

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	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	-54.300		
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			¹²⁸ Pm	-50.930	¹³² Sm	-57.210	¹⁴⁰ Eu	-67.530		
¹⁷⁸ La	89.680	¹⁸² Ce	96.400	¹¹⁹ Nd	-16.970 †	¹²⁹ Pm	-55.570	¹³³ Sm	-59.170	¹⁴¹ Eu	-70.560		
¹⁷⁹ La	95.280	¹⁸³ Ce	103.770	¹²⁰ Nd	-26.460 ‡	¹³⁰ Pm	-57.780	¹³⁴ Sm	-62.960	¹⁴² Eu	-71.470		
¹⁸⁰ La	102.760	¹⁸⁴ Ce	109.440	¹²¹ Nd	-31.140	¹³¹ Pm	-61.810	¹³⁵ Sm	-64.450	¹⁴³ Eu	-74.420		
¹⁸¹ La	108.530	¹⁸⁵ Ce	120.760 †	¹²² Nd	-37.620	¹³² Pm	-63.480	¹³⁶ Sm	-67.810	¹⁴⁴ Eu	-75.990		
¹⁸² La	116.180	¹⁸⁶ Ce	129.060 †	¹²³ Nd	-41.550	¹³³ Pm	-67.000	¹³⁷ Sm	-68.930	¹⁴⁵ Eu	-79.530		
¹⁸³ La	122.130			¹²⁴ Nd	-47.270	¹³⁴ Pm	-68.210	¹³⁸ Sm	-71.940	¹⁴⁶ Eu	-76.330		
¹⁸⁴ La	133.700 †	¹²⁰ Pr	-37.580 †	¹²⁵ Nd	-50.470	¹³⁵ Pm	-71.300	¹³⁹ Sm	-72.770	¹⁴⁷ Eu	-76.560		
¹⁸⁵ La	142.220 †	¹²¹ Pr	-43.690 †	¹²⁶ Nd	-55.460	¹³⁶ Pm	-72.150	¹⁴⁰ Sm	-75.520	¹⁴⁸ Eu	-75.440		
		¹²² Pr	-47.250 †	¹²⁷ Nd	-57.980	¹³⁷ Pm	-74.890	¹⁴¹ Sm	-76.140	¹⁴⁹ Eu	-76.210		
¹¹⁵ Ce	-21.340 †	¹²³ Pr	-52.620	¹²⁸ Nd	-62.310	¹³⁸ Pm	-75.450	¹⁴² Sm	-78.860	¹⁵⁰ Eu	-74.890		
¹¹⁶ Ce	-30.770 ‡	¹²⁴ Pr	-55.480	¹²⁹ Nd	-64.220	¹³⁹ Pm	-77.930	¹⁴³ Sm	-80.120	¹⁵¹ Eu	-75.390		
¹¹⁷ Ce	-35.340	¹²⁵ Pr	-60.150	¹³⁰ Nd	-67.960	¹⁴⁰ Pm	-78.260	¹⁴⁴ Sm	-83.350	¹			

Isotope	Mass Excess	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											

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		
		²³⁵ Os	181.210 †	²⁴⁰ Ir	202.650 †	²³⁸ Pt	168.610	²⁴³ Au	189.510	²⁴⁰ Hg	151.110		
¹⁶⁰ Os	-5.540 †	²³⁶ Os	188.110	¹⁶⁴ Pt	5.010 †	²³⁹ Pt	176.730 †	²⁴⁴ Au	197.820 †	²⁴¹ Hg	158.790		
¹⁶¹ Os	-7.730 ‡	²³⁷ Os	196.670 †	¹⁶⁵ Pt	2.420 †	²⁴⁰ Pt	183.400	²⁴⁵ Au	204.700	²⁴² Hg	165.030		
¹⁶² Os	-11.730 ‡			¹⁶⁶ Pt	-1.930 ‡	²⁴¹ Pt	191.730 †	²⁴⁶ Au	213.210 †	²⁴³ Hg	172.910		
¹⁶³ Os	-13.730 ‡	¹⁶⁸ Ir	-17.690 †	¹⁶⁷ Pt	-4.270 ‡	²⁴² Pt	198.610	¹⁶⁹ Hg	12.420 †	²⁴⁴ Hg	179.360		
¹⁶⁴ Os	-17.730	¹⁶⁹ Ir	-21.500 †	¹⁶⁸ Pt	-8.590 ‡	²⁴³ Pt	207.130 †	¹⁷⁰ Hg	7.800 †	²⁴⁵ Hg	187.310		
¹⁶⁵ Os	-19.970	¹⁷⁰ Ir	-23.270 †	¹⁶⁹ Pt	-11.000 ‡			¹⁷¹ Hg	5.170 ‡	²⁴⁶ Hg	193.830		
¹⁶⁶ Os	-23.890	¹⁷¹ Ir	-26.680	¹⁷⁰ Pt	-15.070	¹⁷⁴ Au	-14.490 †	¹⁷² Hg	0.860 ‡	²⁴⁷ Hg	201.970 †		
¹⁶⁷ Os	-25.770	¹⁷² Ir	-28.050	¹⁷¹ Pt	-17.100	¹⁷⁵ Au	-18.020 †	¹⁷³ Hg	-1.600 ‡	²⁴⁸ Hg	208.680		
¹⁶⁸ Os	-29.320	¹⁷³ Ir	-31.050	¹⁷² Pt	-20.770	¹⁷⁶ Au	-19.530 †	¹⁷⁴ Hg	-5.790 ‡	²⁴⁹ Hg	217.020 †		
¹⁶⁹ Os	-30.810	¹⁷⁴ Ir	-32.030	¹⁷³ Pt	-22.410	¹⁷⁷ Au	-22.650	¹⁷⁵ Hg	-7.960	²⁵⁰ Hg	223.930		
¹⁷⁰ Os	-33.960	¹⁷⁵ Ir	-34.620	¹⁷⁴ Pt	-25.670	¹⁷⁸ Au	-23.770	¹⁷⁶ Hg	-11.740	²⁵¹ Hg	232.450 †		
¹⁷¹ Os	-35.060	¹⁷⁶ Ir	-35.200	¹⁷⁵ Pt	-26.910	¹⁷⁹ Au	-26.490	¹⁷⁷ Hg	-13.520				
¹⁷² Os	-37.800	¹⁷⁷ Ir	-37.380	¹⁷⁶ Pt	-29.760	¹⁸⁰ Au	-27.220	¹⁷⁸ Hg	-16.900	¹⁷⁹ Tl	-8.930 †		
¹⁷³ Os	-38.500	¹⁷⁸ Ir	-37.570	¹⁷⁷ Pt	-30.610	¹⁸¹ Au	-29.550	¹⁷⁹ Hg	-18.280	¹⁸⁰ Tl	-10.590 †		
¹⁷⁴ Os	-40.820	¹⁷⁹ Ir	-39.360	¹⁷⁸ Pt	-33.060	¹⁸² Au	-29.910	¹⁸⁰ Hg	-21.270	¹⁸¹ Tl	-13.850 †		
¹⁷⁵ Os	-41.130	¹⁸⁰ Ir	-39.170	¹⁷⁹ Pt	-33.520	¹⁸³ Au	-31.860	¹⁸¹ Hg	-22.270	¹⁸² Tl	-15.120		
¹⁷⁶ Os	-43.040	¹⁸¹ Ir	-40.580	¹⁸⁰ Pt	-35.580	¹⁸⁴ Au	-31.860	¹⁸² Hg	-24.870	¹⁸³ Tl	-18.900		
¹⁷⁷ Os	-42.950	¹⁸² Ir	-40.030	¹⁸¹ Pt	-35.660	¹⁸⁵ Au	-33.460	¹⁸³ Hg	-25.500	¹⁸⁴ Tl	-18.900		
¹⁷⁸ Os	-44.470	¹⁸³ Ir	-41.070	¹⁸² Pt	-37.340	¹⁸⁶ Au	-33.120	¹⁸⁴ Hg	-27.730	¹⁸⁵ Tl	-21.400		
¹⁷⁹ Os	-44.000	¹⁸⁴ Ir	-40.180	¹⁸³ Pt	-37.060	¹⁸⁷ Au	-34.370	¹⁸⁵ Hg	-28.000	¹⁸⁶ Tl	-21.950		
¹⁸⁰ Os	-45.140	¹⁸⁵ Ir	-40.880	¹⁸⁴ Pt	-38.380	¹⁸⁸ Au	-33.700	¹⁸⁶ Hg	-29.860	¹⁸⁷ Tl	-24.090		
¹⁸¹ Os	-44.300	¹⁸⁶ Ir	-39.660	¹⁸⁵ Pt	-37.750	¹⁸⁹ Au	-34.620	¹⁸⁷ Hg	-29.800	¹⁸⁸ Tl	-24.330		
¹⁸² Os	-45.070	¹⁸⁷ Ir	-40.040	¹⁸⁶ Pt	-38.730	¹⁹⁰ Au	-33.640	¹⁸⁸ Hg	-31.320	¹⁸⁹ Tl	-26.260		
¹⁸³ Os	-43.900	¹⁸⁸ Ir	-38.510	¹⁸⁷ Pt	-37.780	¹⁹¹ Au	-34.260	¹⁸⁹ Hg	-30.920	¹⁹⁰ Tl	-26.300		
¹⁸⁴ Os	-44.330	¹⁸⁹ Ir	-38.590	¹⁸⁸ Pt	-38.430	¹⁹² Au	-32.990	¹⁹⁰ Hg	-32.110	¹⁹¹ Tl	-27.930		
¹⁸⁵ Os	-42.820	¹⁹⁰ Ir	-36.770	¹⁸⁹ Pt	-37.180	¹⁹³ Au	-33.500	¹⁹¹ Hg	-31.470	¹⁹² Tl	-27.690		
¹⁸⁶ Os	-42.930	¹⁹¹ Ir	-36.560	¹⁹⁰ Pt	-37.520	¹⁹⁴ Au	-32.220	¹⁹² Hg	-32.560	¹⁹³ Tl	-29.040		
¹⁸⁷ Os	-41.120	¹⁹² Ir	-34.480	¹⁹¹ Pt	-35.970	¹⁹⁵ Au	-32.550	¹⁹³ Hg	-31.790	¹⁹⁴ Tl	-28.520		
¹⁸⁸ Os	-40.930	¹⁹³ Ir	-34.000	¹⁹² Pt	-36.030	¹⁹⁶ Au	-31.030	¹⁹⁴ Hg	-32.610	¹⁹⁵ Tl	-29.590		
¹⁸⁹ Os	-38.840	¹⁹⁴ Ir	-31.780	¹⁹³ Pt	-34.210	¹⁹⁷ Au	-31.110	¹⁹⁵ Hg	-31.580	¹⁹⁶ Tl	-28.810		
¹⁹⁰ Os	-38.360	¹⁹⁵ Ir	-31.390	¹⁹⁴ Pt	-34.240	¹⁹⁸ Au	-29.360	¹⁹⁶ Hg	-32.140	¹⁹⁷ Tl	-29.600		
¹⁹¹ Os	-36.010	¹⁹⁶ Ir	-29.180	¹⁹⁵ Pt	-32.480	¹⁹⁹ Au	-29.200	¹⁹⁷ Hg	-30.860	¹⁹⁸ Tl	-28.560		
¹⁹² Os	-35.270	¹⁹⁷ Ir	-28.570	¹⁹⁶ Pt	-32.330	²⁰⁰ Au	-27.230	¹⁹⁸ Hg	-31.170	¹⁹⁹ Tl	-29.090		
¹⁹³ Os	-32.670	¹⁹⁸ Ir	-26.150	¹⁹⁷ Pt	-30.350	²⁰¹ Au	-26.830	¹⁹⁹ Hg	-29.640	²⁰⁰ Tl	-27.800		
¹⁹⁴ Os	-31.730	¹⁹⁹ Ir	-25.340	¹⁹⁸ Pt	-29.960	²⁰² Au	-24.630	²⁰⁰ Hg	-29.700	²⁰¹ Tl	-28.070		
¹⁹⁵ Os	-29.270	²⁰⁰ Ir	-22.720	¹⁹⁹ Pt	-27.770	²⁰³ Au	-24.010	²⁰¹ Hg	-27.940	²⁰² Tl	-26.520		
¹⁹⁶ Os	-28.440	²⁰¹ Ir	-21.690	²⁰⁰ Pt	-27.160	²⁰⁴ Au	-21.580	²⁰² Hg	-27.750	²⁰³ Tl	-26.530		
¹⁹⁷ Os	-25.790	²⁰² Ir	-18.870	²⁰¹ Pt	-24.750	²⁰⁵ Au	-20.720	²⁰³ Hg	-25.750	²⁰⁴ Tl	-24.720		
¹⁹⁸ Os	-24.750	²⁰³ Ir	-17.640	²⁰² Pt	-23.930	²⁰⁶ Au	-14.460	²⁰⁴ Hg	-25.310	²⁰⁵ Tl	-24.470		
¹⁹⁹ Os	-21.910	²⁰⁴ Ir	-10.910	²⁰³ Pt	-21.310	²⁰⁷ Au	-11.430	²⁰⁵ Hg	-23.070	²⁰⁶ Tl	-22.410		
²⁰⁰ Os	-20.680	²⁰⁵ Ir	-7.350	²⁰⁴ Pt	-20.260	²⁰⁸ Au	-6.660	²⁰⁶ Hg	-22.380	²⁰⁷ Tl	-21.890		
²⁰¹ Os	-17.650	²⁰⁶ Ir	-2.040	²⁰⁵ Pt	-13.760	²⁰⁹ Au	-3.470	²⁰⁷ Hg	-16.350	²⁰⁸ Tl	-16.090		
²⁰² Os	-16.220	²⁰⁷ Ir	1.680	²⁰⁶ Pt	-10.470	²¹⁰ Au	1.460	²⁰⁸ Hg	-13.590	²⁰⁹ Tl	-13.620		
²⁰³ Os	-9.260	²⁰⁸ Ir	7.150	²⁰⁷ Pt	-5.420	²¹¹ Au	4.830	²⁰⁹ Hg	-9.090	²¹⁰ Tl	-9.390		
²⁰⁴ Os	-5.430	²⁰⁹ Ir	11.030	²⁰⁸ Pt	-1.960	²¹² Au	9.940	²¹⁰ Hg	-6.170	²¹¹ Tl	-6.740		
²⁰⁵ Os	0.150	²¹⁰ Ir	16.660	²⁰⁹ Pt	3.240	²¹³ Au							

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	28.870
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
²²³ Np	28.750	²³⁰ Pu	35.670	²⁴⁵ Am	62.080	²⁵⁵ Cm	90.250	²⁷⁴ Bk	169.620	²³⁴ Es	63.800		
²²⁴ Np	29.890	²³¹ Pu	37.300	²⁴⁶ Am	65.460	²⁵⁶ Cm	93.110	²⁷⁵ Bk	174.190	²³⁵ Es	62.550		
²²⁵ Np	29.540	²³² Pu	37.470	²⁴⁷ Am	67.440	²⁵⁷ Cm	97.590	²⁷⁶ Bk	180.290	²³⁶ Es	62.990		
²²⁶ Np	30.900	²³³ Pu	39.360	²⁴⁸ Am	71.090	²⁵⁸ Cm	100.700	²⁷⁷ Bk	185.030	²³⁷ Es	62.010		
²²⁷ Np	30.790	²³⁴ Pu	39.820	²⁴⁹ Am	73.360	²⁵⁹ Cm	105.420	²⁷⁸ Bk	190.980	²³⁸ Es	62.730		
²²⁸ Np	32.400	²³⁵ Pu	41.990	²⁵⁰ Am	77.280	²⁶⁰ Cm	108.770	²⁷⁹ Bk	195.530	²³⁹ Es	62.050		
²²⁹ Np	32.550	²³⁶ Pu	42.740	²⁵¹ Am	79.810	²⁶¹ Cm	113.710	²⁸⁰ Bk	201.600	²⁴⁰ Es	63.060		
²³⁰ Np	34.410	²³⁷ Pu	45.190	²⁵² Am	84.000	²⁶² Cm	117.280	²⁸¹ Bk	206.310	²⁴¹ Es	62.670		
²³¹ Np	34.830	²³⁸ Pu	46.230	²⁵³ Am	86.800	²⁶³ Cm	122.450			²⁴² Es	63.990		
²³² Np	36.960	²³⁹ Pu	48.970	²⁵⁴ Am	91.240	²⁶⁴ Cm	126.230	²²¹ Cf	69.800 †	²⁴³ Es	63.910		
²³³ Np	37.650	²⁴⁰ Pu	50.300	²⁵⁵ Am	94.290	²⁶⁵ Cm	131.600	²²² Cf	66.170 †	²⁴⁴ Es	65.530		
²³⁴ Np	40.050	²⁴¹ Pu	53.320	²⁵⁶ Am	98.970	²⁶⁶ Cm	135.600	²²³ Cf	64.210 †	²⁴⁵ Es	65.760		
²³⁵ Np	41.030	²⁴² Pu	54.950	²⁵⁷ Am	102.270	²⁶⁷ Cm	141.160	²²⁴ Cf	60.710 ‡	²⁴⁶ Es	67.680		
²³⁶ Np	43.710	²⁴³ Pu	58.250	²⁵⁸ Am	107.180	²⁶⁸ Cm	145.360	²²⁵ Cf	62.020 ‡	²⁴⁷ Es	68.220		
²³⁷ Np	44.980	²⁴⁴ Pu	60.160	²⁵⁹ Am	110.720	²⁶⁹ Cm	151.110	²²⁶ Cf	60.610	²⁴⁸ Es	70.440		
²³⁸ Np	47.940	²⁴⁵ Pu	63.750	²⁶⁰ Am	115.850	²⁷⁰ Cm	155.500	²²⁷ Cf	60.760	²⁴⁹ Es	71.290		
²³⁹ Np	49.490	²⁴⁶ Pu	65.950	²⁶¹ Am	119.610	²⁷¹ Cm	161.440	²²⁸ Cf	59.010	²⁵⁰ Es	73.810		
²⁴⁰ Np	52.740	²⁴⁷ Pu	69.810	²⁶² Am	124.960	²⁷² Cm	166.010	²²⁹ Cf	58.950	²⁵¹ Es	74.960		
²⁴¹ Np	54.580	²⁴⁸ Pu	72.280	²⁶³ Am	128.940	²⁷³ Cm	172.130	²³⁰ Cf	57.420	²⁵² Es	77.770		
²⁴² Np	58.100	²⁴⁹ Pu	76.410	²⁶⁴ Am	134.490	²⁷⁴ Cm	176.890	²³¹ Cf	57.580	²⁵³ Es	79.210		
²⁴³ Np	60.220	²⁵⁰ Pu	79.140	²⁶⁵ Am	138.670	²⁷⁵ Cm	183.180	²³² Cf	56.290	²⁵⁴ Es	82.310		
²⁴⁴ Np	64.020	²⁵¹ Pu	83.530	²⁶⁶ Am	144.430	²⁷⁶ Cm	188.120	²³³ Cf	56.700	²⁵⁵ Es	84.030		
²⁴⁵ Np	66.420	²⁵² Pu	86.530	²⁶⁷ Am	148.810	²⁷⁷ Cm	194.290	²³⁴ Cf	55.670	²⁵⁶ Es	87.400		
²⁴⁶ Np	70.490	²⁵³ Pu	91.170	²⁶⁸ Am	154.750	²⁷⁸ Cm	199.030	²³⁵ Cf	56.340	²⁵⁷ Es	89.410		
²⁴⁷ Np	73.170	²⁵⁴ Pu	94.420	²⁶⁹ Am	159.330	²⁷⁹ Cm	205.300	²³⁶ Cf	55.590	²⁵⁸ Es	93.040		
²⁴⁸ Np	77.500	²⁵⁵ Pu	99.290	²⁷⁰ Am	165.460	²⁸⁰ Cm	210.210	²³⁷ Cf	56.540	²⁵⁹ Es	95.300		
²⁴⁹ Np	80.440	²⁵⁶ Pu	102.790	²⁷¹ Am	170.220	²²⁵ Bk	53.950 †	²³⁸ Cf	56.080	²⁶⁰ Es	99.190		
²⁵⁰ Np	85.020	²⁵⁷ Pu	107.890	²⁷² Am	176.530	²²⁶ Bk	54.280 †	²³⁹ Cf	57.320	²⁶¹ Es	101.710		
²⁵¹ Np	88.210	²⁵⁸ Pu	111.620	²⁷³ Am	181.470	²²⁷ Bk	52.760 †	²⁴⁰ Cf	57.160	²⁶² Es	105.840		
²⁵² Np	93.050	²⁵⁹ Pu	116.950	²⁷⁴ Am	187.960	²²⁸ Bk	52.930	²⁴¹ Cf	58.700	²⁶³ Es	108.600		
²⁵³ Np	96.490	²⁶⁰ Pu	120.900	²⁷⁵ Am	193.090	²²⁹ Bk	51.630	²⁴² Cf	58.840	²⁶⁴ Es	112.950		
²⁵⁴ Np	101.560	²⁶¹ Pu	126.440	²⁷⁶ Am	199.430	²³⁰ Bk	52.030	²⁴³ Cf	60.680	²⁶⁵ Es	115.950		
²⁵⁵ Np	105.240	²⁶² Pu	130.600	²⁷⁷ Am	204.380	²³¹ Bk	50.960	²⁴⁴ Cf	61.130	²⁶⁶ Es	120.520		
²⁵⁶ Np	110.540	²⁶³ Pu	136.350	²⁷⁸ Am	210.840	²³² Bk	51.600	²⁴⁵ Cf	63.270	²⁶⁷ Es	123.740		
²⁵⁷ Np	114.450	²⁶⁴ Pu	140.710	²⁷⁹ Am	215.950	²³³ Bk	50.800	²⁴⁶ Cf	64.030	²⁶⁸ Es	128.520		
²⁵⁸ Np	119.970	²⁶⁵ Pu	146.660			²³⁴ Bk	51.710	²⁴⁷ Cf	66.470	²⁶⁹ Es	131.940		
²⁵⁹ Np	124.100	²⁶⁶ Pu	151.230	²¹⁵ Cm	61.410 †	²³⁵ Bk	51.180	²⁴⁸ Cf	67.530	²⁷⁰ Es	136.930		
²⁶⁰ Np	129.830	²⁶⁷ Pu	157.360	²¹⁶ Cm	58.340 †	²³⁶ Bk	52.360	²⁴⁹ Cf	70.260	²⁷¹ Es	140.550		
²⁶¹ Np	134.180	²⁶⁸ Pu	162.130	²¹⁷ Cm	57.010 †	²³⁷ Bk	52.120	²⁵⁰ Cf	71.620	²⁷² Es	145.730		
²⁶² Np	140.110	²⁶⁹ Pu	168.450	²¹⁸ Cm	54.140 ‡	²³⁸ Bk	53.590	²⁵¹ Cf	74.640	²⁷³ Es	149.550		
²⁶³ Np	144.660	²⁷⁰ Pu	173.400	²¹⁹ Cm	53.000 ‡	²³⁹ Bk	53.650	²⁵² Cf	76.290	²⁷⁴ Es	154.910		
²⁶⁴ Np	150.790	²⁷¹ Pu	179.900	²²⁰ Cm	49.820 ‡	²⁴⁰ Bk	55.410	²⁵³ Cf	79.600	²⁷⁵ Es	158.910		
²⁶⁵ Np	155.550	²⁷² Pu	185.040	²²¹ Cm	48.310	²⁴¹ Bk	55.780	²⁵⁴ Cf	81.530	²⁷⁶ Es	164.450		
²⁶⁶ Np	161.870	²⁷³ Pu	191.720	²²² Cm	45.250	²⁴² Bk	57.840	²⁵⁵ Cf	85.100	²⁷⁷ Es	168.630		
²⁶⁷ Np	166.820	²⁷⁴ Pu	197.030	²²³ Cm	47.010	²⁴³ Bk	58.500	²⁵⁶ Cf	87.310	²⁷⁸ Es	174.350		
²⁶⁸ Np	173.330	²⁷⁵ Pu	203.540	²²⁴ Cm	46.070	²⁴⁴ Bk	60.860	²⁵⁷ Cf	91.150	²⁷⁹ Es	178.630		
²⁶⁹ Np	178.470	²⁷⁶ Pu	208.680	²²⁵ Cm	46.620	²⁴⁵ Bk	61.830	²⁵⁸ Cf	93.610	²⁸⁰ Es	184.150		
²⁷⁰ Np	185.160	²⁷⁷ Pu	215.350	²²⁶ Cm	45.330	²⁴⁶ Bk	64.480	²⁵⁹ Cf	97.700	²⁸¹ Es	188.310		
²⁷¹ Np	190.480	²⁷⁸ Pu	220.660	²²⁷ Cm	45.750	²⁴⁷ Bk	65.760	²⁶⁰ Cf	100.420	²⁸² Es	193.990		
²⁷² Np	197.360			²²⁸ Cm	44.680	²⁴⁸ Bk	68.700	²⁶¹ Cf	104.750	²⁸³ Es	198.320		
²⁷³ Np	202.780	²¹⁹ Am	43.030 †	²²⁹ Cm	45.310	²⁴⁹ Bk	70.270	²⁶² Cf	107.710			²²⁷ Fm	78.560 †
²⁷⁴ Np	209.490	²²⁰ Am	41.740 †	²³⁰ Cm	44.490	²⁵⁰ Bk	73.500	²⁶³ Cf	112.260			²²⁸ Fm	76.700 †
²⁷⁵ Np	214.830	²²¹ Am	38.900 †	²³¹ Cm	45.370	²⁵¹ Bk	75.350	²⁶⁴ Cf	115.450			²²⁹ Fm	76.500 ‡
²⁷⁶ Np	221.710	²²² Am	40.890 †	²³² Cm	44.800	²⁵² Bk	78.860	²⁶⁵ Cf	120.220			²³⁰ Fm	74.360 ‡
²⁷⁷ Np	227.230	²²³ Am	40.170	²³³ Cm	45.940	²⁵³ Bk	81.000	²⁶⁶ Cf	123.630			²³¹ Fm	73.840 ‡
		²²⁴ Am	40.970	²³⁴ Cm	45.650	²⁵⁴ Bk	84.770	²⁶⁷ Cf	128.610			²³² Fm	71.860
²¹⁰ Pu	49.980 †	²²⁵ Am	39.920	²³⁵ Cm	47.070	²⁵⁵ Bk	87.180	²⁶⁸ Cf	132.230			²³³ Fm	71.560
²¹¹ Pu	48.600 †	²²⁶ Am	40.570	²³⁶ Cm	47.060	²⁵⁶ Bk	87.180	²⁶⁹ Cf	137.410			²³⁴ Fm	69.820
²¹² Pu	45.690 ‡	²²⁷ Am	39.740	²³⁷ Cm	48.760	²⁵⁷ Bk	93.880	²⁷⁰ Cf	141.230			²³⁵ Fm	69.770
²¹³ Pu	44.560 ‡	²²⁸ Am	40.610	²³⁸ Cm	49.050	²⁵⁸ Bk	98.170	²⁷¹ Cf	146.600			²³⁶ Fm	68.290
²¹⁴ Pu	41.900 ‡	²²⁹ Am	40.020	²³⁹ Cm	51.040	²⁵⁹ Bk	101.080	²⁷² Cf	150.610			²³⁷ Fm	68.510
²¹⁵ Pu	40.980	²³⁰ Am	41.140	²⁴⁰ Cm	51.630	²⁶⁰ Bk	105.600	²⁷³ Cf	156.170			²³⁸ Fm	67.310
²¹⁶ Pu	38.530	²³¹ Am	40.810	²⁴¹ Cm	53.910	²⁶¹ Bk	108.750	²⁷⁴ Cf	160.360			²³⁹ Fm	67.810
²¹⁷ Pu	37.750	²³² Am	42.190	²⁴² Cm	54.800	²⁶² Bk	113.500	²⁷⁵ Cf	166.100			²⁴⁰ Fm	66.910
²¹⁸ Pu	34.990	²³³ Am	42.130	²⁴³ Cm	57.380	²⁶³ Bk	116.880	²⁷⁶ Cf	170.470			²⁴¹ Fm	67.700
²¹⁹ Pu	33.930	²³⁴ Am	43.780	²⁴⁴ Cm	58.570	²⁶⁴ Bk	121.850	²⁷⁷ Cf	176.380			²⁴² Fm	67.100
²²⁰ Pu	31.320	²³⁵ Am	44.000	²⁴⁵ Cm	61.440	²⁶⁵ Bk	125.450	²⁷⁸ Cf	180.930			²⁴³ Fm	68.190
²²¹ Pu	33.540	²³⁶ Am	45.940	²⁴⁶ Cm	62.930	²⁶⁶ Bk	130.620	²⁷⁹ Cf	186.640			²⁴⁴ Fm	67.900
²²² Pu	33.050	²³⁷ Am	46.450	²⁴⁷ Cm	66.090	²⁶⁷ Bk	134.430	²⁸⁰ Cf	191.000			²⁴⁵ Fm	69.300
²²³ Pu	34.130	²³⁸ Am	48.670	²⁴⁸ Cm	67.860	²⁶⁸ Bk	139.800	²⁸¹ Cf	196.870			²⁴⁶ Fm	69.320
²²⁴ Pu	33.320	²³⁹ Am	49.480	²⁴⁹ Cm	71.300	²⁶⁹ Bk	143.800	²⁸² Cf	201.390			²⁴⁷ Fm	71.030
²²⁵ Pu	34.220	²⁴⁰ Am	51.990	²⁵⁰ Cm	73.370	²⁷⁰ Bk	149.370	²³⁰ Es	66.980 †			²⁴⁸ Fm	71.360
²²⁶ Pu	33.630	²⁴¹ Am	53.100	²⁵¹ Cm	77.080	²⁷¹ Bk	153.570	²³¹ Es	65.220 †			²⁴⁹ Fm	73.370
²²⁷ Pu	34.750	²⁴² Am	55.900	²⁵² Cm	79.420	²⁷² Bk	159.310	²³² Es	65.150 †			²⁵⁰ Fm	74.010
²²⁸													

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	130.340	²⁶³ Sg	110.510	²⁶¹ Hs	119.210	²⁶⁷ 110	133.800		
²⁷¹ Md	131.240	²⁴⁸ Lr	86.470	²⁷⁴ Rf	132.770	²⁶⁴ Sg	111.080	²⁶² Hs	118.790	²⁶⁸ 110	133.520		
²⁷² Md	135.830	²⁴⁹ Lr	85.860	²⁷⁵ Rf	136.750	²⁶⁵ Sg	113.250	²⁶³ Hs	120.000	²⁶⁹ 110	134.830		
²⁷³ Md	139.070	²⁵⁰ Lr	86.920	²⁷⁶ Rf	139.390	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		