Fm	71.030		
226Pu	33.630	241Am	53.100	251Cm	77.080	270Bk	149.370	230Es	66.980 †	248Fm	71.360		
227Pu	34.750	242Am	55.900	252Cm	79.420	271Bk	153.570	231Es	65.220 †	249Fm	73.370		
228Pu	34.400	243Am	57.300	253Cm	83.400	272Bk	159.310	232Es	65.150 †	250Fm	74.010		
229Pu	35.770	244Am	60.390	254Cm	86.010	273Bk	163.700	233Es	63.630 †	251Fm	76.310		

Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess	Isotope	Mass Excess
²⁵² Fm	77.260	²⁷⁸ Md	164.810	²⁵⁶ Lr	91.960	²⁸² Rf	161.400	²⁷² Sg	126.100	²⁷⁰ Hs	126.310		
²⁵³ Fm	79.860	²⁸⁰ Md	170.130	²⁵⁷ Lr	92.580	²⁸³ Rf	165.810	²⁷³ Sg	129.250	²⁷¹ Hs	128.560		
²⁵⁴ Fm	81.100	²⁸¹ Md	173.800	²⁵⁸ Lr	94.840	²⁸⁴ Rf	168.880	²⁷⁴ Sg	131.050	²⁷² Hs	129.470		
²⁵⁵ Fm	83.980	²⁸² Md	178.940	²⁵⁹ Lr	95.740	²⁸⁵ Rf	173.450	²⁷⁵ Sg	134.410	²⁷³ Hs	131.960		
²⁵⁶ Fm	85.510	²⁸³ Md	182.730	²⁶⁰ Lr	98.280	²⁸⁶ Rf	176.680	²⁷⁶ Sg	136.430	²⁷⁴ Hs	133.110		
²⁵⁷ Fm	88.670	²⁸⁴ Md	188.020	²⁶¹ Lr	99.460	²⁸⁷ Rf	181.420	²⁷⁷ Sg	140.000	²⁷⁵ Hs	135.830		
²⁵⁸ Fm	90.470	²⁸⁵ Md	191.970	²⁶² Lr	102.270	²⁸⁸ Rf	184.820	²⁷⁸ Sg	142.230	²⁷⁶ Hs	137.210		
²⁵⁹ Fm	93.900			²⁶³ Lr	103.720			²⁷⁹ Sg	146.000	²⁷⁷ Hs	140.150		
²⁶⁰ Fm	95.970	²³³ No	90.400 †	²⁶⁴ Lr	106.790	²⁴⁹ Ha	99.340 †	²⁸⁰ Sg	148.430	²⁷⁸ Hs	141.760		
²⁶¹ Fm	99.650	²³⁴ No	87.980 †	²⁶⁵ Lr	108.500	²⁵⁰ Ha	99.670 †	²⁸¹ Sg	152.400	²⁷⁹ Hs	144.910		
²⁶² Fm	101.970	²³⁵ No	87.240 †	²⁶⁶ Lr	111.810	²⁵¹ Ha	98.650 †	²⁸² Sg	154.950	²⁸⁰ Hs	146.730		
²⁶³ Fm	105.900	²³⁶ No	85.060 ‡	²⁶⁷ Lr	113.760	²⁵² Ha	99.290	²⁸³ Sg	158.820	²⁸¹ Hs	150.090		
²⁶⁴ Fm	108.470	²³⁷ No	84.570 ‡	²⁶⁸ Lr	117.310	²⁵³ Ha	98.580	²⁸⁴ Sg	161.340	²⁸² Hs	151.940		
²⁶⁵ Fm	112.630	²³⁸ No	82.660	²⁶⁹ Lr	119.500	²⁵⁴ Ha	99.540	²⁸⁵ Sg	165.380	²⁸³ Hs	155.250		
²⁶⁶ Fm	115.420	²³⁹ No	82.440	²⁷⁰ Lr	123.270	²⁵⁵ Ha	99.130	²⁸⁶ Sg	168.080	²⁸⁴ Hs	157.220		
²⁶⁷ Fm	119.800	²⁴⁰ No	80.810	²⁷¹ Lr	125.690	²⁵⁶ Ha	100.390	²⁸⁷ Sg	172.280	²⁸⁵ Hs	160.700		
²⁶⁸ Fm	122.820	²⁴¹ No	80.870	²⁷² Lr	129.670	²⁵⁷ Ha	100.290	²⁸⁸ Sg	175.150	²⁸⁶ Hs	162.860		
²⁶⁹ Fm	127.410	²⁴² No	79.540	²⁷³ Lr	132.300	²⁵⁸ Ha	101.840	²⁸⁹ Sg	179.520	²⁸⁷ Hs	166.520		
²⁷⁰ Fm	130.640	²⁴³ No	79.900	²⁷⁴ Lr	136.490	²⁵⁹ Ha	102.040	²⁹⁰ Sg	182.570	²⁸⁸ Hs	168.860		
²⁷¹ Fm	135.430	²⁴⁴ No	78.870	²⁷⁵ Lr	139.330	²⁶⁰ Ha	103.880			²⁸⁹ Hs	172.700		
²⁷² Fm	138.860	²⁴⁵ No	79.530	²⁷⁶ Lr	143.710	²⁶¹ Ha	104.370	²⁵⁵ Ns	112.310 †	²⁹⁰ Hs	175.220		
²⁷³ Fm	143.840	²⁴⁶ No	78.810	²⁷⁷ Lr	146.750	²⁶² Ha	106.480	²⁵⁶ Ns	112.850 †	²⁹¹ Hs	179.240		
²⁷⁴ Fm	147.470	²⁴⁷ No	79.780	²⁷⁸ Lr	151.320	²⁶³ Ha	107.250	²⁵⁷ Ns	112.040 †	²⁹² Hs	181.940		
²⁷⁵ Fm	152.640	²⁴⁸ No	79.380	²⁷⁹ Lr	154.540	²⁶⁴ Ha	109.640	²⁵⁸ Ns	112.870				
²⁷⁶ Fm	156.450	²⁴⁹ No	80.650	²⁸⁰ Lr	159.300	²⁶⁵ Ha	110.680	²⁵⁹ Ns	112.360	²⁶¹ Mt	126.120 †		
²⁷⁷ Fm	161.790	²⁵⁰ No	80.560	²⁸¹ Lr	162.710	²⁶⁶ Ha	113.320	²⁶⁰ Ns	113.490	²⁶² Mt	126.830 †		
²⁷⁸ Fm	165.790	²⁵¹ No	82.150	²⁸² Lr	167.340	²⁶⁷ Ha	114.610	²⁶¹ Ns	113.280	²⁶³ Mt	126.200 †		
²⁷⁹ Fm	171.310	²⁵² No	82.370	²⁸³ Lr	170.590	²⁶⁸ Ha	117.500	²⁶² Ns	114.690	²⁶⁴ Mt	127.190		
²⁸⁰ Fm	175.290	²⁵³ No	84.250	²⁸⁴ Lr	175.350	²⁶⁹ Ha	119.050	²⁶³ Ns	114.770	²⁶⁵ Mt	126.840		
²⁸¹ Fm	180.630	²⁵⁴ No	84.780	²⁸⁵ Lr	178.770	²⁷⁰ Ha	122.170	²⁶⁴ Ns	116.460	²⁶⁶ Mt	128.110		
²⁸² Fm	184.600	²⁵⁵ No	86.960	²⁸⁶ Lr	183.680	²⁷¹ Ha	123.960	²⁶⁵ Ns	116.810	²⁶⁷ Mt	128.040		
²⁸³ Fm	190.090	²⁵⁶ No	87.780	²⁸⁷ Lr	187.260	²⁷² Ha	127.310	²⁶⁶ Ns	118.770	²⁶⁸ Mt	129.570		
²⁸⁴ Fm	194.220	²⁵⁷ No	90.250			²⁷³ Ha	129.320	²⁶⁷ Ns	119.380	²⁶⁹ Mt	129.760		
		²⁵⁸ No	91.370	²³⁹ Rf	101.070 †	²⁷⁴ Ha	132.880	²⁶⁸ Ns	121.600	²⁷⁰ Mt	131.550		
²³⁷ Md	76.040 †	²⁵⁹ No	94.110	²⁴⁰ Rf	98.740 †	²⁷⁵ Ha	135.110	²⁶⁹ Ns	122.480	²⁷¹ Mt	132.000		
²³⁸ Md	76.040 †	²⁶⁰ No	95.510	²⁴¹ Rf	98.100 ‡	²⁷⁶ Ha	138.890	²⁷⁰ Ns	124.940	²⁷² Mt	134.040		
²³⁹ Md	74.620 †	²⁶¹ No	98.520	²⁴² Rf	96.050 ‡	²⁷⁷ Ha	141.320	²⁷¹ Ns	126.060	²⁷³ Mt	134.740		
²⁴⁰ Md	74.900	²⁶² No	100.180	²⁴³ Rf	95.690 ‡	²⁷⁸ Ha	145.290	²⁷² Ns	128.770	²⁷⁴ Mt	137.010		
²⁴¹ Md	73.770	²⁶³ No	103.460	²⁴⁴ Rf	93.940	²⁷⁹ Ha	147.930	²⁷³ Ns	130.130	²⁷⁵ Mt	137.950		
²⁴² Md	74.350	²⁶⁴ No	105.370	²⁴⁵ Rf	93.880	²⁸⁰ Ha	152.100	²⁷⁴ Ns	133.060	²⁷⁶ Mt	140.450		
²⁴³ Md	73.530	²⁶⁵ No	108.890	²⁴⁶ Rf	92.430	²⁸¹ Ha	154.930	²⁷⁵ Ns	134.650	²⁷⁷ Mt	141.620		
²⁴⁴ Md	74.400	²⁶⁶ No	111.060	²⁴⁷ Rf	92.670	²⁸² Ha	159.170	²⁷⁶ Ns	137.800	²⁷⁸ Mt	144.350		
²⁴⁵ Md	73.890	²⁶⁷ No	114.810	²⁴⁸ Rf	91.540	²⁸³ Ha	161.890	²⁷⁷ Ns	139.610	²⁷⁹ Mt	145.740		
²⁴⁶ Md	75.070	²⁶⁸ No	117.210	²⁴⁹ Rf	92.090	²⁸⁴ Ha	166.110	²⁷⁸ Ns	142.970	²⁸⁰ Mt	148.680		
²⁴⁷ Md	74.880	²⁶⁹ No	121.180	²⁵⁰ Rf	91.270	²⁸⁵ Ha	168.990	²⁷⁹ Ns	144.990	²⁸¹ Mt	150.230		
²⁴⁸ Md	76.370	²⁷⁰ No	123.800	²⁵¹ Rf	92.130	²⁸⁶ Ha	173.380	²⁸⁰ Ns	148.560	²⁸² Mt	153.150		
²⁴⁹ Md	76.490	²⁷¹ No	127.990	²⁵² Rf	91.620	²⁸⁷ Ha	176.430	²⁸¹ Ns	150.790	²⁸³ Mt	154.740		
²⁵⁰ Md	78.280	²⁷² No	130.830	²⁵³ Rf	92.780	²⁸⁸ Ha	180.980	²⁸² Ns	154.450	²⁸⁴ Mt	157.850		
²⁵¹ Md	78.710	²⁷³ No	135.220	²⁵⁴ Rf	92.590	²⁸⁹ Ha	184.190	²⁸³ Ns	156.600	²⁸⁵ Mt	159.630		
²⁵² Md	80.800	²⁷⁴ No	138.250	²⁵⁵ Rf	94.050			²⁸⁴ Ns	160.280	²⁸⁶ Mt	162.930		
²⁵³ Md	81.540	²⁷⁵ No	142.840	²⁵⁶ Rf	94.170	²⁴⁶ Sg	110.070 †	²⁸⁵ Ns	162.610	²⁸⁷ Mt	164.900		
²⁵⁴ Md	83.930	²⁷⁶ No	146.070	²⁵⁷ Rf	95.930	²⁴⁷ Sg	109.600 †	²⁸⁶ Ns	166.460	²⁸⁸ Mt	168.380		
²⁵⁵ Md	84.960	²⁷⁷ No	150.850	²⁵⁸ Rf	96.340	²⁴⁸ Sg	107.750 ‡	²⁸⁷ Ns	168.980	²⁸⁹ Mt	170.540		
²⁵⁶ Md	87.630	²⁷⁸ No	154.270	²⁵⁹ Rf	98.380	²⁴⁹ Sg	107.580 ‡	²⁸⁸ Ns	173.000	²⁹⁰ Mt	174.200		
²⁵⁷ Md	88.950	²⁷⁹ No	159.220	²⁶⁰ Rf	99.080	²⁵⁰ Sg	106.040	²⁸⁹ Ns	175.690	²⁹¹ Mt	176.550		
²⁵⁸ Md	91.910	²⁸⁰ No	162.830	²⁶¹ Rf	101.410	²⁵¹ Sg	106.180	²⁹⁰ Ns	179.880	²⁹² Mt	180.400		
²⁵⁹ Md	93.500	²⁸¹ No	167.840	²⁶² Rf	102.390	²⁵² Sg	104.950	²⁹¹ Ns	182.760	²⁹³ Mt	182.930		
²⁶⁰ Md	96.720	²⁸² No	171.280	²⁶³ Rf	104.990	²⁵³ Sg	105.390						
²⁶¹ Md	98.590	²⁸³ No	176.230	²⁶⁴ Rf	106.240	²⁵⁴ Sg	104.480	²⁵² Hs	122.240 †	²⁵⁸ 110	135.250 †		
²⁶² Md	102.060	²⁸⁴ No	179.830	²⁶⁵ Rf	109.090	²⁵⁵ Sg	105.220	²⁵³ Hs	121.970 †	²⁵⁹ 110	135.170 †		
²⁶³ Md	104.180	²⁸⁵ No	184.940	²⁶⁶ Rf	110.600	²⁵⁶ Sg	104.620	²⁵⁴ Hs	120.340 ‡	²⁶⁰ 110	133.760 ‡		
²⁶⁴ Md	107.910	²⁸⁶ No	188.700	²⁶⁷ Rf	113.700	²⁵⁷ Sg	105.670	²⁵⁵ Hs	120.370 ‡	²⁶¹ 110	133.970 ‡		
²⁶⁵ Md	110.270			²⁶⁸ Rf	115.450	²⁵⁸ Sg	105.360	²⁵⁶ Hs	119.060	²⁶² 110	132.850		
²⁶⁶ Md	114.230	²⁴³ Lr	87.290 †	²⁶⁹ Rf	118.790	²⁵⁹ Sg	106.700	²⁵⁷ Hs	119.390	²⁶³ 110	133.350		
²⁶⁷ Md	116.820	²⁴⁴ Lr	87.440 †	²⁷⁰ Rf	120.780	²⁶⁰ Sg	106.700	²⁵⁸ Hs	118.380	²⁶⁴ 110	132.520		
²⁶⁸ Md	121.000	²⁴⁵ Lr	86.200 †	²⁷¹ Rf	124.340	²⁶¹ Sg	108.330	²⁵⁹ Hs	119.010	²⁶⁵ 110	133.300		
²⁶⁹ Md	123.820	²⁴⁶ Lr	86.640	²⁷² Rf	126.560	²⁶² Sg	108.610	²⁶⁰ Hs	118.290	²⁶⁶ 110	132.740		
²⁷⁰ Md	128.210	²⁴⁷ Lr	85.720	²⁷³ Rf	126.560	²⁶³ Sg	110.510	²⁶¹ Hs	119.210	²⁶⁷ 110	133.800		
²⁷¹ Md	131.240	²⁴⁸ Lr	86.470	²⁷⁴ Rf	130.340	²⁶⁴ Sg	111.080	²⁶² Hs	118.790	²⁶⁸ 110	133.520		
²⁷² Md	135.830	²⁴⁹ Lr	85.860	²⁷⁵ Rf	132.770	²⁶⁵ Sg	113.250	²⁶³ Hs	120.000	²⁶⁹ 110	134.830		
²⁷³ Md	139.070	²⁵⁰ Lr	86.920	²⁷⁶ Rf	136.750	²⁶⁶ Sg	114.080	²⁶⁴ Hs	119.860	²⁷⁰ 110	134.820		
²⁷⁴ Md	143.850	²⁵¹ Lr	86.620	²⁷⁷ Rf	143.570	²⁶⁷ Sg	116.510	²⁶⁵ Hs	121.340	²⁷¹ 110	136.390		
²⁷⁵ Md	147.280	²⁵² Lr	87.990	²⁷⁸ Rf	146.410	²⁶⁸ Sg	117.600	²⁶⁶ Hs	121.480	²⁷² 110	136.630		
²⁷⁶ Md	152.250	²⁵³ Lr	88.000	²⁷⁹ Rf	150.780	²⁶⁹ Sg	120.280	²⁶⁷ Hs	123.23				

Isotope	Mass Excess	Isotope	Mass Excess
²⁷⁶ ₁₁₀	141.730	²⁸⁸ ₁₁₂	166.270
²⁷⁷ ₁₁₀	144.020	²⁸⁹ ₁₁₂	169.020
²⁷⁸ ₁₁₀	144.980	²⁹⁰ ₁₁₂	170.460
²⁷⁹ ₁₁₀	147.500	²⁹¹ ₁₁₂	173.420
²⁸⁰ ₁₁₀	148.630	²⁹² ₁₁₂	175.070
²⁸¹ ₁₁₀	151.160	²⁹³ ₁₁₂	178.220
²⁸² ₁₁₀	152.360	²⁹⁴ ₁₁₂	180.080
²⁸³ ₁₁₀	155.090	²⁹⁵ ₁₁₂	183.450
²⁸⁴ ₁₁₀	156.490	²⁹⁶ ₁₁₂	185.510
²⁸⁵ ₁₁₀	159.410	²⁷¹ ₁₁₃	155.080 †
²⁸⁶ ₁₁₀	161.000	²⁷² ₁₁₃	155.740 †
²⁸⁷ ₁₁₀	164.110	²⁷³ ₁₁₃	154.990 †
²⁸⁸ ₁₁₀	165.910	²⁷⁴ ₁₁₃	155.820
²⁸⁹ ₁₁₀	169.210	²⁷⁵ ₁₁₃	155.320
²⁹⁰ ₁₁₀	171.190	²⁷⁶ ₁₁₃	156.380
²⁹¹ ₁₁₀	174.690	²⁷⁷ ₁₁₃	156.110
²⁹² ₁₁₀	176.870	²⁷⁸ ₁₁₃	157.390
²⁹³ ₁₁₀	180.550	²⁷⁹ ₁₁₃	157.350
²⁹⁴ ₁₁₀	182.930	²⁸⁰ ₁₁₃	158.860
²⁶⁷ ₁₁₁	140.490 †	²⁸¹ ₁₁₃	159.040
²⁶⁸ ₁₁₁	141.330 †	²⁸² ₁₁₃	160.770
²⁶⁹ ₁₁₁	140.840 †	²⁸³ ₁₁₃	161.170
²⁷⁰ ₁₁₁	141.940	²⁸⁴ ₁₁₃	163.110
²⁷¹ ₁₁₁	141.710	²⁸⁵ ₁₁₃	163.740
²⁷² ₁₁₁	143.070	²⁸⁶ ₁₁₃	165.890
²⁷³ ₁₁₁	143.090	²⁸⁷ ₁₁₃	166.730
²⁷⁴ ₁₁₁	144.690	²⁸⁸ ₁₁₃	169.090
²⁷⁵ ₁₁₁	144.970	²⁸⁹ ₁₁₃	170.150
²⁷⁶ ₁₁₁	146.810	²⁹⁰ ₁₁₃	172.730
²⁷⁷ ₁₁₁	147.330	²⁹¹ ₁₁₃	174.000
²⁷⁸ ₁₁₁	149.410	²⁹² ₁₁₃	176.780
²⁷⁹ ₁₁₁	150.030	²⁹³ ₁₁₃	178.270
²⁸⁰ ₁₁₁	152.150	²⁹⁴ ₁₁₃	181.270
²⁸¹ ₁₁₁	152.950	²⁹⁵ ₁₁₃	182.970
²⁸² ₁₁₁	155.280	²⁹⁶ ₁₁₃	186.180
²⁸³ ₁₁₁	156.280	²⁹⁷ ₁₁₃	188.100
²⁸⁴ ₁₁₁	158.810	²⁶⁷ ₁₁₄	165.730 †
²⁸⁵ ₁₁₁	160.020	²⁶⁸ ₁₁₄	164.040 †
²⁸⁶ ₁₁₁	162.750	²⁶⁹ ₁₁₄	163.930 ‡
²⁸⁷ ₁₁₁	164.160	²⁷⁰ ₁₁₄	162.490 ‡
²⁸⁸ ₁₁₁	167.090	²⁷¹ ₁₁₄	162.630 ‡
²⁸⁹ ₁₁₁	168.700	²⁷² ₁₁₄	161.440
²⁹⁰ ₁₁₁	171.830	²⁷³ ₁₁₄	161.830
²⁹¹ ₁₁₁	173.640	²⁷⁴ ₁₁₄	160.880
²⁹² ₁₁₁	176.960	²⁷⁵ ₁₁₄	161.500
²⁹³ ₁₁₁	178.980	²⁷⁶ ₁₁₄	160.790
²⁹⁴ ₁₁₁	182.500	²⁷⁷ ₁₁₄	161.650
²⁹⁵ ₁₁₁	184.720	²⁷⁸ ₁₁₄	161.180
²⁶² ₁₁₂	150.640 †	²⁷⁹ ₁₁₄	162.260
²⁶³ ₁₁₂	150.440 †	²⁸⁰ ₁₁₄	162.020
²⁶⁴ ₁₁₂	148.910 †	²⁸¹ ₁₁₄	163.330
²⁶⁵ ₁₁₂	148.990 ‡	²⁸² ₁₁₄	163.320
²⁶⁶ ₁₁₂	147.740 ‡	²⁸³ ₁₁₄	164.850
²⁶⁷ ₁₁₂	148.100 ‡	²⁸⁴ ₁₁₄	165.070
²⁶⁸ ₁₁₂	147.130	²⁸⁵ ₁₁₄	166.820
²⁶⁹ ₁₁₂	147.760	²⁸⁶ ₁₁₄	167.260
²⁷⁰ ₁₁₂	147.050	²⁸⁷ ₁₁₄	169.240
²⁷¹ ₁₁₂	147.940	²⁸⁸ ₁₁₄	169.900
²⁷² ₁₁₂	147.500	²⁸⁹ ₁₁₄	172.090
²⁷³ ₁₁₂	148.650	²⁹⁰ ₁₁₄	172.970
²⁷⁴ ₁₁₂	148.460	²⁹¹ ₁₁₄	175.380
²⁷⁵ ₁₁₂	149.850	²⁹² ₁₁₄	176.490
²⁷⁶ ₁₁₂	149.910	²⁹³ ₁₁₄	179.110
²⁷⁷ ₁₁₂	151.400	²⁹⁴ ₁₁₄	180.450
²⁷⁸ ₁₁₂	151.560	²⁹⁵ ₁₁₄	183.290
²⁷⁹ ₁₁₂	153.270	²⁹⁶ ₁₁₄	184.850
²⁸⁰ ₁₁₂	153.650	²⁹⁷ ₁₁₄	187.910
²⁸¹ ₁₁₂	155.580	²⁹⁸ ₁₁₄	189.690
²⁸² ₁₁₂	156.170		
²⁸³ ₁₁₂	158.310		
²⁸⁴ ₁₁₂	159.120		
²⁸⁵ ₁₁₂	161.460		
²⁸⁶ ₁₁₂	162.490		
²⁸⁷ ₁₁₂	165.040		