

Fission Products Per Tonne of Fuel

used for 50.68 GWth-day LWR burnup at power of 36.54 MWth and $3.14 \times 10^{14} N/cm^2/s$ neutron flux,
at discharge, as calculated by ORIGEN2 version 2.1 on 9 October 2013.

Radiotoxicity in Sieverts computed for adult ingestion using dose factors from ICRP publication 119

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹²⁷ I	¹²⁷ Te	82.01 gm	646.2 mM									
¹²⁸ I		328.6 μg	2.569 μM	715.4 TBq	2.177 EBq	β ¹²⁸ Xe	24.99 m	836.6 keV	95.88 W	291.8 kW	32.91 kSv	100.1 MSv
					6.9% →	ϵ ¹²⁸ Te						
¹²⁹ I	¹²⁹ Te	271.6 gm	2.107 M	1.775 GBq	6.535 MBq	β ¹²⁹ Xe	16.10 My	78.03 keV	22.19 μW	81.70 nW	195.2 Sv	718.9 mSv
¹³⁰ I	^{130m} I	26.77 mg	206.1 μM	1.933 PBq	72.21 PBq	β ¹³⁰ Xe	12.36 h	2.429 MeV	752.1 W	28.09 kW	3.866 MSv	144.4 MSv
^{130m} I		128.3 μg	987.6 nM	763.5 TBq	5.951 EBq	γ ¹³⁰ I	8.840 m	307.6 keV	37.62 W	293.2 kW		
					16% →	β ¹³⁰ Xe						
¹³¹ I	¹³¹ Te	8.021 gm	61.27 mM	36.82 PBq	4.590 PBq	β ¹³¹ Xe	8.023 d	572.8 keV	3.379 kW	421.3 W	810.0 MSv	101.0 MSv
					1.086% →	β ^{131m} Xe						
¹³² I	¹³² Te	137.9 mg	1.045 mM	52.70 PBq	382.2 PBq	β ¹³² Xe	2.295 h	2.773 MeV	23.41 kW	169.8 kW	15.28 MSv	110.8 MSv
¹³³ I	¹³³ Te	1.730 gm	13.02 mM	72.58 PBq	41.95 PBq	β ¹³³ Xe	20.80 h	1.013 MeV	11.78 kW	6.809 kW	312.1 MSv	180.4 MSv
						2.846% →	β ^{133m} Xe					
^{133m} I		6.872 μg	51.71 nM	2.398 PBq	349.0 EBq	γ ¹³³ I	9.000 s	1.631 MeV	626.5 W	91.17 MW		
¹³⁴ I	¹³⁴ Te	80.26 mg	599.4 μM	79.28 PBq	987.8 PBq	β ¹³⁴ Xe	52.50 m	3.247 MeV	41.24 kW	513.8 kW	8.721 MSv	108.7 MSv
^{134m} I		606.3 μg	4.528 μM	8.512 PBq	14.04 EBq	γ ¹³⁴ I	3.600 m	346.7 keV	472.8 W	779.8 kW		
					2.3% →	β ^{134m} Xe						
¹³⁵ I	¹³⁵ Te	524.4 mg	3.887 mM	68.17 PBq	130.0 PBq	β ¹³⁵ Xe	6.570 h	1.936 MeV	21.14 kW	40.31 kW	63.40 MSv	120.9 MSv
					16.509% →	β ^{135m} Xe						
¹³⁶ I	¹³⁶ Te	869.7 μg	6.399 μM	32.18 PBq	37.00 EBq	β ¹³⁶ Xe	1.390 m	4.256 MeV	21.94 kW	25.23 MW		
^{136m} I	¹³⁷ Te	280.2 μg	2.062 μM	18.71 PBq	66.77 EBq	β ¹³⁶ Xe	46.90 s	3.823 MeV	11.46 kW	40.90 MW		
¹³⁷ I		247.0 μg	1.804 μM	30.61 PBq	123.9 EBq	β ¹³⁷ Xe	24.51 s	3.542 MeV	17.37 kW	70.32 MW		
					6.5% →	β n ¹³⁶ Xe						
¹³⁸ I	¹³⁸ Te	31.62 μg	229.3 nM	14.96 PBq	473.1 EBq	β ¹³⁸ Xe	6.460 s	3.997 MeV	9.580 kW	303.0 MW		
					5.3% →	β n ¹³⁷ Xe						
¹³⁹ I	¹³⁹ Te	5.214 μg	37.53 nM	6.529 PBq	1.252×10^{12}	β ¹³⁹ Xe	2.300 s	4.223 MeV	4.417 kW	847.1 MW		
					9.8% →	β n ¹³⁸ Xe						
¹⁴⁰ I	¹⁴⁰ Te	513.8 ng	3.672 nM	1.782 PBq	3.468×10^{12}	β ¹⁴⁰ Xe	860.0 ms	5.020 MeV	1.433 kW	2.789 GW		
						9.3% →	β n ¹³⁹ Xe					
¹⁴¹ I	¹⁴¹ Te	40.11 ng	284.6 pM	297.1 TBq	7.407×10^{12}	β ¹⁴¹ Xe	430.0 ms	4.832 MeV	230.0 W	5.734 GW		
					21% →	β n ¹⁴⁰ Xe						
¹⁴² I	¹⁴² Te	3.013 ng	21.23 pM	45.23 TBq	1.501×10^{13}	β ¹⁴² Xe	200.0 ms	6.833 MeV	49.51 W	16.43 GW		
						25% →	β n ¹⁴¹ Xe					
¹⁴³ I		342.7 pg	2.397 pM	3.051 TBq	8.903×10^{12}	β ¹⁴³ Xe	100.0 ms	5.510 MeV	2.693 W	7.858 GW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹⁴⁴ I		11.41 pg	≤ 1 pM	249.4 GBq	2.186×10 ¹³	4% → β n ¹⁴² Xe β ¹⁴⁴ Xe	50.00 ms	7.216 MeV	288.3 mW	25.27 GW		
E ₅₃ I		364.1 gm	2.833 M	429.0 PBq	1.178 PBq	4% → β n ¹⁴³ Xe			169.4 kW	465.3 W	1.213 GSv	3.332 MSv
¹⁴⁰ Ce	¹⁴⁰ La	1.870 kg	13.37 M									
¹⁴¹ Ce	¹⁴¹ La	55.55 gm	394.2 mM	58.59 PBq	1.055 PBq	β ¹⁴¹ Pr	32.50 d	246.8 keV	2.317 kW	41.71 W	41.60 MSv	748.9 kSv
¹⁴² Ce	¹⁴² La	1.711 kg	12.06 M	3.190 Bq	1.864 mBq	2 β ¹⁴² Nd	50.00 Py	1.417 MeV	≤ 1 pW	≤ 1 pW		
¹⁴³ Ce	¹⁴³ La	2.128 gm	14.89 mM	52.30 PBq	24.58 PBq	β ¹⁴³ Pr	1.377 d	710.5 keV	5.953 kW	2.797 kW	57.53 MSv	27.03 MSv
¹⁴⁴ Ce	¹⁴⁴ La	407.3 gm	2.830 M	48.11 PBq	118.1 TBq	β ¹⁴⁴ Pr	285.0 d	111.9 keV	862.3 W	2.117 W	250.2 MSv	614.2 kSv
¹⁴⁵ Ce	¹⁴⁵ La	2.244 mg	15.48 μM	35.91 PBq	16.00 EBq	1.38% → β ^{144m} Pr						
¹⁴⁶ Ce	¹⁴⁶ La	8.663 mg	59.37 μM	29.09 PBq	3.358 EBq	β ¹⁴⁵ Pr	2.950 m	1.485 MeV	8.542 kW	3.807 MW		
¹⁴⁷ Ce	¹⁴⁷ La	558.9 μg	3.804 μM	22.69 PBq	40.60 EBq	β ¹⁴⁶ Pr	13.52 m	439.0 keV	2.046 kW	236.2 kW		
¹⁴⁸ Ce	¹⁴⁸ La	256.6 μg	1.735 μM	16.84 PBq	65.63 EBq	β ¹⁴⁷ Pr	57.00 s	2.122 MeV	7.715 kW	13.80 MW		
¹⁴⁹ Ce	¹⁴⁹ La	3.389 μg	22.76 nM	9.500 PBq	2.803×10 ¹²	β ¹⁴⁸ Pr	56.00 s	986.0 keV	2.660 kW	10.37 MW		
¹⁵⁰ Ce	¹⁵⁰ La	1.623 μg	10.83 nM	4.519 PBq	2.784×10 ¹²	β ¹⁴⁹ Pr	5.300 s	2.514 MeV	3.826 kW	1.129 GW		
¹⁵¹ Ce	¹⁵¹ La	496.6 ng	3.290 nM	1.374 PBq	2.767×10 ¹²	β ¹⁵⁰ Pr	4.000 s	1.519 MeV	1.100 kW	677.8 MW		
¹⁵² Ce	¹⁵² La	1.550 μg	10.20 nM	303.5 TBq	195.8 EBq	β ¹⁵¹ Pr	1.020 s	3.096 MeV	681.6 W	1.373 GW		
¹⁵³ Ce	¹⁵³ La	33.57 ng	219.5 pM	53.11 TBq	1.582×10 ¹²	β ¹⁵² Pr	1.100 s	2.236 MeV	108.7 W	70.13 MW		
¹⁵⁴ Ce	¹⁵⁴ La	8.119 ng	52.74 pM	6.133 TBq	755.4 EBq	β ¹⁵³ Pr	1.500 s	3.811 MeV	32.43 W	966.0 MW		
¹⁵⁵ Ce		183.8 pg	1.186 pM	695.0 GBq	3.781×10 ¹²	0.622% → β n ¹⁵² Pr						
¹⁵⁶ Ce		28.32 pg	≤ 1 pM	65.25 GBq	2.304×10 ¹²	β ¹⁵⁴ Pr	2.000 s	2.950 MeV	2.898 W	356.9 MW		
¹⁵⁷ Ce		≤ 1 pg	≤ 1 pM	5.019 GBq	7.356×10 ¹²	0.637% → β n ¹⁵³ Pr						
E ₅₈ Ce		4.046 kg	28.66 M	279.3 PBq	69.03 TBq	β ¹⁵⁵ Pr	200.0 ms	4.570 MeV	508.8 mW	2.768 GW	349.3 MSv	86.33 kSv
¹³² Cs		2.191 mg	16.61 μM	12.39 TBq	5.655 PBq	ϵ ¹³² Xe	6.530 d	728.5 keV	1.446 W	660.0 W	6.195 kSv	2.827 MSv
¹³³ Cs	¹³³ Xe	1.603 kg	12.06 M			1.8% → β ¹³² Ba						
¹³⁴ Cs	^{134m} Cs	234.7 gm	1.753 M	11.24 PBq	47.89 TBq	β ¹³⁴ Ba	2.065 y	1.717 MeV	3.092 kW	13.17 W	213.6 MSv	909.9 kSv
^{134m} Cs		8.790 mg	65.64 μM	2.625 PBq	298.6 PBq	0.0003% → ϵ ¹³⁴ Xe						
¹³⁵ Cs	¹³⁵ Xe	618.4 gm	4.584 M	26.36 GBq	42.63 MBq	γ ¹³⁴ Cs	2.908 h	135.2 keV	56.84 W	6.466 kW	52.50 kSv	5.973 MSv
^{135m} Cs	¹³⁵ Xe	1.904 mg	14.11 μM	1.853 PBq	973.2 PBq	β ¹³⁵ Ba	2.300 My	56.29 keV	237.7 μW	384.4 nW	52.72 Sv	85.25 mSv
¹³⁶ Cs		1.147 gm	8.440 mM	3.112 PBq	2.713 PBq	γ ¹³⁵ Cs	53.00 m	1.618 MeV	480.4 W	252.3 kW	35.21 kSv	18.49 MSv
¹³⁷ Cs	¹³⁷ Xe	1.810 kg	13.22 M	5.829 PBq	3.220 TBq	β ¹³⁶ Ba	13.03 d	2.299 MeV	1.146 kW	999.1 W	9.336 MSv	8.139 MSv
¹³⁸ Cs	¹³⁸ Xe	41.34 mg	299.8 μM	64.77 PBq	1.567 EBq	β ^{137m} Ba	30.04 y	186.5 keV	174.2 W	96.24 mW	75.78 MSv	41.87 kSv
						5.601% → β ¹³⁷ Ba						
						β ¹³⁸ Ba	33.41 m	3.557 MeV	36.91 kW	892.8 kW	5.959 MSv	144.1 MSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

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				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
^{138m} Cs		186.4 μg	1.352 μM	3.242 PBq	17.39 EBq	γ ¹³⁸ ₅₅ Cs β ¹³⁸ ₅₆ Ba	2.910 m	933.8 keV	485.0 W	2.602 MW		
					19% →							
¹³⁹ Cs	¹³⁹ ₅₄ Xe	11.51 mg	82.86 μM	61.33 PBq	5.328 EBq	β ¹³⁹ ₅₆ Ba	9.270 m	1.996 MeV	19.61 kW	1.704 MW		
¹⁴⁰ Cs	¹⁴⁰ ₅₄ Xe	1.178 mg	8.419 μM	55.11 PBq	46.78 EBq	β ¹⁴⁰ ₅₆ Ba	1.062 m	4.061 MeV	35.85 kW	30.43 MW		
¹⁴¹ Cs	¹⁴¹ ₅₄ Xe	341.2 μg	2.421 μM	40.41 PBq	118.4 EBq	β ¹⁴¹ ₅₆ Ba	24.84 s	3.202 MeV	20.73 kW	60.76 MW		
¹⁴² Cs	¹⁴² ₅₄ Xe	13.92 μg	98.08 nM	24.09 PBq	1.731×10 ¹²	β ¹⁴² ₅₆ Ba	1.684 s	4.589 MeV	17.71 kW	1.272 GW		
¹⁴³ Cs	¹⁴³ ₅₄ Xe	6.666 μg	46.64 nM	11.45 PBq	1.718×10 ¹²	β ¹⁴³ ₅₆ Ba	1.791 s	3.734 MeV	6.849 kW	1.027 GW		
					1.64% →							
¹⁴⁴ Cs	¹⁴⁴ ₅₄ Xe	1.235 μg	8.580 nM	3.512 PBq	2.844×10 ¹²	β n ¹⁴⁴ ₅₆ Ba β ¹⁴⁴ ₅₆ Ba	994.0 ms	5.389 MeV	3.032 kW	2.455 GW		
					3.2% →							
¹⁴⁵ Cs	¹⁴⁵ ₅₄ Xe	171.3 ng	1.182 nM	881.2 TBq	5.144×10 ¹²	β n ¹⁴⁵ ₅₆ Ba β ¹⁴⁵ ₅₆ Ba	594.0 ms	4.021 MeV	567.6 W	3.313 GW		
					14.3% →							
¹⁴⁶ Cs	¹⁴⁶ ₅₄ Xe	8.665 ng	59.37 pM	130.5 TBq	1.506×10 ¹³	β n ¹⁴⁶ ₅₆ Ba β ¹⁴⁶ ₅₆ Ba	323.0 ms	5.797 MeV	121.2 W	13.99 GW		
					14.2% →							
¹⁴⁷ Cs	¹⁴⁷ ₅₄ Xe	4.243 ng	28.87 pM	21.61 TBq	5.093×10 ¹²	β n ¹⁴⁷ ₅₆ Ba β ¹⁴⁷ ₅₆ Ba	225.0 ms	4.905 MeV	16.98 W	4.002 GW		
					28.5% →							
¹⁴⁸ Cs		100.5 pg	≤ 1 pM	1.407 TBq	1.400×10 ¹³	β n ¹⁴⁸ ₅₆ Ba β ¹⁴⁸ ₅₆ Ba	146.0 ms	6.566 MeV	1.480 W	14.73 GW		
					25.1% →							
¹⁵⁰ Cs		≤ 1 pg	≤ 1 pM	1.329 GBq	2.239×10 ¹³	β ¹⁵⁰ ₅₆ Ba	100.0 ms	7.261 MeV	1.546 mW	26.04 GW		
E ⁵⁵ Cs		4.267 kg	31.63 M	289.6 PBq	67.87 TBq				146.8 kW	34.41 W	304.7 MSv	71.41 kSv
⁹⁹ Ru	⁹⁹ ₄₃ Tc	6.991 mg	70.68 μM									
¹⁰⁰ Ru	¹⁰⁰ ₄₂ Mo	218.3 gm	2.185 M									
¹⁰¹ Ru	¹⁰¹ ₄₃ Tc	1.166 kg	11.56 M									
¹⁰² Ru	¹⁰² ₄₃ Tc	1.217 kg	11.94 M									
¹⁰³ Ru	¹⁰³ ₄₃ Tc	51.82 gm	503.6 mM	61.92 PBq	1.195 PBq	β ^{103m} ₄₅ Rh β ¹⁰³ ₄₅ Rh	39.26 d	564.2 keV	5.597 kW	108.0 W	45.20 MSv	872.3 kSv
					1.198% →							
¹⁰⁴ Ru	¹⁰⁴ ₄₃ Tc	863.0 gm	8.306 M									
¹⁰⁵ Ru	¹⁰⁵ ₄₃ Tc	183.8 mg	1.752 mM	45.74 PBq	248.9 PBq	β ¹⁰⁵ ₄₅ Rh β ^{105m} ₄₅ Rh	4.440 h	1.184 MeV	8.677 kW	47.21 kW	11.89 MSv	64.70 MSv
					28.388% →							
¹⁰⁶ Ru	¹⁰⁶ ₄₃ Tc	224.5 gm	2.120 M	27.81 PBq	123.9 TBq	β ¹⁰⁶ ₄₅ Rh	1.020 y	10.03 keV	44.68 W	199.0 mW	194.7 MSv	867.1 kSv
¹⁰⁷ Ru	¹⁰⁷ ₄₃ Tc	1.806 mg	16.89 μM	27.98 PBq	15.49 EBq	β ¹⁰⁷ ₄₅ Rh	3.750 m	1.452 MeV	6.507 kW	3.603 MW		
¹⁰⁸ Ru	¹⁰⁸ ₄₃ Tc	1.360 mg	12.60 μM	19.48 PBq	14.32 EBq	β ¹⁰⁸ ₄₅ Rh	4.550 m	515.9 keV	1.610 kW	1.184 MW		
¹⁰⁹ Ru	¹⁰⁹ ₄₃ Tc	109.0 μg	1.001 μM	11.94 PBq	109.5 EBq	β ¹⁰⁹ ₄₅ Rh	34.50 s	2.381 MeV	4.554 kW	41.78 MW		
¹¹⁰ Ru	¹¹⁰ ₄₃ Tc	21.91 μg	199.3 nM	5.200 PBq	237.3 EBq	β ¹¹⁰ ₄₅ Rh	11.60 s	1.539 MeV	1.282 kW	58.51 MW		
¹¹¹ Ru	¹¹¹ ₄₃ Tc	9.123 μg	82.25 nM	2.227 PBq	244.1 EBq	β ¹¹¹ ₄₅ Rh	2.120 s	3.240 MeV	1.156 kW	126.7 MW		
¹¹² Ru	¹¹² ₄₃ Tc	172.5 ng	1.541 nM	919.0 TBq	5.328×10 ¹²	β ¹¹² ₄₅ Rh	1.750 s	2.205 MeV	324.7 W	1.882 GW		
¹¹³ Ru	¹¹³ ₄₃ Tc	355.1 ng	3.145 nM	474.5 TBq	1.336×10 ¹²	β ¹¹³ ₄₅ Rh	800.0 ms	4.044 MeV	307.4 W	865.7 MW		
¹¹⁴ Ru	¹¹⁴ ₄₃ Tc	284.5 ng	2.497 nM	206.3 TBq	725.1 EBq	β ¹¹⁴ ₄₅ Rh	530.0 ms	2.945 MeV	97.34 W	342.1 MW		

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				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹¹⁵ Ru	¹¹⁵ ₄₃ Tc	19.11 ng	166.3 pM	95.19 TBq	4.981×10 ¹²	β ¹¹⁵ ₄₅ Rh	700.0 ms	4.889 MeV	74.55 W	3.901 GW		
¹¹⁶ Ru	¹¹⁶ ₄₃ Tc	8.259 ng	71.24 pM	21.17 TBq	2.563×10 ¹²	β n ¹¹⁴ ₄₅ Rh	1.700 s	3.727 MeV	12.64 W	1.530 GW		
¹¹⁷ Ru	¹¹⁷ ₄₃ Tc	268.4 pg	2.295 pM	3.102 TBq	1.156×10 ¹³	β n ¹¹⁵ ₄₅ Rh	340.0 ms	5.819 MeV	2.892 W	10.77 GW		
¹¹⁸ Ru		3.603 ng	30.55 pM	20.69 TBq	5.742×10 ¹²	β n ¹¹⁶ ₄₅ Rh	700.0 ms	4.429 MeV	14.68 W	4.074 GW		
¹²⁰ Ru		≤ 1 pg	≤ 1 pM	4.341 GBq	1.188×10 ¹³	β n ¹¹⁷ ₄₅ Rh	80.00 ms	5.317 MeV	3.698 mW	10.12 GW		
A ₄₄ Ru		3.741 kg	36.61 M	204.0 PBq	54.54 TBq	β ¹²⁰ ₄₅ Rh			30.26 kW	8.090 W	251.8 MSv	67.30 kSv
¹²² Te	¹²² ₅₁ Sb	1.235 gm	10.13 mM									
¹²³ Te	^{123m} ₅₂ Te	17.22 mg	140.1 μM	185.3 mBq	10.76 Bq	ε ¹²³ ₅₁ Sb	92.00 Py	17.09 keV	≤ 1 pW	≤ 1 pW	815.3 pSv	47.35 nSv
^{123m} Te		4.066 mg	33.08 μM	1.336 TBq	328.6 TBq	γ ¹²³ ₅₂ Te	119.5 d	245.6 keV	52.56 mW	12.93 W	1.870 kSv	460.0 kSv
¹²⁴ Te	¹²⁴ ₅₀ Sn	835.2 mg	6.741 mM									
¹²⁵ Te	¹²⁵ ₅₁ Sb	9.172 gm	73.43 mM									
^{125m} Te	¹²⁵ ₅₁ Sb	244.4 mg	1.957 mM	163.0 TBq	666.9 TBq	γ ¹²⁵ ₅₂ Te	57.40 d	141.7 keV	3.701 W	15.14 W	141.8 kSv	580.2 kSv
¹²⁶ Te	¹²⁶ ₅₁ Sb	1.302 gm	10.34 mM									
¹²⁷ Te	¹²⁷ ₅₁ Sb	44.11 mg	347.6 μM	4.312 PBq	97.76 PBq	β ¹²⁷ ₅₃ I	9.350 h	227.7 keV	157.3 W	3.566 kW	733.0 kSv	16.62 MSv
^{127m} Te	¹²⁷ ₅₁ Sb	1.683 gm	13.26 mM	587.7 TBq	349.2 TBq	γ ¹²⁷ ₅₂ Te	109.0 d	90.73 keV	8.542 W	5.075 W	1.352 MSv	803.2 kSv
					2.4% →	β ¹²⁷ ₅₃ I						
¹²⁸ Te	¹²⁸ ₅₁ Sb	170.8 gm	1.335 M	8.029 nBq	47.01 pBq	2β ¹²⁸ ₅₄ Xe	≥ 10 ²¹ y	867.2 keV	≤ 1 pW	≤ 1 pW		
¹²⁹ Te	¹²⁹ ₅₁ Sb	15.79 mg	122.5 μM	12.24 PBq	775.2 PBq	β ¹²⁹ ₅₃ I	1.160 h	602.8 keV	1.182 kW	74.86 kW	771.1 kSv	48.84 MSv
^{129m} Te	¹²⁹ ₅₁ Sb	1.649 gm	12.79 mM	1.839 PBq	1.115 PBq	γ ¹²⁹ ₅₂ Te	33.60 d	295.8 keV	87.15 W	52.85 W	5.517 MSv	3.346 MSv
					37% →	β ¹²⁹ ₅₃ I						
¹³⁰ Te	¹³⁰ ₅₁ Sb	547.3 gm	4.213 M	70.54 nBq	128.9 pBq	2β ¹³⁰ ₅₄ Xe	≥ 10 ²¹ y	2.528 MeV	≤ 1 pW	≤ 1 pW		
¹³¹ Te	¹³¹ ₅₁ Sb	15.29 mg	116.8 μM	32.51 PBq	2.126 EBq	β ¹³¹ ₅₃ I	25.00 m	1.139 MeV	5.930 kW	387.8 kW	2.828 MSv	185.0 MSv
^{131m} Te	¹³¹ ₅₁ Sb	184.3 mg	1.408 mM	5.444 PBq	29.54 PBq	β ¹³¹ ₅₃ I	1.250 d	1.621 MeV	1.414 kW	7.672 kW	10.34 MSv	56.12 MSv
					21% →	γ ¹³¹ ₅₂ Te						
¹³² Te	¹³² ₅₁ Sb	4.604 gm	34.90 mM	51.78 PBq	11.25 PBq	β ¹³² ₅₃ I	3.204 d	333.9 keV	2.770 kW	601.7 W	196.8 MSv	42.74 MSv
¹³³ Te	¹³³ ₅₁ Sb	10.19 mg	76.67 μM	42.86 PBq	4.206 EBq	β ¹³³ ₅₃ I	12.45 m	1.745 MeV	11.98 kW	1.176 MW	3.086 MSv	302.8 MSv
^{133m} Te	¹³³ ₅₁ Sb	26.59 mg	200.1 μM	25.12 PBq	944.7 PBq	β ¹³³ ₅₃ I	55.40 m	2.982 MeV	12.00 kW	451.3 kW	7.034 MSv	264.5 MSv
					17.5% →	γ ¹³³ ₅₂ Te						
¹³⁴ Te	¹³⁴ ₅₁ Sb	45.84 mg	342.3 μM	56.96 PBq	1.243 EBq	β ¹³⁴ ₅₃ I	41.80 m	1.182 MeV	10.79 kW	235.4 kW	6.266 MSv	136.7 MSv
¹³⁵ Te	¹³⁵ ₅₁ Sb	189.9 μg	1.408 μM	30.60 PBq	161.1 EBq	β ¹³⁵ ₅₃ I	19.00 s	3.105 MeV	15.22 kW	80.15 MW		
¹³⁶ Te	¹³⁶ ₅₁ Sb	107.1 μg	788.0 nM	15.67 PBq	146.3 EBq	β ¹³⁶ ₅₃ I	17.50 s	2.839 MeV	7.128 kW	66.55 MW		
¹³⁷ Te	¹³⁷ ₅₁ Sb	5.186 μg	37.87 nM	4.519 PBq	871.4 EBq	β ¹³⁷ ₅₃ I	2.490 s	4.290 MeV	3.106 kW	598.9 MW		
					1.495% →	β n ¹³⁶ ₅₃ I						
					1.495% →	β n ^{136m} ₅₃ I						

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹³⁸ Te	¹³⁸ ₅₁ Sb	603.7 ng	4.377 nM	1.114 PBq	1.845×10 ¹²	β ¹³⁸ ₅₃ I	1.400 s	3.588 MeV	640.4 W	1.061 GW		
¹³⁹ Te	¹³⁹ ₅₁ Sb	30.64 ng	220.5 pM	217.4 TBq	7.095×10 ¹²	β n ¹³⁷ ₅₃ I	500.0 ms	5.249 MeV	182.8 W	5.966 GW		
¹⁴⁰ Te		6.746 ng	48.21 pM	26.77 TBq	3.968×10 ¹²	β ¹³⁹ ₅₃ I	300.0 ms	4.241 MeV	18.19 W	2.696 GW		
¹⁴¹ Te		97.27 pg	≤ 1 pM	1.222 TBq	1.256×10 ¹³	β ¹⁴⁰ ₅₃ I	100.0 ms	6.007 MeV	1.176 W	12.09 GW		
¹⁴² Te		22.37 pg	≤ 1 pM	133.9 GBq	5.986×10 ¹²	β ¹⁴¹ ₅₃ I	50.00 ms	4.630 MeV	99.33 mW	4.440 GW		
E ⁵² Te		739.2 gm	5.715 M	286.0 PBq	386.9 TBq	β ¹⁴² ₅₃ I			72.62 kW	98.24 W	234.8 MSv	317.7 kSv
⁸⁶ Sr	⁸⁶ Rb	887.0 mg	10.32 mM									
⁸⁷ Sr	⁸⁷ Rb	7.615 mg	87.62 μM									
^{87m} Sr	⁸⁷ Rb	864.3 ng	9.945 nM	410.8 GBq	475.3 PBq	γ ⁸⁷ ₃₈ Sr	2.816 h	386.9 keV	25.46 mW	29.46 kW	12.32 Sv	14.26 MSv
					0.3% →	ϵ ⁸⁷ ₃₇ Rb						
⁸⁸ Sr	⁸⁸ Rb	519.1 gm	5.905 M									
⁸⁹ Sr	⁸⁹ Rb	26.49 gm	298.0 mM	28.50 PBq	1.076 PBq	β ⁸⁹ ₃₉ Y	50.57 d	583.0 keV	2.662 kW	100.5 W	74.10 MSv	2.797 MSv
					0.01% →	β ^{89m} ₃₉ Y						
⁹⁰ Sr	⁹⁰ Rb	780.6 gm	8.682 M	3.942 PBq	5.050 TBq	β ⁹⁰ ₃₉ Y	28.79 y	195.7 keV	123.6 W	158.3 mW	110.4 MSv	141.4 kSv
⁹¹ Sr	⁹¹ Rb	269.5 mg	2.964 mM	36.18 PBq	134.2 PBq	β ^{91m} ₃₉ Y	9.630 h	1.351 MeV	7.833 kW	29.06 kW	23.52 MSv	87.26 MSv
					41.165% →	β ⁹¹ ₃₉ Y						
⁹² Sr	⁹² Rb	86.65 mg	942.8 μM	40.34 PBq	465.6 PBq	β ⁹² ₃₉ Y	2.710 h	1.534 MeV	9.915 kW	114.4 kW	17.35 MSv	200.2 MSv
⁹³ Sr	⁹³ Rb	4.715 mg	50.75 μM	47.08 PBq	9.985 EBq	β ⁹³ ₃₉ Y	7.423 m	2.555 MeV	19.27 kW	4.087 MW		
⁹⁴ Sr	⁹⁴ Rb	764.8 μg	8.144 μM	44.97 PBq	58.80 EBq	β ⁹⁴ ₃₉ Y	1.255 m	2.111 MeV	15.21 kW	19.89 MW		
⁹⁵ Sr	⁹⁵ Rb	247.5 μg	2.607 μM	41.86 PBq	169.1 EBq	β ⁹⁵ ₃₉ Y	23.90 s	3.300 MeV	22.13 kW	89.41 MW		
⁹⁶ Sr	⁹⁶ Rb	26.77 μg	279.1 nM	29.12 PBq	1.088×10 ¹²	β ⁹⁶ ₃₉ Y	1.060 s	2.472 MeV	11.53 kW	430.7 MW		
⁹⁷ Sr	⁹⁷ Rb	720.2 ng	7.430 nM	15.51 PBq	2.154×10 ¹³	β ⁹⁷ ₃₉ Y	429.0 ms	4.185 MeV	10.40 kW	14.44 GW		
					0.025% →	β n ⁹⁶ ₃₉ Y						
⁹⁸ Sr	⁹⁸ Rb	1.230 μg	12.56 nM	6.166 PBq	5.013×10 ¹²	β ⁹⁸ ₃₉ Y	653.0 ms	3.186 MeV	3.147 kW	2.559 GW		
⁹⁹ Sr	⁹⁹ Rb	230.6 ng	2.331 nM	1.738 PBq	7.537×10 ¹²	β ⁹⁹ ₃₉ Y	270.0 ms	5.200 MeV	1.448 kW	6.279 GW		
¹⁰⁰ Sr	¹⁰⁰ Rb	86.85 ng	869.1 pM	346.9 TBq	3.994×10 ¹²	β ¹⁰⁰ ₃₉ Y	202.0 ms	3.962 MeV	220.2 W	2.535 GW		
					0.78% →	β n ⁹⁹ ₃₉ Y						
¹⁰¹ Sr		2.986 ng	29.58 pM	49.04 TBq	1.642×10 ¹³	β ¹⁰¹ ₃₉ Y	118.0 ms	6.091 MeV	47.85 W	16.02 GW		
					1.185% →	β n ¹⁰⁰ ₃₉ Y						
¹⁰² Sr		464.9 pg	4.560 pM	4.593 TBq	9.880×10 ¹²	β ¹⁰² ₃₉ Y	69.00 ms	4.878 MeV	3.589 W	7.720 GW		
					5.5% →	β n ¹⁰¹ ₃₉ Y						
¹⁰³ Sr		5.392 pg	≤ 1 pM	157.8 GBq	2.927×10 ¹³	β ¹⁰³ ₃₉ Y	50.00 ms	7.021 MeV	177.5 mW	32.92 GW		
¹⁰⁴ Sr		≤ 1 pg	≤ 1 pM	6.725 GBq	2.087×10 ¹³	β ¹⁰⁴ ₃₉ Y	30.00 ms	5.971 MeV	6.433 mW	19.96 GW		
E ³⁸ Sr		1.327 kg	14.90 M	295.8 PBq	222.8 TBq				103.9 kW	78.30 W	225.3 MSv	169.8 kSv
⁸⁹ Y	⁸⁹ ₃₈ Sr	649.5 gm	7.305 M									
^{89m} Y	⁸⁹ ₃₈ Sr	73.02 pg	≤ 1 pM	21.34 GBq	292.2 EBq	γ ⁸⁹ ₃₉ Y	15.66 s	916.7 keV	3.134 mW	42.92 MW		
⁹⁰ Y	⁹⁰ ₃₈ Sr	204.5 mg	2.275 mM	4.119 PBq	20.14 PBq	β ⁹⁰ ₄₀ Zr	2.671 d	935.0 keV	617.0 W	3.017 kW	11.12 MSv	54.38 MSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
^{90m} Y		1.722 μg	19.15 nM	716.1 GBq	415.9 PBq	γ ⁹⁰ ₃₉ Y	3.190 h	683.0 keV	78.36 mW	45.51 kW	121.7 Sv	70.70 MSv
⁹¹ Y	⁹¹ ₃₈ Sr	41.84 gm	460.2 mM	38.01 PBq	908.5 TBq	β ⁹¹ ₄₀ Zr	58.51 d	605.5 keV	3.687 kW	88.12 W	91.22 MSv	2.180 MSv
^{91m} Y	⁹¹ ₃₈ Sr	13.65 mg	150.2 μM	21.00 PBq	1.538 EBq	γ ⁹¹ ₃₉ Y	49.71 m	557.6 keV	1.876 kW	137.4 kW	231.0 kSv	16.92 MSv
⁹² Y	⁹² ₃₈ Sr	113.8 mg	1.238 mM	40.56 PBq	356.4 PBq	β ⁹² ₄₀ Zr	3.540 h	1.697 MeV	11.03 kW	96.92 kW	19.87 MSv	174.6 MSv
⁹³ Y	⁹³ ₃₈ Sr	392.0 mg	4.219 mM	48.41 PBq	123.5 PBq	β ⁹³ ₄₀ Zr	10.18 h	1.262 MeV	9.787 kW	24.97 kW	58.09 MSv	148.2 MSv
⁹⁴ Y	⁹⁴ ₃₈ Sr	12.84 mg	136.7 μM	49.78 PBq	3.877 EBq	β ⁹⁴ ₄₀ Zr	18.70 m	2.810 MeV	22.41 kW	1.745 MW	4.032 MSv	314.0 MSv
⁹⁵ Y	⁹⁵ ₃₈ Sr	7.819 mg	82.38 μM	54.59 PBq	6.982 EBq	β ⁹⁵ ₄₀ Zr	10.30 m	2.233 MeV	19.53 kW	2.498 MW	2.511 MSv	321.2 MSv
⁹⁶ Y	⁹⁶ ₃₈ Sr	1.653 mg	17.23 μM	52.11 PBq	31.52 EBq	β ⁹⁶ ₄₀ Zr	5.340 s	3.868 MeV	32.29 kW	19.53 MW		
⁹⁷ Y	⁹⁷ ₃₈ Sr	11.68 μg	120.5 nM	45.30 PBq	3.878 × 10 ¹²	β ⁹⁷ ₄₀ Zr	3.750 s	3.096 MeV	22.47 kW	1.924 GW		
					0.055% →	β n ⁹⁶ ₄₀ Zr						
⁹⁸ Y	⁹⁸ ₃₈ Sr	2.265 μg	23.13 nM	32.18 PBq	1.421 × 10 ¹³	β ⁹⁸ ₄₀ Zr	590.0 ms	4.785 MeV	24.67 kW	10.89 GW		
					0.27% →	β n ⁹⁷ ₄₀ Zr						
⁹⁹ Y	⁹⁹ ₃₈ Sr	3.509 μg	35.47 nM	18.51 PBq	5.275 × 10 ¹²	β ⁹⁹ ₄₀ Zr	1.477 s	3.736 MeV	11.08 kW	3.158 GW		
					1.7% →	β n ⁹⁸ ₄₀ Zr						
¹⁰⁰ Y	¹⁰⁰ ₃₈ Sr	1.506 μg	15.07 nM	8.316 PBq	5.522 × 10 ¹²	β ¹⁰⁰ ₄₀ Zr	735.0 ms	5.824 MeV	7.759 kW	5.152 GW		
					0.92% →	β n ⁹⁹ ₄₀ Zr						
¹⁰¹ Y	¹⁰¹ ₃₈ Sr	638.6 ng	6.327 nM	2.705 PBq	4.236 × 10 ¹²	β ¹⁰¹ ₄₀ Zr	450.0 ms	4.613 MeV	1.999 kW	3.130 GW		
¹⁰² Y	¹⁰² ₃₈ Sr	45.61 ng	447.5 pM	685.4 TBq	1.503 × 10 ¹³	β ¹⁰² ₄₀ Zr	300.0 ms	6.731 MeV	739.1 W	16.20 GW		
					4.9% →	β n ¹⁰¹ ₄₀ Zr						
¹⁰³ Y	¹⁰³ ₃₈ Sr	9.297 ng	90.32 pM	103.0 TBq	1.108 × 10 ¹³	β ¹⁰³ ₄₀ Zr	224.0 ms	5.538 MeV	91.39 W	9.830 GW		
					8% →	β n ¹⁰² ₄₀ Zr						
¹⁰⁴ Y	¹⁰⁴ ₃₈ Sr	350.8 pg	3.375 pM	9.771 TBq	2.785 × 10 ¹³	β ¹⁰⁴ ₄₀ Zr	130.0 ms	7.621 MeV	11.93 W	34.01 GW		
					8.777% →	β n ¹⁰³ ₄₀ Zr						
¹⁰⁵ Y		21.25 pg	≤ 1 pM	487.1 GBq	2.292 × 10 ¹³	β ¹⁰⁵ ₄₀ Zr	150.0 ms	6.643 MeV	518.4 mW	24.40 GW		
					19.753% →	β n ¹⁰⁴ ₄₀ Zr						
¹⁰⁷ Y		≤ 1 pg	≤ 1 pM	251.9 MBq	3.733 × 10 ¹³	β ¹⁰⁷ ₄₀ Zr	30.00 ms	7.474 MeV	301.6 μW	44.69 GW		
E ₃₉ Y		692.1 gm	7.774 M	416.4 PBq	601.6 TBq				170.0 kW	245.7 W	187.1 MSv	270.3 kSv
⁹⁰ Zr	⁹⁰ ₃₉ Y	41.79 gm	464.8 mM			γ ⁹⁰ ₄₀ Zr						
^{90m} Zr		≤ 1 pg	≤ 1 pM	196.0 MBq	5.592 × 10 ¹²		809.2 ms	2.314 MeV	72.67 μW	2.073 GW		
⁹¹ Zr	⁹¹ ₃₉ Y	834.8 gm	9.183 M									
⁹² Zr	⁹² ₃₉ Y	956.1 gm	10.40 M									
⁹³ Zr	⁹³ ₃₉ Y	1.073 kg	11.55 M	99.78 GBq	92.99 MBq	β ^{93m} ₄₁ Nb	1.530 My	19.59 keV	313.2 μW	291.9 nW	109.8 Sv	102.3 mSv
					2.5% →	β ⁹³ ₄₁ Nb						
⁹⁴ Zr	⁹⁴ ₃₉ Y	1.125 kg	11.98 M	26.41 Bq	23.48 mBq	2β ⁹⁴ ₄₂ Mo	6.000 Py	1.144 MeV	4.839 pW	≤ 1 pW		
⁹⁵ Zr	⁹⁵ ₃₉ Y	72.10 gm	759.7 mM	57.33 PBq	795.1 TBq	β ⁹⁵ ₄₁ Nb	64.03 d	854.5 keV	7.848 kW	108.8 W	54.46 MSv	755.4 kSv
					1.08% →	β ^{95m} ₄₁ Nb						
⁹⁶ Zr	⁹⁶ ₃₉ Y	1.211 kg	12.63 M	4.282 mBq	3.536 μBq	2β ⁹⁶ ₄₂ Mo	39.00 Ey	3.350 MeV	≤ 1 pW	≤ 1 pW		
⁹⁷ Zr	⁹⁷ ₃₉ Y	826.6 mg	8.529 mM	58.51 PBq	70.78 PBq	β ^{97m} ₄₁ Nb	16.74 h	878.9 keV	8.238 kW	9.966 kW	122.9 MSv	148.6 MSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
⁹⁸ Zr	⁹⁸ Y	432.5 μg	4.417 μM	59.48 PBq	4.952% → 137.5 EBq	β ⁹⁷ Nb						
⁹⁹ Zr	⁹⁹ Y	33.62 μg	339.9 nM	59.10 PBq	1.758×10 ¹²	β ⁹⁸ Nb	30.70 s	902.5 keV	8.600 kW	19.88 MW		
					36.8% →	β ⁹⁹ Nb	2.200 s	2.413 MeV	22.85 kW	679.7 MW		
¹⁰⁰ Zr	¹⁰⁰ Y	92.28 μg	923.6 nM	54.29 PBq	588.3 EBq	β ^{99m} Nb						
¹⁰¹ Zr	¹⁰¹ Y	27.71 μg	274.6 nM	34.73 PBq	1.253×10 ¹²	β ¹⁰⁰ Nb	7.100 s	1.368 MeV	11.90 kW	129.0 MW		
¹⁰² Zr	¹⁰² Y	139.7 μg	1.371 μM	19.99 PBq	143.1 EBq	β ¹⁰¹ Nb	2.300 s	3.122 MeV	17.37 kW	626.8 MW		
¹⁰³ Zr	¹⁰³ Y	3.328 μg	32.33 nM	7.624 PBq	2.291×10 ¹²	β ¹⁰² Nb	2.900 s	2.170 MeV	6.949 kW	49.74 MW		
¹⁰⁴ Zr	¹⁰⁴ Y	1.793 μg	17.25 nM	1.903 PBq	1.061×10 ¹²	β ¹⁰³ Nb	1.300 s	4.136 MeV	5.052 kW	1.518 GW		
¹⁰⁵ Zr	¹⁰⁵ Y	36.59 ng	348.7 pM	260.6 TBq	7.122×10 ¹²	β ¹⁰⁴ Nb	1.200 s	2.976 MeV	907.4 W	506.1 MW		
					1.4% →	β n ¹⁰⁵ Nb	600.0 ms	5.008 MeV	209.1 W	5.715 GW		
¹⁰⁶ Zr		7.032 ng	66.38 pM	28.27 TBq	4.020×10 ¹²	β n ¹⁰⁴ Nb						
					1.524% →	β n ¹⁰⁶ Nb	900.0 ms	3.959 MeV	17.93 W	2.550 GW		
¹⁰⁷ Zr	¹⁰⁷ Y	80.63 pg	≤ 1 pM	1.267 TBq	1.571×10 ¹³	β n ¹⁰⁵ Nb						
					3.713% →	β n ¹⁰⁷ Nb	240.0 ms	5.996 MeV	1.217 W	15.09 GW		
¹⁰⁸ Zr		37.71 pg	≤ 1 pM	357.8 GBq	9.488×10 ¹²	β n ¹⁰⁶ Nb						
¹⁰⁹ Zr		≤ 1 pg	≤ 1 pM	26.40 GBq	2.763×10 ¹³	β ¹⁰⁸ Nb	80.00 ms	4.855 MeV	278.3 mW	7.380 GW		
A ⁴⁰ Zr		5.315 kg	56.98 M	353.2 PBq	66.47 TBq	β ¹⁰⁹ Nb	60.00 ms	6.859 MeV	29.01 mW	30.36 GW	177.3 MSv	33.37 kSv
¹³² Ba	¹³² Cs	3.099 mg	23.49 μM									
¹³⁴ Ba	¹³⁴ Xe	107.8 gm	805.1 mM									
¹³⁵ Ba	¹³⁵ Cs	1.048 gm	7.768 mM									
^{135m} Ba		308.3 μg	2.285 μM	9.234 TBq	29.95 PBq	γ ¹³⁵ Ba	1.196 d	266.5 keV	394.3 mW	1.279 kW	3.971 kSv	12.88 MSv
¹³⁶ Ba	¹³⁶ Xe	41.65 gm	306.5 mM									
^{136m} Ba		51.42 ng	378.4 pM	513.0 TBq	9.977×10 ¹²	γ ¹³⁶ Ba	308.4 ms	2.039 MeV	167.6 W	3.259 GW		
¹³⁷ Ba	¹³⁷ Cs	80.18 gm	585.7 mM									
^{137m} Ba	¹³⁷ Cs	277.3 μg	2.025 μM	5.522 PBq	19.91 EBq	γ ¹³⁷ Ba	2.552 m	662.3 keV	585.9 W	2.113 MW		
¹³⁸ Ba	¹³⁸ Cs	1.944 kg	14.10 M									
¹³⁹ Ba	¹³⁹ Cs	105.0 mg	755.9 μM	63.58 PBq	605.5 PBq	β ¹³⁹ La	1.384 h	939.4 keV	9.569 kW	91.13 kW	7.630 MSv	72.66 MSv
¹⁴⁰ Ba	¹⁴⁰ Cs	22.70 gm	162.2 mM	61.29 PBq	2.700 PBq	β ¹⁴⁰ La	12.77 d	470.6 keV	4.621 kW	203.6 W	159.4 MSv	7.020 MSv
¹⁴¹ Ba	¹⁴¹ Cs	21.22 mg	150.6 μM	57.37 PBq	2.704 EBq	β ¹⁴¹ La	18.27 m	1.729 MeV	15.89 kW	748.8 kW	4.016 MSv	189.3 MSv
¹⁴² Ba	¹⁴² Cs	11.76 mg	82.87 μM	53.89 PBq	4.582 EBq	β ¹⁴² La	10.60 m	1.469 MeV	12.68 kW	1.078 MW	1.886 MSv	160.4 MSv
¹⁴³ Ba	¹⁴³ Cs	216.8 μg	1.517 μM	46.56 PBq	214.8 EBq	β ¹⁴³ La	14.50 s	2.658 MeV	19.83 kW	91.47 MW		
¹⁴⁴ Ba	¹⁴⁴ Cs	130.7 μg	908.1 nM	34.48 PBq	263.8 EBq	β ¹⁴⁴ La	11.50 s	1.693 MeV	9.354 kW	71.57 MW		
¹⁴⁵ Ba	¹⁴⁵ Cs	38.83 μg	267.9 nM	18.04 PBq	464.6 EBq	β ¹⁴⁵ La	4.310 s	3.207 MeV	9.269 kW	238.7 MW		
¹⁴⁶ Ba	¹⁴⁶ Cs	5.200 μg	35.63 nM	6.762 PBq	1.300×10 ¹²	β ¹⁴⁶ La	2.220 s	1.939 MeV	2.101 kW	404.0 MW		
¹⁴⁷ Ba	¹⁴⁷ Cs	1.236 μg	8.412 nM	1.577 PBq	1.276×10 ¹²	β ¹⁴⁷ La	893.0 ms	3.657 MeV	923.8 W	747.4 MW		
¹⁴⁸ Ba	¹⁴⁸ Cs	591.6 ng	3.999 nM	282.9 TBq	478.2 EBq	β ¹⁴⁸ La	612.0 ms	2.619 MeV	118.7 W	200.6 MW		
					0.4% →	β n ¹⁴⁷ La						

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹⁴⁹ Ba		10.68 ng	71.71 pM	32.63 TBq	3.055×10^{12}	β ¹⁴⁹ ₅₇ La	344.0 ms	4.306 MeV	22.51 W	2.108 GW		
¹⁵⁰ Ba	¹⁵⁰ Cs	1.584 ng	10.56 pM	2.455 TBq	1.550×10^{12}	β n ¹⁴⁸ ₅₇ La						
¹⁵² Ba		1.788 pg	≤ 1 pM	6.510 GBq	3.641×10^{12}	β ¹⁵⁰ ₅₇ La	300.0 ms	3.410 MeV	1.341 W	846.6 MW		
E ⁵⁶ Ba		2.198 kg	15.96 M	349.9 PBq	159.2 TBq	β ¹⁵² ₅₇ La	100.0 ms	4.190 MeV	4.370 mW	2.444 GW	172.9 MSv	78.67 kSv
¹³⁸ La		7.637 mg	55.38 μ M	5.426 Bq	710.5 Bq	ϵ ¹³⁸ ₅₆ Ba	102.0 Gy	1.237 MeV	1.075 pW	140.8 pW	5.969 nSv	781.5 nSv
¹³⁹ La	¹³⁹ ₅₆ Ba	1.849 kg	13.31 M									
¹⁴⁰ La	¹⁴⁰ ₅₆ Ba	3.108 gm	22.21 mM	64.03 PBq	20.60 PBq	β ¹⁴⁰ ₅₈ Ce	1.679 d	2.827 MeV	29.00 kW	9.331 kW	128.1 MSv	41.20 MSv
¹⁴¹ La	¹⁴¹ ₅₆ Ba	275.4 mg	1.954 mM	57.66 PBq	209.4 PBq	β ¹⁴¹ ₅₈ Ce	3.920 h	990.4 keV	9.149 kW	33.22 kW	20.76 MSv	75.37 MSv
¹⁴² La	¹⁴² ₅₆ Ba	104.5 mg	736.4 μ M	55.26 PBq	528.8 PBq	β ¹⁴² ₅₈ Ce	1.518 h	3.571 MeV	31.61 kW	302.5 kW	9.947 MSv	95.18 MSv
¹⁴³ La	¹⁴³ ₅₆ Ba	14.93 mg	104.5 μ M	51.93 PBq	3.478 EBq	β ¹⁴³ ₅₈ Ce	14.14 m	1.971 MeV	16.40 kW	1.098 MW	2.908 MSv	194.8 MSv
¹⁴⁴ La	¹⁴⁴ ₅₆ Ba	626.5 μ g	4.353 μ M	45.45 PBq	72.55 EBq	β ¹⁴⁴ ₅₈ Ce	40.80 s	3.444 MeV	25.08 kW	40.03 MW		
¹⁴⁵ La	¹⁴⁵ ₅₆ Ba	335.1 μ g	2.312 μ M	33.29 PBq	99.34 EBq	β ¹⁴⁵ ₅₈ Ce	24.80 s	2.576 MeV	13.74 kW	41.00 MW		
¹⁴⁶ La	¹⁴⁶ ₅₆ Ba	63.73 μ g	436.7 nM	21.97 PBq	344.7 EBq	β ¹⁴⁶ ₅₈ Ce	6.270 s	4.123 MeV	14.51 kW	227.7 MW		
¹⁴⁷ La	¹⁴⁷ ₅₆ Ba	38.08 μ g	259.2 nM	10.82 PBq	284.1 EBq	β ¹⁴⁷ ₅₈ Ce	4.015 s	2.875 MeV	4.983 kW	130.9 MW		
¹⁴⁸ La	¹⁴⁸ ₅₆ Ba	1.896 μ g	12.82 nM	4.116 PBq	2.171×10^{12}	β ¹⁴⁸ ₅₈ Ce	1.260 s	4.600 MeV	3.033 kW	1.600 GW		
¹⁴⁹ La	¹⁴⁹ ₅₆ Ba	1.068 μ g	7.171 nM	1.046 PBq	979.4 EBq	β ¹⁴⁹ ₅₈ Ce	1.050 s	3.579 MeV	599.8 W	561.6 MW		
¹⁵⁰ La	¹⁵⁰ ₅₆ Ba	47.47 ng	316.6 pM	203.8 TBq	4.293×10^{12}	β n ¹⁴⁸ ₅₈ Ce						
¹⁵¹ La		9.004 ng	59.65 pM	26.12 TBq	2.901×10^{12}	β ¹⁵⁰ ₅₈ Ce	510.0 ms	5.268 MeV	172.0 W	3.623 GW		
¹⁵² La	¹⁵² ₅₆ Ba	329.2 pg	2.167 pM	2.924 TBq	8.882×10^{12}	β n ¹⁴⁹ ₅₈ Ce						
¹⁵³ La		48.11 pg	≤ 1 pM	300.5 GBq	6.246×10^{12}	β ¹⁵¹ ₅₈ Ce	300.0 ms	4.400 MeV	18.41 W	2.045 GW		
¹⁵⁴ La		≤ 1 pg	≤ 1 pM	13.86 GBq	1.547×10^{13}	β ¹⁵² ₅₈ Ce	280.0 ms	6.069 MeV	2.843 W	8.636 GW		
E ⁵⁷ La		1.853 kg	13.34 M	345.8 PBq	186.7 TBq	β n ¹⁵¹ ₅₈ Ce					161.7 MSv	87.27 kSv
¹⁴⁰ Pr		76.89 ng	549.6 pM	1.128 TBq	14.67 EBq	ϵ ¹⁴⁰ ₅₈ Ce	3.390 m	700.0 keV	126.5 mW	1.645 MW		
¹⁴¹ Pr	¹⁴¹ ₅₈ Ce	1.633 kg	11.59 M									
¹⁴² Pr	^{142m} ₅₉ Pr	97.62 mg	687.9 μ M	4.171 PBq	42.73 PBq	β ¹⁴² ₆₀ Nd	19.12 h	866.6 keV	579.1 W	5.932 kW	5.422 MSv	55.54 MSv
^{142m} Pr		243.3 μ g	1.714 μ M	816.8 TBq	3.357 EBq	ϵ ¹⁴² ₅₈ Ce						
¹⁴³ Pr	¹⁴³ ₅₈ Ce	20.87 gm	146.0 mM	52.04 PBq	2.494 PBq	γ ¹⁴² ₅₉ Pr	14.60 m	250.0 keV	32.71 W	134.4 kW	13.89 kSv	57.07 MSv
¹⁴⁴ Pr	¹⁴⁴ ₅₈ Ce	17.32 mg	120.4 μ M	48.45 PBq	2.797 EBq	β ¹⁴³ ₆₀ Nd	13.56 d	314.1 keV	2.619 kW	125.5 W	62.45 MSv	2.992 MSv
^{144m} Pr	¹⁴⁴ ₅₈ Ce	86.06 μ g	598.0 nM	577.7 TBq	6.713 EBq	β ¹⁴⁴ ₆₀ Nd	17.28 m	1.240 MeV	9.623 kW	555.6 kW	2.422 MSv	139.9 MSv
¹⁴⁵ Pr	¹⁴⁵ ₅₈ Ce	268.5 mg	1.853 mM	35.93 PBq	133.8 PBq	γ ¹⁴⁴ ₅₉ Pr	6.900 m	57.73 keV	5.343 W	62.08 kW		
¹⁴⁶ Pr	¹⁴⁶ ₅₈ Ce	14.83 mg	101.6 μ M	29.21 PBq	1.970 EBq	β ¹⁴⁴ ₆₀ Nd						
¹⁴⁷ Pr	¹⁴⁷ ₅₈ Ce	5.914 mg	40.25 μ M	23.34 PBq	3.947 EBq	β ¹⁴⁵ ₆₀ Nd	5.984 h	691.3 keV	3.979 kW	14.82 kW	14.01 MSv	52.19 MSv
						β ¹⁴⁶ ₆₀ Nd	24.15 m	2.562 MeV	11.99 kW	808.5 kW		
						β ¹⁴⁷ ₆₀ Nd	13.40 m	1.568 MeV	5.862 kW	991.2 kW	770.2 kSv	130.2 MSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹⁴⁸ Pr	¹⁴⁸ Ce	919.5 μg	6.216 μM	18.80 PBq	20.45 EBq	β ¹⁴⁸ Nd	2.290 m	2.821 MeV	8.497 kW	9.241 MW		
¹⁴⁹ Pr	¹⁴⁹ Ce	660.1 μg	4.432 μM	13.41 PBq	20.32 EBq	β ¹⁴⁹ Nd	2.260 m	1.409 MeV	3.026 kW	4.584 MW		
¹⁵⁰ Pr	¹⁵⁰ Ce	41.17 μg	274.6 nM	9.245 PBq	224.6 EBq	β ¹⁵⁰ Nd	6.100 s	3.212 MeV	4.757 kW	115.5 MW		
¹⁵¹ Pr	¹⁵¹ Ce	7.554 μg	50.05 nM	5.222 PBq	691.3 EBq	β ¹⁵¹ Nd	18.90 s	2.378 MeV	1.989 kW	263.3 MW		
¹⁵² Pr	¹⁵² Ce	7.102 μg	46.74 nM	2.346 PBq	330.3 EBq	β ¹⁵² Nd	3.630 s	3.986 MeV	1.498 kW	210.9 MW		
¹⁵³ Pr	¹⁵³ Ce	2.143 μg	14.01 nM	755.4 TBq	352.5 EBq	β ¹⁵³ Nd	4.280 s	3.143 MeV	380.4 W	177.5 MW		
¹⁵⁴ Pr	¹⁵⁴ Ce	89.22 ng	579.6 pM	185.2 TBq	2.076×10 ¹²	β ¹⁵⁴ Nd	2.300 s	4.722 MeV	140.1 W	1.570 GW		
¹⁵⁵ Pr	¹⁵⁵ Ce	25.89 ng	167.1 pM	36.90 TBq	1.425×10 ¹²	β ¹⁵⁵ Nd	1.000 s	3.882 MeV	22.95 W	886.4 MW		
¹⁵⁶ Pr	¹⁵⁶ Ce	1.321 ng	8.471 pM	6.928 TBq	5.245×10 ¹²	β ¹⁵⁶ Nd	500.0 ms	5.509 MeV	6.114 W	4.628 GW		
¹⁵⁷ Pr	¹⁵⁷ Ce	262.6 pg	1.673 pM	1.030 TBq	2.717% →	β n ¹⁵⁵ Nd	300.0 ms	4.789 MeV	790.2 mW	3.009 GW		
					3.922×10 ¹²	β n ¹⁵⁶ Nd						
¹⁵⁸ Pr		7.339 pg	≤ 1 pM	73.80 GBq	6.387% →	β ¹⁵⁸ Nd	200.0 ms	6.316 MeV	74.68 mW	10.18 GW		
					1.006×10 ¹³	β ¹⁵⁹ Nd						
¹⁵⁹ Pr		≤ 1 pg	≤ 1 pM	2.832 GBq	8.364×10 ¹²	β ¹⁵⁹ Nd	100.0 ms	5.726 MeV	2.598 mW	7.673 GW		
E ⁵⁹ Pr		1.654 kg	11.74 M	244.5 PBq	147.8 TBq				55.01 kW	33.25 W	85.09 MSv	51.44 kSv
¹⁴⁶ Pm		9.383 mg	64.31 μM	154.7 GBq	16.49 TBq	ε ¹⁴⁶ Nd	5.531 y	850.6 keV	21.08 mW	2.247 W	139.2 Sv	14.84 kSv
¹⁴⁷ Pm	¹⁴⁷ Nd	146.8 gm	999.2 mM	5.041 PBq	34% →	β ¹⁴⁶ Sm	2.623 y	60.46 keV	48.83 W	332.6 mW	1.311 MSv	8.928 kSv
					34.34 TBq	β ¹⁴⁷ Sm						
¹⁴⁸ Pm	^{148m} Pm	1.746 gm	11.80 mM	10.62 PBq	6.082 PBq	β ¹⁴⁸ Sm	5.368 d	1.298 MeV	2.209 kW	1.265 kW	28.67 MSv	16.42 MSv
^{148m} Pm		1.574 gm	10.64 mM	1.245 PBq	791.0 TBq	β ¹⁴⁸ Sm	41.05 d	2.138 MeV	426.5 W	271.0 W	2.116 MSv	1.345 MSv
¹⁴⁹ Pm	¹⁴⁹ Nd	1.549 gm	10.40 mM	22.73 PBq	5% →	γ ¹⁴⁸ Pm	2.212 d	376.8 keV	1.372 kW	885.7 W	22.50 MSv	14.53 MSv
					14.67 PBq	β ¹⁴⁹ Sm						
¹⁵⁰ Pm		867.1 μg	5.784 μM	250.3 TBq	288.7 PBq	β ¹⁵⁰ Sm	2.680 h	2.282 MeV	91.52 W	105.5 kW	65.08 kSv	75.05 MSv
¹⁵¹ Pm	¹⁵¹ Nd	290.6 mg	1.926 mM	7.865 PBq	27.06 PBq	β ¹⁵¹ Sm	1.183 d	620.9 keV	782.3 W	2.692 kW	5.741 MSv	19.76 MSv
¹⁵² Pm	¹⁵² Nd	503.5 μg	3.314 μM	5.626 PBq	11.17 EBq	β ¹⁵² Sm	4.120 m	1.726 MeV	1.556 kW	3.090 MW		
^{152m} Pm		17.44 μg	114.8 nM	106.5 TBq	6.107 EBq	β ¹⁵² Sm	7.520 m	1.706 MeV	29.11 W	1.669 MW		
¹⁵³ Pm	¹⁵³ Nd	441.8 μg	2.889 μM	3.723 PBq	8.427 EBq	β ¹⁵³ Sm	5.250 m	749.8 keV	447.2 W	1.012 MW		
¹⁵⁴ Pm	¹⁵⁴ Nd	134.4 μg	873.1 nM	2.170 PBq	16.15 EBq	β ¹⁵⁴ Sm	1.730 m	2.644 MeV	919.1 W	6.839 MW		
^{154m} Pm		14.78 μg	96.02 nM	371.2 TBq	25.12 EBq	β ¹⁵⁴ Sm	2.680 m	2.554 MeV	151.9 W	10.28 MW		
¹⁵⁵ Pm	¹⁵⁵ Nd	18.95 μg	122.3 nM	1.397 PBq	73.72 EBq	β ¹⁵⁵ Sm	41.50 s	1.960 MeV	438.7 W	23.15 MW		
¹⁵⁶ Pm	¹⁵⁶ Nd	3.919 μg	25.13 nM	800.9 TBq	204.4 EBq	β ¹⁵⁶ Sm	26.70 s	3.215 MeV	412.5 W	105.3 MW		
¹⁵⁷ Pm	¹⁵⁷ Nd	10.11 μg	64.42 nM	395.3 TBq	39.10 EBq	β ¹⁵⁷ Sm	10.56 s	2.626 MeV	166.3 W	16.45 MW		
¹⁵⁸ Pm	¹⁵⁸ Nd	187.9 ng	1.190 nM	130.7 TBq	695.6 EBq	β ¹⁵⁸ Sm	4.800 s	4.143 MeV	86.75 W	461.7 MW		
¹⁵⁹ Pm	¹⁵⁹ Nd	48.21 ng	303.3 pM	29.94 TBq	621.0 EBq	β ¹⁵⁹ Sm	3.000 s	3.455 MeV	16.57 W	343.7 MW		
¹⁶⁰ Pm	¹⁶⁰ Nd	1.822 ng	11.39 pM	4.774 TBq	0.018% →	β n ¹⁵⁸ Sm	2.000 s	4.893 MeV	3.742 W	2.054 GW		
					2.620×10 ¹²	β ¹⁶⁰ Sm						
¹⁶¹ Pm	¹⁶¹ Nd	250.2 pg	1.555 pM	546.3 GBq	0.268% →	β n ¹⁵⁹ Sm	700.0 ms	4.321 MeV	378.2 mW	1.512 GW		
					2.183×10 ¹²	β ¹⁶¹ Sm						

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Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹⁶² Pm E ₆₁ Pm		3.534 pg 152.0 gm	≤ 1 pM 1.034 M	22.79 GBq 62.51 PBq	6.449×10 ¹² 411.3 TBq	β ¹⁶² ₆₂ Sm	500.0 ms	5.815 MeV	21.23 mW 9.158 kW	6.007 GW 60.26 W	60.41 MSv	397.5 kSv
⁹⁵ Mo ⁹⁶ Mo ⁹⁷ Mo ⁹⁸ Mo ⁹⁹ Mo	⁹⁵ Nb ₄₁ ⁹⁶ Zr ₄₀ ⁹⁷ Nb ₄₁ ⁹⁸ Nb ₄₁ ⁹⁹ Nb ₄₁	1.004 kg 80.49 gm 1.201 kg 1.238 kg 3.841 gm	10.58 M 839.3 mM 12.39 M 12.64 M 38.83 mM									
¹⁰⁰ Mo ¹⁰¹ Mo ¹⁰² Mo ¹⁰³ Mo ¹⁰⁴ Mo ¹⁰⁵ Mo ¹⁰⁶ Mo ¹⁰⁷ Mo ¹⁰⁸ Mo ¹⁰⁹ Mo	¹⁰⁰ Nb ₄₁ ¹⁰¹ Nb ₄₁ ¹⁰² Nb ₄₁ ¹⁰³ Nb ₄₁ ¹⁰⁴ Nb ₄₁ ¹⁰⁵ Nb ₄₁ ¹⁰⁶ Nb ₄₁ ¹⁰⁷ Nb ₄₁ ¹⁰⁸ Nb ₄₁ ¹⁰⁹ Nb ₄₁	1.423 kg 13.21 mg 9.847 mg 890.1 μg 1.192 mg 492.2 μg 46.26 μg 12.57 μg 804.9 ng 168.4 ng	14.24 M 130.9 μM 96.62 μM 8.649 μM 11.47 μM 4.691 μM 436.8 nM 117.6 nM 7.458 nM 1.546 nM									
¹¹⁰ Mo ¹¹¹ Mo ¹¹² Mo ¹¹³ Mo ¹¹⁴ Mo ¹¹⁵ Mo A ₄₂ Mo	¹¹⁰ Nb ₄₁ ¹¹¹ Nb ₄₁	59.17 ng 2.486 ng 802.6 pg 16.46 pg 2.763 pg ≤ 1 pg 4.950 kg	538.3 pM 22.41 pM 7.170 pM ≤ 1 pM ≤ 1 pM ≤ 1 pM 50.74 M									
⁹² Nb ⁹³ Nb ^{93m} Nb ⁹⁴ Nb ^{94m} Nb ⁹⁵ Nb ^{95m} Nb ⁹⁶ Nb ⁹⁷ Nb	⁹³ Zr ₄₀ ⁹³ Zr ₄₀ ^{94m} Nb ₄₁ ⁹⁵ Zr ₄₀ ⁹⁵ Zr ₄₀ ⁹⁷ Zr ₄₀	20.21 pg 126.4 μg 891.3 μg 1.182 mg 4.048 ng 40.07 gm 29.14 mg 2.463 mg 59.36 mg	≤ 1 pM 1.361 μM 9.594 μM 12.59 μM 43.11 pM 422.2 mM 307.0 μM 25.68 μM 612.5 μM									

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
^{97m} Nb	⁹⁷ / ₄₀ Zr	773.2 μg	7.979 μM	55.48 PBq	71.75 EBq	γ ⁹⁷ / ₄₁ Nb	52.70 s	742.7 keV	6.601 kW	8.537 MW	73.19 kSv	151.7 MSv
⁹⁸ Nb	⁹⁸ / ₄₀ Zr	39.81 μg	406.6 nM	60.62 PBq	1.523×10 ¹²	β ⁹⁸ / ₄₂ Mo	2.860 s	2.081 MeV	20.21 kW	507.7 MW		
^{98m} Nb		482.5 μg	4.928 μM	665.4 TBq	1.379 EBq	β ⁹⁸ / ₄₂ Mo	51.30 m	3.245 MeV	345.9 W	716.9 kW		
⁹⁹ Nb	⁹⁹ / ₄₀ Zr	209.3 μg	2.116 μM	61.77 PBq	295.1 EBq	β ⁹⁹ / ₄₂ Mo	15.00 s	1.556 MeV	15.40 kW	73.58 MW		
^{99m} Nb	⁹⁹ / ₄₀ Zr	99.19 μg	1.003 μM	2.683 PBq	27.05 EBq	β ⁹⁹ / ₄₂ Mo	2.600 m	2.168 MeV	932.0 W	9.396 MW		
					2% →	γ ⁹⁹ / ₄₁ Nb						
¹⁰⁰ Nb	¹⁰⁰ / ₄₀ Zr	19.88 μg	199.0 nM	34.60 PBq	1.740×10 ¹²	β ¹⁰⁰ / ₄₂ Mo	1.500 s	3.980 MeV	22.06 kW	1.110 GW		
^{100m} Nb		19.96 μg	199.8 nM	34.60 PBq	1.733×10 ¹²	β ¹⁰⁰ / ₄₂ Mo	2.900 s	3.484 MeV	19.31 kW	967.4 MW		
¹⁰¹ Nb	¹⁰¹ / ₄₀ Zr	97.66 μg	967.8 nM	57.70 PBq	590.8 EBq	β ¹⁰¹ / ₄₂ Mo	7.100 s	2.231 MeV	20.62 kW	211.1 MW		
¹⁰² Nb	¹⁰² / ₄₀ Zr	36.52 μg	358.3 nM	49.85 PBq	1.365×10 ¹²	β ¹⁰² / ₄₂ Mo	1.300 s	4.173 MeV	33.33 kW	912.7 MW		
¹⁰³ Nb	¹⁰³ / ₄₀ Zr	137.2 μg	1.333 μM	35.50 PBq	258.7 EBq	β ¹⁰³ / ₄₂ Mo	1.500 s	3.117 MeV	17.73 kW	129.2 MW		
¹⁰⁴ Nb	¹⁰⁴ / ₄₀ Zr	4.426 μg	42.59 nM	17.78 PBq	4.017×10 ¹²	β ¹⁰⁴ / ₄₂ Mo	4.900 s	5.094 MeV	14.51 kW	3.278 GW		
					0.06% →	β n ¹⁰³ / ₄₂ Mo						
¹⁰⁵ Nb	¹⁰⁵ / ₄₀ Zr	2.799 μg	26.68 nM	6.184 PBq	2.209×10 ¹²	β ¹⁰⁵ / ₄₂ Mo	2.950 s	3.956 MeV	3.919 kW	1.400 GW		
					1.7% →	β n ¹⁰⁴ / ₄₂ Mo						
¹⁰⁶ Nb	¹⁰⁶ / ₄₀ Zr	224.4 ng	2.118 nM	1.652 PBq	7.362×10 ¹²	β ¹⁰⁶ / ₄₂ Mo	920.0 ms	6.004 MeV	1.589 kW	7.081 GW		
					4.5% →	β n ¹⁰⁵ / ₄₂ Mo						
¹⁰⁷ Nb	¹⁰⁷ / ₄₀ Zr	44.28 ng	414.1 pM	258.2 TBq	5.831×10 ¹²	β ¹⁰⁷ / ₄₂ Mo	300.0 ms	4.968 MeV	205.5 W	4.641 GW		
					6% →	β n ¹⁰⁶ / ₄₂ Mo						
¹⁰⁸ Nb	¹⁰⁸ / ₄₀ Zr	2.778 ng	25.74 pM	48.37 TBq	1.741×10 ¹³	β ¹⁰⁸ / ₄₂ Mo	193.0 ms	7.014 MeV	54.35 W	19.56 GW		
					6.2% →	β n ¹⁰⁷ / ₄₂ Mo						
¹⁰⁹ Nb	¹⁰⁹ / ₄₀ Zr	697.3 pg	6.401 pM	9.341 TBq	1.340×10 ¹³	β ¹⁰⁹ / ₄₂ Mo	190.0 ms	5.894 MeV	8.820 W	12.65 GW		
					12.653% →	β n ¹⁰⁸ / ₄₂ Mo						
¹¹⁰ Nb		34.69 pg	≤ 1 pM	1.047 TBq	3.018×10 ¹³	β ¹¹⁰ / ₄₂ Mo	170.0 ms	7.828 MeV	1.313 W	37.85 GW		
					4% →	β n ¹⁰⁹ / ₄₂ Mo						
¹¹¹ Nb		3.686 pg	≤ 1 pM	88.86 GBq	2.411×10 ¹³	β ¹¹¹ / ₄₂ Mo	80.00 ms	6.772 MeV	96.40 mW	26.15 GW		
A ₄₁ Nb		40.17 gm	423.2 mM	537.0 PBq	13.37 PBq				195.0 kW	4.856 kW	38.10 MSv	948.5 kSv
¹⁴² Nd	¹⁴² / ₅₈ Ce	51.55 gm	363.3 mM									
¹⁴³ Nd	¹⁴³ / ₅₉ Pr	1.093 kg	7.648 M									
¹⁴⁴ Nd	¹⁴⁴ / ₅₉ Pr	1.664 kg	11.56 M	66.79 Bq	40.14 mBq	α ¹⁴⁰ / ₅₈ Ce	2.290 Py	1.905 MeV	20.39 pW	≤ 1 pW		
¹⁴⁵ Nd	¹⁴⁵ / ₅₉ Pr	975.5 gm	6.732 M									
¹⁴⁶ Nd	¹⁴⁶ / ₅₉ Pr	1.091 kg	7.477 M									
¹⁴⁷ Nd	¹⁴⁷ / ₅₉ Pr	7.896 gm	53.74 mM	23.48 PBq	2.974 PBq	β ¹⁴⁷ / ₆₁ Pm	10.98 d	407.0 keV	1.531 kW	193.9 W	25.83 MSv	3.271 MSv
¹⁴⁸ Nd	¹⁴⁸ / ₅₉ Pr	563.2 gm	3.808 M	18.65 mBq	33.12 μBq	2β ¹⁴⁸ / ₆₂ Sm	2.700 Ey	1.929 MeV	≤ 1 pW	≤ 1 pW		
¹⁴⁹ Nd	¹⁴⁹ / ₅₉ Pr	31.98 mg	214.7 μM	14.39 PBq	450.0 PBq	β ¹⁴⁹ / ₆₁ Pm	1.728 h	890.1 keV	2.052 kW	64.17 kW	1.727 MSv	54.00 MSv
¹⁵⁰ Nd	¹⁵⁰ / ₅₉ Pr	273.6 gm	1.825 M	1.150 mBq	4.201 μBq	2β ¹⁵⁰ / ₆₂ Sm	21.00 Ey	3.368 MeV	≤ 1 pW	≤ 1 pW		
¹⁵¹ Nd	¹⁵¹ / ₅₉ Pr	2.113 mg	14.00 μM	7.854 PBq	3.717 EBq	β ¹⁵¹ / ₆₁ Pm	12.44 m	1.483 MeV	1.866 kW	883.1 kW	235.6 kSv	111.5 MSv
¹⁵² Nd	¹⁵² / ₅₉ Pr	1.376 mg	9.057 μM	5.481 PBq	3.983 EBq	β ¹⁵² / ₆₁ Pm	11.40 m	561.8 keV	493.3 W	358.5 kW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹⁵³ Nd	¹⁵³ Pr	80.93 μg	529.2 nM	3.272 PBq	40.43 EBq	β ¹⁵³ Pm	31.60 s	2.087 MeV	1.094 kW	13.52 MW		
¹⁵⁴ Nd	¹⁵⁴ Pr	25.97 μg	168.7 nM	1.761 PBq	67.81 EBq	β ¹⁵⁴ Pm	25.90 s	1.079 MeV	304.4 W	11.72 MW		
¹⁵⁵ Nd	¹⁵⁵ Pr	6.700 μg	43.24 nM	692.8 TBq	103.4 EBq	β ¹⁵⁵ Pm	8.900 s	2.552 MeV	283.3 W	42.28 MW		
¹⁵⁶ Nd	¹⁵⁶ Pr	5.595 μg	35.88 nM	256.1 TBq	45.77 EBq	β ¹⁵⁶ Pm	5.490 s	1.725 MeV	70.76 W	12.65 MW		
¹⁵⁷ Nd	¹⁵⁷ Pr	112.9 ng	719.4 pM	72.43 TBq	641.5 EBq	β ¹⁵⁷ Pm	2.500 s	3.244 MeV	37.64 W	333.4 MW		
¹⁵⁸ Nd	¹⁵⁸ Pr	32.80 ng	207.7 pM	10.99 TBq	335.1 EBq	β ¹⁵⁸ Pm	700.0 ms	2.536 MeV	4.465 W	136.1 MW		
¹⁵⁹ Nd	¹⁵⁹ Pr	567.6 pg	3.571 pM	1.059 TBq	0.005% → 1.866×10 ¹²	β n ¹⁵⁷ Pm β ¹⁵⁹ Pm	500.0 ms	3.958 MeV	671.5 mW	1.183 GW		
¹⁶⁰ Nd		61.00 pg	≤ 1 pM	75.09 GBq	0.236% → 1.231×10 ¹²	β n ¹⁵⁸ Pm β ¹⁶⁰ Pm	300.0 ms	3.371 MeV	40.55 mW	664.8 MW		
¹⁶¹ Nd		1.089 pg	≤ 1 pM	5.081 GBq	0.947% → 4.666×10 ¹²	β n ¹⁵⁹ Pm β ¹⁶¹ Pm	200.0 ms	4.869 MeV	3.963 mW	3.639 GW		
E ⁶⁰ Nd		5.720 kg	39.47 M	57.27 PBq	10.01 TBq				7.738 kW	1.353 W	27.79 MSv	4.859 kSv
¹⁵⁰ Eu	¹⁵¹ Sm	454.6 ng	3.032 nM	1.114 MBq	2.451 TBq	ϵ ¹⁵⁰ Sm	36.36 y	1.540 MeV	274.9 nW	604.7 mW	1.448 mSv	3.186 kSv
¹⁵¹ Eu		17.81 mg	119.0 μM	926.2 nBq	52.00 μBq	α ¹⁴⁷ Pm	1.700 Ey	1.905 MeV	≤ 1 pW	≤ 1 pW		
¹⁵² Eu		63.01 mg	414.8 μM	403.4 GBq	6.402 TBq	ϵ ¹⁵² Sm	13.52 y	1.276 MeV	82.45 mW	1.309 W	564.8 Sv	8.963 kSv
^{152m} Eu		71.01 μg	467.4 nM	5.818 TBq	27.9% → 81.93 PBq	β ¹⁵² Gd β ¹⁵² Gd	9.275 h	809.9 keV	754.9 mW	10.63 kW	2.909 kSv	40.97 MSv
					28% →	ϵ ¹⁵² Sm						
¹⁵³ Eu	¹⁵³ Sm	194.4 gm	1.271 M									
¹⁵⁴ Eu		65.94 gm	428.4 mM	659.1 TBq	9.995 TBq	β ¹⁵⁴ Gd	8.593 y	1.509 MeV	159.3 W	2.416 W	1.318 MSv	19.99 kSv
					0.02% →	ϵ ¹⁵⁴ Sm						
¹⁵⁵ Eu	¹⁵⁵ Sm	25.82 gm	166.7 mM	444.9 TBq	17.23 TBq	β ¹⁵⁵ Gd	4.753 y	122.6 keV	8.739 W	338.5 mW	142.4 kSv	5.514 kSv
¹⁵⁶ Eu	¹⁵⁶ Sm	5.259 gm	33.73 mM	10.73 PBq	2.040 PBq	β ¹⁵⁶ Gd	15.19 d	1.741 MeV	2.993 kW	569.1 W	23.61 MSv	4.489 MSv
¹⁵⁷ Eu	¹⁵⁷ Sm	24.89 mg	158.6 μM	1.210 PBq	48.61 PBq	β ¹⁵⁷ Gd	15.18 h	752.1 keV	145.8 W	5.858 kW	726.0 kSv	29.17 MSv
¹⁵⁸ Eu	¹⁵⁸ Sm	440.9 μg	2.792 μM	423.4 TBq	960.3 PBq	β ¹⁵⁸ Gd	45.90 m	2.129 MeV	144.4 W	327.5 kW	39.80 kSv	90.27 MSv
¹⁵⁹ Eu	¹⁵⁹ Sm	94.46 μg	594.4 nM	228.5 TBq	2.419 EBq	β ¹⁵⁹ Gd	18.10 m	1.582 MeV	57.90 W	613.0 kW		
¹⁶⁰ Eu	¹⁶⁰ Sm	2.028 μg	12.68 nM	103.8 TBq	51.18 EBq	β ¹⁶⁰ Gd	38.00 s	2.268 MeV	37.72 W	18.60 MW		
¹⁶¹ Eu	¹⁶¹ Sm	727.2 ng	4.519 nM	44.86 TBq	61.69 EBq	β ¹⁶¹ Gd	26.00 s	2.076 MeV	14.92 W	20.52 MW		
¹⁶² Eu	¹⁶² Sm	1.337 μg	8.256 nM	12.78 TBq	9.559 EBq	β ¹⁶² Gd	10.60 s	3.348 MeV	6.854 W	5.126 MW		
¹⁶³ Eu	¹⁶³ Sm	16.92 ng	103.8 pM	2.921 TBq	172.6 EBq	β ¹⁶³ Gd	6.000 s	3.007 MeV	1.407 W	83.16 MW		
¹⁶⁴ Eu	¹⁶⁴ Sm	483.3 pg	2.948 pM	567.4 GBq	1.174×10 ¹²	β ¹⁶⁴ Gd	2.000 s	4.407 MeV	400.6 mW	828.9 MW		
¹⁶⁵ Eu	¹⁶⁵ Sm	86.70 pg	≤ 1 pM	86.12 GBq	993.3 EBq	β ¹⁶⁵ Gd	1.000 s	3.780 MeV	52.15 mW	601.5 MW		
E ⁶³ Eu		291.5 gm	1.901 M	13.87 PBq	47.57 TBq				3.571 kW	12.25 W	25.84 MSv	88.62 kSv
¹²¹ Sb	¹²¹ Sn	12.18 gm	100.7 mM									
¹²² Sb	^{122m} Sb	8.627 mg	70.77 μM	126.6 TBq	14.67 PBq	β ¹²² Te	2.700 d	1.006 MeV	20.40 W	2.365 kW	215.2 kSv	24.95 MSv
					2.6% →	ϵ ¹²² Sn						
^{122m} Sb		73.16 ng	600.1 pM	994.1 GBq	13.59 EBq	γ ¹²² Sb	4.190 m	161.9 keV	25.79 mW	352.5 kW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹²³ Sb	¹²³ ₅₀ Sn	14.76 gm	120.1 mM									
¹²⁴ Sb	^{124m} ₅₁ Sb	128.6 mg	1.038 mM	83.27 TBq	647.5 TBq	β ¹²⁴ ₅₂ Te	60.20 d	2.240 MeV	29.88 W	232.3 W	208.2 kSv	1.619 MSv
^{124m} Sb		14.32 ng	115.6 pM	518.5 GBq	36.21 EBq	γ ¹²⁴ ₅₁ Sb	1.550 m	433.6 keV	36.02 mW	2.515 MW		
					25% →	β ¹²⁴ ₅₂ Te						
¹²⁵ Sb	¹²⁵ ₅₀ Sn	19.53 gm	156.4 mM	746.5 TBq	38.22 TBq	β ¹²⁵ ₅₂ Te	2.759 y	527.4 keV	63.07 W	3.229 W	821.2 kSv	42.05 kSv
					22.377% →	β ^{125m} ₅₂ Te						
¹²⁶ Sb	^{126m} ₅₁ Sb	17.14 mg	136.1 μM	53.04 TBq	3.095 PBq	β ¹²⁶ ₅₂ Te	12.40 d	3.116 MeV	26.48 W	1.545 kW	127.3 kSv	7.427 MSv
^{126m} Sb	¹²⁶ ₅₀ Sn	7.056 μg	56.04 nM	20.52 TBq	2.908 EBq	β ¹²⁶ ₅₂ Te	19.10 m	2.148 MeV	7.060 W	1.001 MW	738.7 Sv	104.7 MSv
					14% →	γ ¹²⁶ ₅₁ Sb						
¹²⁷ Sb	¹²⁷ ₅₀ Sn	438.4 mg	3.454 mM	4.334 PBq	9.886 PBq	β ¹²⁷ ₅₂ Te	3.850 d	1.001 MeV	695.0 W	1.585 kW	7.368 MSv	16.81 MSv
					16.479% →	β ^{127m} ₅₂ Te						
¹²⁸ Sb	¹²⁸ ₅₀ Sn	5.954 mg	46.55 μM	598.8 TBq	100.6 PBq	β ¹²⁸ ₅₂ Te	9.010 h	3.482 MeV	334.0 W	56.10 kW	455.1 kSv	76.43 MSv
^{128m} Sb	¹²⁸ ₅₀ Sn	1.301 mg	10.17 μM	6.806 PBq	5.231 EBq	β ¹²⁸ ₅₂ Te	10.40 m	2.959 MeV	3.226 kW	2.480 MW	224.6 kSv	172.6 MSv
					3.6% →	γ ¹²⁸ ₅₁ Sb						
¹²⁹ Sb	¹²⁹ ₅₀ Sn	59.69 mg	463.0 μM	12.43 PBq	208.2 PBq	β ¹²⁹ ₅₂ Te	4.360 h	1.884 MeV	3.752 kW	62.86 kW	5.221 MSv	87.46 MSv
					16.6% →	β ^{129m} ₅₂ Te						
¹³⁰ Sb		3.048 mg	23.46 μM	4.079 PBq	1.338 EBq	β ¹³⁰ ₅₂ Te	39.50 m	3.950 MeV	2.581 kW	846.8 kW	371.2 kSv	121.8 MSv
^{130m} Sb	¹³⁰ ₅₀ Sn	2.056 mg	15.83 μM	17.48 PBq	8.502 EBq	β ¹³⁰ ₅₂ Te	6.300 m	3.714 MeV	10.40 kW	5.058 MW		
¹³¹ Sb	¹³¹ ₅₀ Sn	13.09 mg	99.99 μM	30.26 PBq	2.312 EBq	β ¹³¹ ₅₂ Te	23.03 m	2.440 MeV	11.83 kW	903.7 kW	3.026 MSv	231.2 MSv
					8.006% →	β ^{131m} ₅₂ Te						
¹³² Sb	¹³² ₅₀ Sn	931.5 μg	7.061 μM	17.55 PBq	18.84 EBq	β ¹³² ₅₂ Te	2.790 m	3.934 MeV	11.06 kW	11.87 MW		
^{132m} Sb	¹³² ₅₀ Sn	931.4 μg	7.061 μM	11.70 PBq	12.56 EBq	β ¹³² ₅₂ Te	4.100 m	3.929 MeV	7.364 kW	7.906 MW		
¹³³ Sb	¹³³ ₅₀ Sn	903.3 μg	6.796 μM	19.70 PBq	21.81 EBq	β ¹³³ ₅₂ Te	2.500 m	3.698 MeV	11.67 kW	12.92 MW		
					17.289% →	β ^{133m} ₅₂ Te						
¹³⁴ Sb	¹³⁴ ₅₀ Sn	12.36 μg	92.29 nM	3.503 PBq	283.4 EBq	β ¹³⁴ ₅₂ Te	780.0 ms	4.929 MeV	2.766 kW	223.8 MW		
^{134m} Sb	¹³⁵ ₅₀ Sn	11.15 μg	83.26 nM	3.248 PBq	291.3 EBq	β ¹³⁴ ₅₂ Te	10.07 s	5.047 MeV	2.626 kW	235.5 MW		
					0.046% →	β n ¹³³ ₅₂ Te						
					0.046% →	β n ^{133m} ₅₂ Te						
¹³⁵ Sb	¹³⁵ ₅₀ Sn	996.9 ng	7.389 nM	1.815 PBq	1.821 × 10 ¹²	β ¹³⁵ ₅₂ Te	1.740 s	4.870 MeV	1.416 kW	1.420 GW		
					15.7% →	β n ¹³⁴ ₅₂ Te						
¹³⁶ Sb	¹³⁶ ₅₀ Sn	27.31 ng	200.9 pM	362.6 TBq	1.328 × 10 ¹³	β ¹³⁶ ₅₂ Te	923.0 ms	6.574 MeV	381.9 W	13.98 GW		
					16.3% →	β n ¹³⁵ ₅₂ Te						
					0.28% →	β n n ¹³⁴ ₅₂ Te						
¹³⁷ Sb		5.174 ng	37.78 pM	55.63 TBq	1.075 × 10 ¹³	β ¹³⁷ ₅₂ Te	450.0 ms	5.843 MeV	52.07 W	10.06 GW		
					49% →	β n ¹³⁶ ₅₂ Te						
¹³⁸ Sb		300.3 pg	2.177 pM	6.973 TBq	2.322 × 10 ¹³	β ¹³⁸ ₅₂ Te	500.0 ms	7.445 MeV	8.317 W	27.70 GW		
¹³⁹ Sb		29.49 pg	≤ 1 pM	515.5 GBq	1.748 × 10 ¹³	β ¹³⁹ ₅₂ Te	300.0 ms	6.494 MeV	536.3 mW	18.19 GW		
E ₅₁ Sb		47.15 gm	382.6 mM	135.0 PBq	2.862 PBq				70.31 kW	1.491 kW	18.04 MSv	382.6 kSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹⁴⁶ Sm	¹⁴⁶ Pm	10.19 mg	69.84 μM	13.20 kBq	1.295 MBq	α ¹⁴² Nd	100.0 My	2.540 MeV	5.371 nW	527.1 nW	712.8 μSv	69.95 mSv
¹⁴⁷ Sm	¹⁴⁷ Pm	89.07 gm	606.3 mM	74.95 kBq	841.5 Bq	α ¹⁴³ Nd	106.0 Gy	2.309 MeV	27.73 nW	311.3 pW	3.673 mSv	41.23 μSv
¹⁴⁸ Sm	¹⁴⁸ Nd	306.2 gm	2.070 M	3.422 Bq	11.18 mBq	α ¹⁴⁴ Nd	7.000 Py	2.014 MeV	1.104 pW	≤ 1 pW		
¹⁴⁹ Sm	¹⁴⁹ Pm	3.034 gm	20.37 mM	134.7 mBq	44.41 mBq	α ¹⁴⁵ Nd	2.000 Py	1.870 MeV	≤ 1 pW	≤ 1 pW		
¹⁵⁰ Sm	¹⁵⁰ Nd	478.3 gm	3.190 M									
¹⁵¹ Sm	¹⁵¹ Pm	22.53 gm	149.3 mM	21.95 TBq	974.3 GBq	β ¹⁵¹ Eu	90.00 y	19.77 keV	69.52 mW	3.086 mW	2.151 kSv	95.48 Sv
¹⁵² Sm	¹⁵² Pm	178.2 gm	1.173 M									
¹⁵³ Sm	¹⁵³ Pm	1.392 gm	9.103 mM	22.61 PBq	16.24 PBq	β ¹⁵³ Eu	1.928 d	330.7 keV	1.198 kW	860.6 W	16.73 MSv	12.02 MSv
¹⁵⁴ Sm	¹⁵⁴ Pm	59.76 gm	388.2 mM									
¹⁵⁵ Sm	¹⁵⁵ Pm	834.3 μg	5.385 μM	1.688 PBq	2.023 EBq	β ¹⁵⁵ Eu	22.30 m	983.6 keV	266.0 W	318.8 kW	48.95 kSv	58.67 MSv
¹⁵⁶ Sm	¹⁵⁶ Pm	13.46 mg	86.32 μM	1.066 PBq	79.20 PBq	β ¹⁵⁶ Eu	9.400 h	426.7 keV	72.87 W	5.414 kW	266.5 kSv	19.80 MSv
¹⁵⁷ Sm	¹⁵⁷ Pm	129.0 μg	822.0 nM	715.0 TBq	5.543 EBq	β ¹⁵⁷ Eu	8.030 m	1.521 MeV	174.2 W	1.350 MW		
¹⁵⁸ Sm	¹⁵⁸ Pm	394.7 μg	2.499 μM	395.3 TBq	1.002 EBq	β ¹⁵⁸ Eu	5.300 m	706.9 keV	44.77 W	113.4 kW		
¹⁵⁹ Sm	¹⁵⁹ Pm	11.66 μg	73.36 nM	188.9 TBq	16.20 EBq	β ¹⁵⁹ Eu	11.37 s	1.977 MeV	59.82 W	5.130 MW		
¹⁶⁰ Sm	¹⁶⁰ Pm	9.073 μg	56.73 nM	67.84 TBq	7.477 EBq	β ¹⁶⁰ Eu	9.600 s	1.791 MeV	19.46 W	2.145 MW		
¹⁶¹ Sm	¹⁶¹ Pm	91.56 ng	568.9 pM	18.45 TBq	201.5 EBq	β ¹⁶¹ Eu	4.800 s	2.744 MeV	8.112 W	88.60 MW		
¹⁶² Sm	¹⁶² Pm	17.38 ng	107.3 pM	2.287 TBq	131.6 EBq	β ¹⁶² Eu	2.400 s	2.179 MeV	798.2 mW	45.93 MW		
¹⁶³ Sm		247.2 pg	1.517 pM	247.2 GBq	1000.0 EBq	β ¹⁶³ Eu	1.000 s	3.578 MeV	141.7 mW	573.2 MW		
¹⁶⁴ Sm		34.37 pg	≤ 1 pM	20.61 GBq	599.7 EBq	β ¹⁶⁴ Eu	500.0 ms	2.937 MeV	9.696 mW	282.1 MW		
¹⁶⁵ Sm		≤ 1 pg	≤ 1 pM	1.244 GBq	2.731 × 10 ¹²	β ¹⁶⁵ Eu	200.0 ms	4.385 MeV	874.0 μW	1.919 GW		
E ⁶² Sm		1.139 kg	7.607 M	26.77 PBq	23.52 TBq				1.844 kW	1.620 W	17.05 MSv	14.97 kSv
¹⁰² Rh		1.540 mg	15.11 μM	68.91 GBq	44.75 TBq	ε ¹⁰² Ru	2.902 y	2.151 MeV	23.75 mW	15.42 W	82.69 Sv	53.70 kSv
¹⁰³ Rh	¹⁰³ Ru	559.4 gm	5.436 M									
^{103m} Rh	¹⁰³ Ru	46.30 mg	449.9 μM	55.77 PBq	1.205 EBq	γ ¹⁰³ Rh	56.11 m	38.82 keV	346.8 W	7.490 kW	211.9 kSv	4.577 MSv
¹⁰⁴ Rh	^{104m} Rh	489.8 μg	4.714 μM	46.52 PBq	94.98 EBq	β ¹⁰⁴ Pd	42.30 s	996.9 keV	7.430 kW	15.17 MW		
^{104m} Rh		197.3 μg	1.899 μM	3.044 PBq	15.43 EBq	ε ¹⁰⁴ Ru						
					0.45% →							
					0.13% →							
¹⁰⁵ Rh	¹⁰⁵ Ru	1.352 gm	12.89 mM	42.27 PBq	31.26 PBq	β ¹⁰⁵ Pd	1.473 d	230.8 keV	1.563 kW	1.156 kW	15.64 MSv	11.57 MSv
^{105m} Rh	¹⁰⁵ Ru	144.9 μg	1.381 μM	12.81 PBq	88.41 EBq	γ ¹⁰⁵ Rh	40.00 s	128.9 keV	264.5 W	1.825 MW		
¹⁰⁶ Rh	¹⁰⁶ Ru	229.3 μg	2.165 μM	30.23 PBq	131.8 EBq	β ¹⁰⁶ Pd	30.00 s	1.617 MeV	7.833 kW	34.16 MW		
^{106m} Rh		2.217 mg	20.93 μM	1.103 PBq	497.5 PBq	β ¹⁰⁶ Pd	2.200 h	3.214 MeV	567.9 W	256.2 kW	176.5 kSv	79.60 MSv
¹⁰⁷ Rh	¹⁰⁷ Ru	9.378 mg	87.72 μM	28.12 PBq	2.999 EBq	β ¹⁰⁷ Pd	21.70 m	806.7 keV	3.634 kW	387.5 kW	674.9 kSv	71.96 MSv
¹⁰⁸ Rh	¹⁰⁸ Ru	85.41 μg	791.5 nM	19.66 PBq	230.2 EBq	β ¹⁰⁸ Pd	16.80 s	2.332 MeV	7.345 kW	86.00 MW		
^{108m} Rh		16.64 μg	154.2 nM	181.8 TBq	10.93 EBq	β ¹⁰⁸ Pd	6.000 m	3.179 MeV	92.58 W	5.564 MW		
¹⁰⁹ Rh	¹⁰⁹ Ru	292.4 μg	2.685 μM	12.45 PBq	42.58 EBq	β ¹⁰⁹ Pd	1.333 m	1.275 MeV	2.543 kW	8.697 MW		
^{109m} Rh		81.22 μg	752.2 nM	6.225 PBq	76.64 EBq	β ^{109m} Pd						
					5% →							
						γ ¹⁰⁹ Rh	50.00 s	250.0 keV	249.3 W	3.069 MW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹¹⁰ Rh	¹¹⁰ ₄₄ Ru	42.86 μg	390.0 nM	5.611 PBq	130.9 EBq	β ¹¹⁰ ₄₆ Pd	28.50 s	3.613 MeV	3.248 kW	75.78 MW		
^{110m} Rh		325.1 ng	2.958 nM	411.6 TBq	1.266×10 ¹²	β ¹¹⁰ ₄₆ Pd	3.200 s	2.536 MeV	167.2 W	514.3 MW		
¹¹¹ Rh	¹¹¹ ₄₄ Ru	51.30 μg	462.5 nM	3.064 PBq	59.73 EBq	β ¹¹¹ ₄₆ Pd	12.00 s	2.276 MeV	1.117 kW	21.77 MW		
¹¹² Rh	¹¹² ₄₄ Ru	1.883 μg	16.83 nM	1.494 PBq	793.4 EBq	β ¹¹² ₄₆ Pd	2.100 s	4.073 MeV	974.9 W	517.7 MW		
¹¹³ Rh	¹¹³ ₄₄ Ru	249.1 ng	2.206 nM	1.023 PBq	4.107×10 ¹²	β ¹¹³ ₄₆ Pd	2.800 s	3.012 MeV	493.7 W	1.982 GW		
¹¹⁴ Rh	¹¹⁴ ₄₄ Ru	263.4 ng	2.312 nM	567.7 TBq	2.155×10 ¹²	β ¹¹⁴ ₄₆ Pd	1.850 s	4.857 MeV	441.7 W	1.677 GW		
¹¹⁵ Rh	¹¹⁵ ₄₄ Ru	690.8 ng	6.011 nM	416.7 TBq	603.2 EBq	β ¹¹⁵ ₄₆ Pd	990.0 ms	3.784 MeV	252.6 W	365.7 MW		
¹¹⁶ Rh	¹¹⁶ ₄₄ Ru	45.30 ng	390.8 pM	195.7 TBq	4.320×10 ¹²	β ¹¹⁶ ₄₆ Pd	680.0 ms	5.738 MeV	179.9 W	3.971 GW		
¹¹⁷ Rh	¹¹⁷ ₄₄ Ru	30.64 ng	262.0 pM	101.7 TBq	3.319×10 ¹²	β ¹¹⁷ ₄₆ Pd	440.0 ms	4.585 MeV	74.71 W	2.438 GW		
¹¹⁸ Rh	¹¹⁸ ₄₄ Ru	13.49 ng	114.4 pM	161.8 TBq	1.199×10 ¹³	β ¹¹⁸ ₄₆ Pd	320.0 ms	6.686 MeV	173.3 W	12.85 GW		
					2.917% →	β n ¹¹⁷ ₄₆ Pd						
¹¹⁹ Rh		1.717 ng	14.44 pM	13.46 TBq	7.839×10 ¹²	β ¹¹⁹ ₄₆ Pd	300.0 ms	5.315 MeV	11.46 W	6.674 GW		
¹²⁰ Rh	¹²⁰ ₄₄ Ru	92.43 pg	≤ 1 pM	1.981 TBq	2.143×10 ¹³	β ¹²⁰ ₄₆ Pd	170.0 ms	7.383 MeV	2.343 W	25.35 GW		
					5.928% →	β n ¹¹⁹ ₄₆ Pd						
¹²¹ Rh		20.02 pg	≤ 1 pM	312.8 GBq	1.562×10 ¹³	β ¹²¹ ₄₆ Pd	250.0 ms	6.230 MeV	312.2 mW	15.59 GW		
					13.568% →	β n ¹²⁰ ₄₆ Pd						
¹²² Rh		1.164 pg	≤ 1 pM	37.82 GBq	3.249×10 ¹³	β ¹²² ₄₆ Pd	50.00 ms	7.972 MeV	48.30 mW	41.49 GW		
¹²³ Rh		≤ 1 pg	≤ 1 pM	3.220 GBq	2.543×10 ¹³	β ¹²³ ₄₆ Pd	42.00 ms	6.917 MeV	3.568 mW	28.18 GW		
A ⁴⁵ Rh		560.8 gm	5.450 M	271.4 PBq	484.0 TBq				39.07 kW	69.67 W	16.70 MSv	29.78 kSv
¹⁰⁴ Pd	¹⁰⁴ ₄₅ Rh	463.0 gm	4.456 M									
¹⁰⁵ Pd	¹⁰⁵ ₄₅ Rh	608.2 gm	5.798 M									
¹⁰⁶ Pd	¹⁰⁶ ₄₅ Rh	369.5 gm	3.489 M									
¹⁰⁷ Pd	¹⁰⁷ ₄₅ Rh	361.2 gm	3.379 M	6.876 GBq	19.04 MBq	β ¹⁰⁷ ₄₇ Ag	6.500 My	10.00 keV	11.02 μW	30.51 nW	254.4 mSv	704.4 μSv
^{107m} Pd		27.75 ng	259.6 pM	5.085 TBq	183.2 EBq	γ ¹⁰⁷ ₄₆ Pd	21.30 s	210.0 keV	171.1 mW	6.166 MW		
¹⁰⁸ Pd	¹⁰⁸ ₄₅ Rh	248.7 gm	2.305 M									
¹⁰⁹ Pd	¹⁰⁹ ₄₅ Rh	204.2 mg	1.875 mM	16.15 PBq	79.09 PBq	β ^{109m} ₄₇ Ag	13.70 h	448.3 keV	1.160 kW	5.681 kW	8.882 MSv	43.50 MSv
					0.048% →	β ¹⁰⁹ ₄₇ Ag						
^{109m} Pd	¹⁰⁹ ₄₅ Rh	461.3 μg	4.236 μM	6.284 PBq	13.62 EBq	γ ¹⁰⁹ ₄₆ Pd	4.690 m	187.9 keV	189.2 W	410.1 kW		
¹¹⁰ Pd	¹¹⁰ ₄₅ Rh	82.30 gm	748.8 mM	16.51 mBq	200.6 μBq	2 β ¹¹⁰ ₄₈ Cd	600.0 Py	2.000 MeV	≤ 1 pW	≤ 1 pW		
¹¹¹ Pd	¹¹¹ ₄₅ Rh	1.110 mg	10.01 μM	3.163 PBq	2.850 EBq	β ^{111m} ₄₇ Ag	23.40 m	896.9 keV	454.5 W	409.5 kW		
					0.704% →	β ¹¹¹ ₄₇ Ag						
^{111m} Pd		261.8 μg	2.361 μM	49.78 TBq	190.1 PBq	γ ¹¹¹ ₄₆ Pd	5.500 h	587.7 keV	4.687 W	17.90 kW		
					7.814% →	β ¹¹¹ ₄₇ Ag						
					19.186% →	β ^{111m} ₄₇ Ag						
¹¹² Pd	¹¹² ₄₅ Rh	31.11 mg	278.0 μM	1.604 PBq	51.56 PBq	β ¹¹² ₄₇ Ag	20.30 h	154.9 keV	39.81 W	1.280 kW		
¹¹³ Pd	¹¹³ ₄₅ Rh	30.19 μg	267.4 nM	1.240 PBq	41.07 EBq	β ^{113m} ₄₇ Ag	1.517 m	1.985 MeV	394.4 W	13.06 MW		
					5% →	β ¹¹³ ₄₇ Ag						
¹¹⁴ Pd	¹¹⁴ ₄₅ Rh	32.59 μg	286.1 nM	829.4 TBq	25.45 EBq	β ¹¹⁴ ₄₇ Ag	2.420 m	1.173 MeV	155.8 W	4.781 MW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹¹⁵ Pd	¹¹⁵ ₄₅ Rh	8.101 μg	70.50 nM	774.2 TBq	95.57 EBq	β ¹¹⁵ ₄₇ Ag 27% → β ^{115m} ₄₇ Ag	25.00 s	2.579 MeV	319.9 W	39.49 MW		
¹¹⁶ Pd	¹¹⁶ ₄₅ Rh	2.238 μg	19.31 nM	575.5 TBq	257.1 EBq	β ¹¹⁶ ₄₇ Ag	11.80 s	1.568 MeV	144.6 W	64.61 MW		
¹¹⁷ Pd	¹¹⁷ ₄₅ Rh	698.8 ng	5.977 nM	498.9 TBq	713.9 EBq	β ¹¹⁷ ₄₇ Ag 5% → β ^{117m} ₄₇ Ag	4.300 s	3.368 MeV	269.2 W	385.2 MW		
¹¹⁸ Pd	¹¹⁸ ₄₅ Rh	363.6 ng	3.083 nM	415.3 TBq	1.142×10 ¹²	β ¹¹⁸ ₄₇ Ag 14.296% → β ^{118m} ₄₇ Ag	1.900 s	2.255 MeV	150.0 W	412.5 MW		
¹¹⁹ Pd	¹¹⁹ ₄₅ Rh	151.0 ng	1.270 nM	309.7 TBq	2.051×10 ¹²	β ¹¹⁹ ₄₇ Ag	920.0 ms	4.281 MeV	212.4 W	1.407 GW		
¹²⁰ Pd	¹²⁰ ₄₅ Rh	139.2 ng	1.161 nM	113.4 TBq	814.7 EBq	β ¹²⁰ ₄₇ Ag	500.0 ms	2.951 MeV	53.61 W	385.1 MW		
¹²¹ Pd	¹²¹ ₄₅ Rh	7.973 ng	65.93 pM	44.26 TBq	5.551×10 ¹²	β ¹²¹ ₄₇ Ag 0.272% → β n ¹²⁰ ₄₇ Ag	600.0 ms	4.956 MeV	35.14 W	4.407 GW		
¹²² Pd	¹²² ₄₅ Rh	5.021 ng	41.18 pM	13.54 TBq	2.697×10 ¹²	β ¹²² ₄₇ Ag	300.0 ms	3.764 MeV	8.165 W	1.626 GW		
¹²³ Pd	¹²³ ₄₅ Rh	278.3 pg	2.264 pM	3.049 TBq	1.096×10 ¹³	β ¹²³ ₄₇ Ag	200.0 ms	5.687 MeV	2.778 W	9.982 GW		
¹²⁴ Pd		95.57 pg	≤ 1 pM	574.8 GBq	6.014×10 ¹²	β ¹²⁴ ₄₇ Ag	100.0 ms	4.516 MeV	415.9 mW	4.352 GW		
¹²⁶ Pd		≤ 1 pg	≤ 1 pM	8.790 GBq	1.155×10 ¹³	β ¹²⁶ ₄₇ Ag	48.60 ms	5.332 MeV	7.509 mW	9.866 GW		
A ⁴⁶ Pd		2.133 kg	20.18 M	32.07 PBq	15.04 TBq				3.595 kW	1.685 W	8.882 MSv	4.164 kSv
⁹⁸ Tc		10.77 mg	110.0 μM	346.5 kBq	32.17 MBq	β ⁹⁸ ₄₄ Ru	4.200 My	1.532 MeV	85.02 nW	7.894 μW	693.0 μSv	64.35 mSv
⁹⁹ Tc	⁹⁹ ₄₂ Mo	1.132 kg	11.45 M	710.2 GBq	627.4 MBq	β ⁹⁹ ₄₄ Ru	214.0 ky	84.59 keV	9.625 mW	8.503 μW	454.5 Sv	401.5 mSv
^{99m} Tc	⁹⁹ ₄₂ Mo	306.7 mg	3.101 mM	59.73 PBq	194.8 PBq	γ ⁹⁹ ₄₃ Tc 0.004% → β ⁹⁹ ₄₄ Ru	6.010 h	142.1 keV	1.360 kW	4.434 kW	1.314 MSv	4.285 MSv
¹⁰⁰ Tc		88.84 μg	889.2 nM	23.49 PBq	264.4 EBq	β ¹⁰⁰ ₄₄ Ru	15.80 s	1.484 MeV	5.586 kW	62.88 MW		
¹⁰¹ Tc	¹⁰¹ ₄₂ Mo	12.83 mg	127.1 μM	62.29 PBq	4.855 EBq	β ¹⁰¹ ₄₄ Ru	14.20 m	809.6 keV	8.079 kW	629.7 kW	1.184 MSv	92.25 MSv
¹⁰² Tc	¹⁰² ₄₂ Mo	78.17 μg	767.1 nM	60.62 PBq	775.5 EBq	β ¹⁰² ₄₄ Ru	5.280 s	1.740 MeV	16.90 kW	216.2 MW		
^{102m} Tc		4.937 μg	48.45 nM	77.46 TBq	15.69 EBq	β ¹⁰² ₄₄ Ru	4.350 m	3.202 MeV	39.73 W	8.047 MW		
¹⁰³ Tc	¹⁰³ ₄₂ Mo	754.0 μg	7.327 μM	61.18 PBq	81.14 EBq	β ¹⁰³ ₄₄ Ru	54.20 s	1.226 MeV	12.02 kW	15.94 MW		
¹⁰⁴ Tc	¹⁰⁴ ₄₂ Mo	14.52 mg	139.7 μM	53.41 PBq	3.678 EBq	β ¹⁰⁴ ₄₄ Ru	18.30 m	3.667 MeV	31.38 kW	2.161 MW	4.273 MSv	294.3 MSv
¹⁰⁵ Tc	¹⁰⁵ ₄₂ Mo	5.406 mg	51.53 μM	44.82 PBq	8.291 EBq	β ¹⁰⁵ ₄₄ Ru	7.600 m	1.861 MeV	13.36 kW	2.471 MW		
¹⁰⁶ Tc	¹⁰⁶ ₄₂ Mo	306.7 μg	2.896 μM	32.67 PBq	106.5 EBq	β ¹⁰⁶ ₄₄ Ru	36.00 s	3.886 MeV	20.34 kW	66.32 MW		
¹⁰⁷ Tc	¹⁰⁷ ₄₂ Mo	138.4 μg	1.294 μM	18.64 PBq	134.7 EBq	β ¹⁰⁷ ₄₄ Ru	21.20 s	2.800 MeV	8.361 kW	60.41 MW		
¹⁰⁸ Tc	¹⁰⁸ ₄₂ Mo	14.42 μg	133.6 nM	10.73 PBq	744.1 EBq	β ¹⁰⁸ ₄₄ Ru	5.170 s	4.618 MeV	7.938 kW	550.5 MW		
¹⁰⁹ Tc	¹⁰⁹ ₄₂ Mo	64.07 μg	588.2 nM	4.815 PBq	75.15 EBq	β ¹⁰⁹ ₄₄ Ru 0.08% → β n ¹⁰⁸ ₄₄ Ru	860.0 ms	3.722 MeV	2.871 kW	44.81 MW		
¹¹⁰ Tc	¹¹⁰ ₄₂ Mo	255.3 ng	2.323 nM	1.168 PBq	4.575×10 ¹²	β ¹¹⁰ ₄₄ Ru 0.04% → β n ¹⁰⁹ ₄₄ Ru	920.0 ms	5.638 MeV	1.055 kW	4.132 GW		
¹¹¹ Tc	¹¹¹ ₄₂ Mo	127.4 ng	1.149 nM	358.8 TBq	2.816×10 ¹²	β ¹¹¹ ₄₄ Ru	290.0 ms	4.567 MeV	262.5 W	2.060 GW		
¹¹² Tc	¹¹² ₄₂ Mo	11.07 ng	98.90 pM	116.2 TBq	1.050×10 ¹³	β ¹¹² ₄₄ Ru 1.5% → β n ¹¹¹ ₄₄ Ru	290.0 ms	6.548 MeV	121.9 W	11.01 GW		
¹¹³ Tc	¹¹³ ₄₂ Mo	3.772 ng	33.40 pM	30.43 TBq	8.067×10 ¹²	β ¹¹³ ₄₄ Ru	130.0 ms	5.426 MeV	26.45 W	7.012 GW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹¹⁴ Tc	¹¹⁴ ₄₂ Mo	319.9 pg	2.808 pM	6.762 TBq	7.186% → 2.114×10 ¹³	β n ¹¹² ₄₄ Ru β n ¹¹⁴ ₄₄ Ru	200.0 ms	7.478 MeV	8.101 W	25.32 GW		
¹¹⁵ Tc	¹¹⁵ ₄₂ Mo	87.01 pg	≤ 1 pM	1.420 TBq	6.536% → 1.632×10 ¹³	β n ¹¹³ ₄₄ Ru β n ¹¹⁵ ₄₄ Ru	270.0 ms	6.326 MeV	1.439 W	16.54 GW		
¹¹⁶ Tc		2.595 pg	≤ 1 pM	87.97 GBq	14.337% → 3.390×10 ¹³	β n ¹¹⁴ ₄₄ Ru β n ¹¹⁶ ₄₄ Ru	120.0 ms	8.259 MeV	116.4 mW	44.86 GW		
¹¹⁷ Tc		≤ 1 pg	≤ 1 pM	3.731 GBq	12.223% → 2.640×10 ¹³	β n ¹¹⁵ ₄₄ Ru β n ¹¹⁷ ₄₄ Ru	40.00 ms	7.022 MeV	4.197 mW	29.70 GW		
A ₄₃ Tc		1.132 kg	11.45 M	434.2 PBq	383.4 TBq				129.7 kW	114.5 W	6.771 MSv	5.979 kSv
¹⁰⁶ Ag		7.102 pg	≤ 1 pM	38.12 kBq	5.368 PBq	ϵ ¹⁰⁶ ₄₆ Pd	24.00 m	1.218 MeV	7.440 nW	1.048 kW	1.220 μSv	171.8 kSv
¹⁰⁷ Ag	¹⁰⁷ ₄₆ Pd	52.94 μg	495.2 nM									
¹⁰⁸ Ag	^{108m} ₄₇ Ag	3.215 ng	29.79 pM	87.45 GBq	27.20 EBq	β ¹⁰⁸ ₄₈ Cd	2.400 m	627.9 keV	8.797 mW	2.736 MW		
^{108m} Ag		1.919 μg	17.78 nM	1.852 MBq	965.1 GBq	2.9% → ϵ ¹⁰⁸ ₄₆ Pd	418.0 y	1.633 MeV	484.6 nW	252.5 mW	4.260 mSv	2.220 kSv
					8.7% → γ ¹⁰⁸ ₄₇ Ag							
¹⁰⁹ Ag	¹⁰⁹ ₄₆ Pd	115.2 gm	1.058 M			γ ¹⁰⁹ ₄₇ Ag	39.70 s	86.94 keV	224.8 W	1.348 MW		
^{109m} Ag	¹⁰⁹ ₄₆ Pd	166.8 μg	1.532 μM	16.14 PBq	96.76 EBq	β ¹¹⁰ ₄₈ Cd	24.56 s	1.212 MeV	1.771 kW	29.97 MW		
¹¹⁰ Ag	^{110m} ₄₇ Ag	59.10 μg	537.7 nM	9.123 PBq	154.4 EBq	ϵ ¹¹⁰ ₄₆ Pd						
^{110m} Ag		1.550 gm	14.10 mM	272.5 TBq	175.8 TBq	β ¹¹⁰ ₄₈ Cd	249.8 d	2.817 MeV	123.0 W	79.35 W	763.0 kSv	492.3 kSv
					1.36% → γ ¹¹⁰ ₄₇ Ag							
¹¹¹ Ag	¹¹¹ ₄₆ Pd	549.3 mg	4.953 mM	3.211 PBq	5.846 PBq	β ¹¹¹ ₄₈ Cd	7.450 d	377.9 keV	194.4 W	353.9 W	4.174 MSv	7.599 MSv
^{111m} Ag	¹¹¹ ₄₆ Pd	54.79 μg	494.0 nM	3.172 PBq	57.89 EBq	γ ¹¹¹ ₄₇ Ag	1.080 m	64.98 keV	33.02 W	602.7 kW		
					0.5% → β ¹¹¹ ₄₈ Cd							
¹¹² Ag	¹¹² ₄₆ Pd	4.861 mg	43.44 μM	1.609 PBq	331.0 PBq	β ¹¹² ₄₈ Cd	3.130 h	2.092 MeV	539.3 W	110.9 kW	691.9 kSv	142.3 MSv
¹¹³ Ag	¹¹³ ₄₆ Pd	5.770 mg	51.10 μM	1.118 PBq	193.8 PBq	β ¹¹³ ₄₈ Cd	5.370 h	1.052 MeV	188.5 W	32.67 kW		
					1.729% → β ^{113m} ₄₈ Cd							
^{113m} Ag	¹¹³ ₄₆ Pd	2.246 μg	19.89 nM	125.8 TBq	56.01 EBq	γ ¹¹³ ₄₇ Ag	1.145 m	1.180 MeV	23.79 W	10.59 MW		
					36% → β ¹¹³ ₄₈ Cd							
¹¹⁴ Ag	¹¹⁴ ₄₆ Pd	1.038 μg	9.113 nM	841.2 TBq	810.4 EBq	β ¹¹⁴ ₄₈ Cd	4.600 s	2.050 MeV	276.2 W	266.1 MW		
¹¹⁵ Ag	¹¹⁵ ₄₆ Pd	191.9 μg	1.670 μM	581.1 TBq	3.028 EBq	β ¹¹⁵ ₄₈ Cd	20.00 m	1.724 MeV	160.5 W	836.4 kW	34.87 kSv	181.7 MSv
					5.762% → β ^{115m} ₄₈ Cd							
^{115m} Ag	¹¹⁵ ₄₆ Pd	1.049 μg	9.129 nM	224.2 TBq	213.7 EBq	β ¹¹⁵ ₄₈ Cd	18.60 s	1.908 MeV	68.52 W	65.32 MW		
					2.3% → β ^{115m} ₄₈ Cd							
					21% → γ ¹¹⁵ ₄₇ Ag							
¹¹⁶ Ag	¹¹⁶ ₄₆ Pd	14.40 μg	124.2 nM	322.5 TBq	22.40 EBq	β ¹¹⁶ ₄₈ Cd	2.680 m	3.424 MeV	176.9 W	12.28 MW		
^{116m} Ag		931.5 ng	8.036 nM	322.5 TBq	346.2 EBq	β ¹¹⁶ ₄₈ Cd	8.600 s	4.010 MeV	207.2 W	222.4 MW		
					6% → γ ¹¹⁶ ₄₇ Ag							

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Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹¹⁷ Ag	¹¹⁷ ₄₆ Pd	6.443 μg	55.11 nM	314.3 TBq	48.78 EBq	β ¹¹⁷ ₄₈ Cd	1.227 m	2.479 MeV	124.8 W	19.37 MW		
^{117m} Ag	¹¹⁷ ₄₆ Pd	466.4 ng	3.989 nM	314.2 TBq	16.93% → 673.7 EBq	β ^{117m} ₄₈ Cd	5.340 s	2.599 MeV	130.8 W	280.4 MW		
¹¹⁸ Ag	¹¹⁸ ₄₆ Pd	433.8 ng	3.679 nM	414.9 TBq	23.284% → 956.4 EBq	β ¹¹⁷ ₄₈ Cd	3.760 s	3.185 MeV	211.7 W	488.0 MW		
^{118m} Ag	¹¹⁸ ₄₆ Pd	228.1 ng	1.934 nM	288.4 TBq	6% → 1.264 × 10 ¹²	β ^{117m} ₄₈ Cd	2.000 s	2.122 MeV	98.06 W	429.9 MW		
¹¹⁹ Ag	¹¹⁹ ₄₆ Pd	993.3 ng	8.353 nM	581.1 TBq	41% → 585.0 EBq	γ ¹¹⁷ ₄₇ Ag	6.000 s	3.180 MeV	296.0 W	298.0 MW		
¹²⁰ Ag	¹²⁰ ₄₆ Pd	132.6 ng	1.106 nM	394.5 TBq	5% → 2.975 × 10 ¹²	β ¹¹⁸ ₄₈ Cd	1.230 s	2.568 MeV	162.3 W	1.224 GW		
¹²¹ Ag	¹²¹ ₄₆ Pd	237.2 ng	1.962 nM	273.0 TBq	0.001% → 1.151 × 10 ¹²	β ^{119m} ₄₈ Cd	780.0 ms	3.862 MeV	168.9 W	712.1 MW		
¹²² Ag	¹²² ₄₆ Pd	4.923 ng	40.38 pM	168.6 TBq	0.001% → 3.425 × 10 ¹³	β ¹²⁰ ₄₈ Cd	480.0 ms	5.875 MeV	158.7 W	32.24 GW		
¹²³ Ag	¹²³ ₄₆ Pd	22.25 ng	181.0 pM	87.60 TBq	3.937 × 10 ¹²	β ¹²¹ ₄₈ Cd	310.0 ms	4.697 MeV	65.92 W	2.963 GW		
¹²⁴ Ag	¹²⁴ ₄₆ Pd	3.204 ng	25.85 pM	40.19 TBq	1.254 × 10 ¹³	β ¹²³ ₄₈ Cd	172.0 ms	6.632 MeV	42.70 W	13.33 GW		
¹²⁵ Ag		1.452 ng	11.62 pM	12.70 TBq	0.05% → 8.747 × 10 ¹²	β ¹²⁴ ₄₈ Cd	166.0 ms	5.475 MeV	11.14 W	7.672 GW		
¹²⁶ Ag	¹²⁶ ₄₆ Pd	186.7 pg	1.483 pM	3.982 TBq	2.133 × 10 ¹³	β ¹²⁵ ₄₈ Cd	107.0 ms	7.262 MeV	4.633 W	24.82 GW		
¹²⁸ Ag		5.448 pg	≤ 1 pM	173.6 GBq	3.186 × 10 ¹³	β ¹²⁶ ₄₈ Cd	58.00 ms	7.892 MeV	219.5 mW	40.29 GW		
E ⁴⁷ Ag		117.3 gm	1.077 M	39.96 PBq	340.6 TBq	β ¹²⁸ ₄₈ Cd			5.463 kW	46.57 W	5.664 MSv	48.28 kSv
¹¹⁴ Sn	¹¹⁴ ₄₈ Cd	3.606 mg	31.66 μM									
¹¹⁵ Sn	¹¹⁵ ₄₉ In	488.7 mg	4.253 mM									
¹¹⁶ Sn	¹¹⁶ ₄₈ Cd	12.26 gm	105.8 mM									
¹¹⁷ Sn	¹¹⁷ ₄₉ In	12.64 gm	108.1 mM									
^{117m} Sn	¹¹⁷ ₄₉ In	1.996 mg	17.07 μM	5.888 TBq	2.950 PBq	γ ¹¹⁷ ₅₀ Sn	13.60 d	312.8 keV	295.1 mW	147.8 W	4.180 kSv	2.094 MSv
¹¹⁸ Sn	¹¹⁸ ₄₉ In	12.81 gm	108.7 mM									
¹¹⁹ Sn	¹¹⁹ ₄₉ In	12.69 gm	106.7 mM									
^{119m} Sn	¹¹⁹ ₄₉ In	67.37 mg	566.6 μM	11.17 TBq	165.8 TBq	γ ¹¹⁹ ₅₀ Sn	293.0 d	87.18 keV	156.0 mW	2.316 W	3.798 kSv	56.37 kSv
¹²⁰ Sn	¹²⁰ ₄₉ In	12.99 gm	108.3 mM									
¹²¹ Sn	¹²¹ ₄₉ In	18.28 mg	151.2 μM	654.3 TBq	35.79 PBq	β ¹²¹ ₅₁ Sb	1.126 d	204.0 keV	21.38 W	1.170 kW	150.5 kSv	8.232 MSv
^{121m} Sn	¹²¹ ₄₉ In	5.494 mg	45.44 μM	12.02 GBq	2.188 TBq	γ ¹²¹ ₅₀ Sn	55.00 y	338.1 keV	651.0 μW	118.5 mW	4.568 Sv	831.4 Sv
¹²² Sn	¹²² ₄₉ In	14.26 gm	117.0 mM			β ¹²¹ ₅₁ Sb						
¹²³ Sn	¹²³ ₄₉ In	489.5 mg	3.983 mM	149.0 TBq	304.4 TBq	β ¹²³ ₅₁ Sb	129.2 d	526.6 keV	12.57 W	25.68 W	312.9 kSv	639.2 kSv
^{123m} Sn	¹²³ ₄₉ In	433.4 μg	3.526 μM	611.8 TBq	1.412 EBq	β ¹²³ ₅₁ Sb	40.06 m	614.8 keV	60.26 W	139.0 kW	23.25 kSv	53.64 MSv
¹²⁴ Sn	¹²⁴ ₄₉ In	19.24 gm	155.3 mM	20.54 mBq	1.068 mBq	2 β ¹²⁴ ₅₂ Te	100.0 Py	2.287 MeV	≤ 1 pW	≤ 1 pW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹²⁵ Sn	¹²⁵ ₄₉ In	135.3 mg	1.083 mM	542.9 TBq	4.013 PBq	β ¹²⁵ ₅₁ Sb	9.640 d	1.117 MeV	97.19 W	718.3 W	1.683 MSv	12.44 MSv
^{125m} Sn	¹²⁵ ₄₉ In	151.0 μ g	1.209 μ M	883.8 TBq	5.853 EBq	β ¹²⁵ ₅₁ Sb	9.520 m	1.134 MeV	160.6 W	1.064 MW		
¹²⁶ Sn	¹²⁶ ₄₉ In	42.50 gm	337.6 mM	44.63 GBq	1.050 GBq	β ^{126m} ₅₁ Sb	230.0 ky	210.4 keV	1.504 mW	35.39 μ W	209.8 Sv	4.936 Sv
					33.068% →	β ^{126m} ₅₁ Sb						
¹²⁷ Sn	¹²⁷ ₄₉ In	6.322 mg	49.81 μ M	2.751 PBq	435.1 PBq	β ¹²⁷ ₅₁ Sb	2.100 h	2.441 MeV	1.076 kW	170.2 kW	550.2 kSv	87.03 MSv
^{127m} Sn	¹²⁷ ₄₉ In	98.32 μ g	774.7 nM	1.304 PBq	13.26 EBq	β ¹²⁷ ₅₁ Sb	4.130 m	1.628 MeV	340.0 W	3.458 MW		
¹²⁸ Sn	¹²⁸ ₄₉ In	6.746 mg	52.74 μ M	6.218 PBq	921.7 PBq	β ¹²⁸ ₅₁ Sb	59.07 m	813.8 keV	810.7 W	120.2 kW	932.7 kSv	138.3 MSv
					% →	β ^{128m} ₅₁ Sb						
¹²⁹ Sn	¹²⁹ ₄₉ In	592.2 μ g	4.594 μ M	4.260 PBq	7.194 EBq	β ¹²⁹ ₅₁ Sb	2.230 m	2.531 MeV	1.727 kW	2.916 MW		
^{129m} Sn	¹²⁹ ₄₉ In	214.5 μ g	1.664 μ M	4.630 PBq	21.59 EBq	β ¹²⁹ ₅₁ Sb	7.200 m	2.687 MeV	1.993 kW	9.291 MW		
¹³⁰ Sn	¹³⁰ ₄₉ In	914.1 μ g	7.036 μ M	13.16 PBq	14.40 EBq	β ^{130m} ₅₁ Sb	3.730 m	1.315 MeV	2.772 kW	3.032 MW		
¹³¹ Sn	¹³¹ ₄₉ In	221.9 μ g	1.695 μ M	11.23 PBq	50.61 EBq	β ¹³¹ ₅₁ Sb	56.00 s	3.012 MeV	5.418 kW	24.42 MW		
¹³² Sn	¹³² ₄₉ In	73.58 μ g	557.8 nM	5.822 PBq	79.12 EBq	β ¹³² ₅₁ Sb	39.70 s	2.061 MeV	1.922 kW	26.12 MW		
					% →	β ^{132m} ₅₁ Sb						
¹³³ Sn	¹³³ ₄₉ In	811.5 ng	6.105 nM	1.734 PBq	2.137 × 10 ¹²	β ¹³³ ₅₁ Sb	1.450 s	4.885 MeV	1.357 kW	1.672 GW		
¹³⁴ Sn	¹³⁴ ₄₉ In	69.01 ng	515.3 pM	254.7 TBq	3.691 × 10 ¹²	β ¹³⁴ ₅₁ Sb	1.050 s	4.134 MeV	168.7 W	2.445 GW		
					17% →	β n ¹³³ ₅₁ Sb						
¹³⁵ Sn		2.630 ng	19.49 pM	27.96 TBq	1.063 × 10 ¹³	β ¹³⁵ ₅₁ Sb	530.0 ms	5.639 MeV	25.26 W	9.605 GW		
					10.5% →	β n ¹³⁴ ₅₁ Sb						
					10.5% →	β n ^{134m} ₅₁ Sb						
¹³⁶ Sn		334.5 pg	2.461 pM	2.487 TBq	7.435 × 10 ¹²	β ¹³⁶ ₅₁ Sb	250.0 ms	4.897 MeV	1.951 W	5.833 GW		
					3% →	β n ¹³⁵ ₅₁ Sb						
E ₅₀ Sn		140.6 gm	1.158 M	54.25 PBq	385.8 TBq				17.96 kW	127.8 W	3.661 MSv	26.03 kSv
⁸⁵ Rb	⁸⁵ ₃₆ Kr	146.3 gm	1.723 M									
⁸⁶ Rb	^{86m} ₃₇ Rb	36.52 mg	425.1 μ M	110.0 TBq	3.012 PBq	β ⁸⁶ ₃₈ Sr	18.64 d	762.7 keV	13.44 W	368.0 W	308.0 kSv	8.434 MSv
					0.005% →	ϵ ⁸⁶ ₃₆ Kr						
^{86m} Rb		139.1 ng	1.619 nM	11.06 TBq	79.51 EBq	γ ⁸⁶ ₃₇ Rb	1.017 m	560.0 keV	992.2 mW	7.133 MW		
⁸⁷ Rb	⁸⁷ ₃₆ Kr	361.8 gm	4.163 M	1.172 MBq	3.239 kBq	β ⁸⁷ ₃₈ Sr	48.10 Gy	141.0 keV	26.47 nW	73.16 pW	1.758 mSv	4.859 μ Sv
⁸⁸ Rb	⁸⁸ ₃₆ Kr	4.798 mg	54.58 μ M	21.33 PBq	4.446 EBq	β ⁸⁸ ₃₈ Sr	17.80 m	2.683 MeV	9.168 kW	1.911 MW	1.920 MSv	400.1 MSv
⁸⁹ Rb	⁸⁹ ₃₆ Kr	5.258 mg	59.14 μ M	27.06 PBq	5.146 EBq	β ⁸⁹ ₃₈ Sr	15.40 m	3.098 MeV	13.43 kW	2.554 MW	1.272 MSv	241.9 MSv
⁹⁰ Rb	⁹⁰ ₃₆ Kr	856.7 μ g	9.528 μ M	25.99 PBq	30.34 EBq	β ⁹⁰ ₃₈ Sr	2.633 m	4.020 MeV	16.74 kW	19.54 MW		
^{90m} Rb	⁹⁰ ₃₆ Kr	358.9 μ g	3.992 μ M	6.455 PBq	17.99 EBq	β ⁹⁰ ₃₈ Sr	4.300 m	4.471 MeV	4.624 kW	12.88 MW		
					2.6% →	γ ⁹⁰ ₃₇ Rb						
⁹¹ Rb	⁹¹ ₃₆ Kr	421.8 μ g	4.639 μ M	33.26 PBq	78.85 EBq	β ⁹¹ ₃₈ Sr	58.40 s	4.067 MeV	21.67 kW	51.38 MW		
⁹² Rb	⁹² ₃₆ Kr	29.22 μ g	317.9 nM	29.62 PBq	1.014 × 10 ¹²	β ⁹² ₃₈ Sr	4.492 s	3.732 MeV	17.71 kW	606.1 MW		
⁹³ Rb	⁹³ ₃₆ Kr	29.46 μ g	317.0 nM	22.82 PBq	774.6 EBq	β ⁹³ ₃₈ Sr	5.800 s	3.441 MeV	12.58 kW	427.0 MW		
					1.4% →	β n ⁹² ₃₈ Sr						
⁹⁴ Rb	⁹⁴ ₃₆ Kr	7.394 μ g	78.72 nM	12.21 PBq	1.651 × 10 ¹²	β ⁹⁴ ₃₈ Sr	2.702 s	4.735 MeV	9.263 kW	1.253 GW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
⁹⁵ Rb	⁹⁵ Kr ₃₆	488.9 ng	5.150 nM	5.970 PBq	10.1% → 1.221×10 ¹³	β n ⁹³ Sr β ⁹⁵ Sr ₃₈	381.0 ms	4.522 MeV	4.325 kW	8.846 GW		
⁹⁶ Rb	⁹⁶ Kr ₃₆	86.77 ng	904.5 pM	1.824 PBq	8.6% → 2.102×10 ¹³	β n ⁹⁴ Sr β ⁹⁶ Sr ₃₈	199.0 ms	6.170 MeV	1.803 kW	20.78 GW		
⁹⁷ Rb	⁹⁷ Kr ₃₆	14.02 ng	144.6 pM	355.1 TBq	13.4% → 2.533×10 ¹³	β n ⁹⁵ Sr β ⁹⁷ Sr ₃₈	169.9 ms	5.229 MeV	297.5 W	21.22 GW		
⁹⁸ Rb		2.636 ng	26.91 pM	80.24 TBq	25.1% → 3.044×10 ¹³	β n ⁹⁶ Sr β ⁹⁸ Sr ₃₈	114.0 ms	6.804 MeV	87.47 W	33.18 GW		
⁹⁹ Rb		146.5 pg	1.481 pM	8.131 TBq	13.8% → 0.051% → 5.550×10 ¹³	β n ⁹⁷ Sr β n n ⁹⁶ Sr β ⁹⁹ Sr ₃₈	50.30 ms	6.020 MeV	7.842 W	53.53 GW		
¹⁰⁰ Rb		17.37 pg	≤ 1 pM	721.0 GBq	15.9% → 4.151×10 ¹³	β n ⁹⁸ Sr β ¹⁰⁰ Sr ₃₈	51.00 ms	8.457 MeV	976.9 mW	56.24 GW		
E ³⁷ Rb		508.1 gm	5.886 M	187.1 PBq	5.6% → 0.15% → 368.2 TBq	β n n ⁹⁸ Sr β n n ⁹⁸ Sr			111.7 kW	219.9 W	3.500 MSv	6.887 kSv
¹⁰⁸ Cd	¹⁰⁸ Ag ₄₇	694.2 μg	6.434 μM	207.6 nBq	299.0 μBq	2ε ¹⁰⁸ Pd ₄₆	410.0 Py	272.0 keV	≤ 1 pW	≤ 1 pW		
¹⁰⁹ Cd		1.068 μg	9.807 nM	102.0 MBq	95.51 TBq	ε ^{109m} Ag ₄₇	1.267 y	19.61 keV	320.4 nW	300.0 mW	204.0 mSv	191.0 kSv
¹¹⁰ Cd	¹¹⁰ Pd ₄₆	75.69 gm	688.7 mM									
¹¹¹ Cd	¹¹¹ Ag ₄₇	45.17 gm	407.3 mM									
^{111m} Cd		1.704 μg	15.36 nM	2.195 TBq	1.288 EBq	γ ¹¹¹ Cd ₄₈	48.54 m	395.8 keV	139.2 mW	81.69 kW		
¹¹² Cd	¹¹² Ag ₄₇	26.93 gm	240.7 mM									
¹¹³ Cd	¹¹³ Ag ₄₇	206.3 mg	1.827 mM	3.139 mBq	15.22 mBq	β ¹¹³ In ₄₉	7.700 Py	93.30 keV	≤ 1 pW	≤ 1 pW	78.47 pSv	380.4 pSv
^{113m} Cd	¹¹³ Ag ₄₇	444.0 mg	3.933 mM	3.565 TBq	8.029 TBq	β ¹¹³ In ₄₉	14.10 y	284.0 keV	162.2 mW	365.3 mW	82.00 kSv	184.7 kSv
¹¹⁴ Cd	¹¹⁴ Ag ₄₇	34.99 gm	307.2 mM	6.772 mBq	193.5 μBq	γ ¹¹³ Cd ₄₈						
¹¹⁵ Cd	¹¹⁵ Ag ₄₇	41.36 mg	359.9 μM	780.2 TBq	18.86 PBq	2β ¹¹⁴ Sn ₅₀	600.0 Py	536.0 keV	≤ 1 pW	≤ 1 pW		
^{115m} Cd	¹¹⁵ Ag ₄₇	79.21 mg	689.4 μM	74.69 TBq	942.9 TBq	β ^{115m} In ₄₉	2.227 d	535.5 keV	66.93 W	1.618 kW	1.092 MSv	26.41 MSv
¹¹⁶ Cd	¹¹⁶ Ag ₄₇	12.55 gm	108.3 mM	42.12 μBq	3.357 μBq	β ¹¹⁵ In ₄₉						
¹¹⁷ Cd	¹¹⁷ Ag ₄₇	1.096 mg	9.375 μM	418.2 TBq	381.6 PBq	β ^{115m} In ₄₉	44.60 d	628.9 keV	7.525 W	95.00 W	246.5 kSv	3.112 MSv
^{117m} Cd	¹¹⁷ Ag ₄₇	777.7 μg	6.652 μM	226.8 TBq	291.6 PBq	β ¹¹⁶ Sn ₅₀	34.00 Ey	2.804 MeV	≤ 1 pW	≤ 1 pW		
¹¹⁸ Cd	¹¹⁸ Ag ₄₇	540.3 μg	4.582 μM	634.0 TBq	1.173 EBq	β ^{117m} In ₄₉	2.490 h	1.214 MeV	81.36 W	74.23 kW	117.1 kSv	106.8 MSv
¹¹⁹ Cd	¹¹⁹ Ag ₄₇	50.86 μg	427.7 nM	316.5 TBq	6.223 EBq	β ¹¹⁷ In ₄₉	3.360 h	1.371 MeV	49.81 W	64.05 kW	63.50 kSv	81.66 MSv
					1.524% → β ^{117m} In ₄₉							
					9.721% → β ¹¹⁸ In ₄₉							
					β ^{119m} In ₄₉							
					β ¹¹⁹ In ₄₉							

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
^{119m} Cd	¹¹⁹ ₄₇ Ag	17.31 μg	145.6 nM	316.5 TBq	18.28 EBq	β ¹¹⁹ ₄₉ In	2.200 m	2.063 MeV	104.6 W	6.043 MW		
					0.22% →	β ^{119m} ₄₉ In						
¹²⁰ Cd	¹²⁰ ₄₇ Ag	9.066 μg	75.61 nM	621.4 TBq	68.54 EBq	β ¹²⁰ ₄₉ In	50.80 s	947.6 keV	94.33 W	10.40 MW		
¹²¹ Cd	¹²¹ ₄₇ Ag	2.272 μg	18.79 nM	612.9 TBq	269.8 EBq	β ^{121m} ₄₉ In	13.50 s	2.794 MeV	274.3 W	120.7 MW		
					32.564% →	β ¹²¹ ₄₉ In						
¹²² Cd	¹²² ₄₇ Ag	936.6 ng	7.683 nM	582.9 TBq	622.4 EBq	β ¹²² ₄₉ In	5.240 s	1.449 MeV	135.3 W	144.5 MW		
¹²³ Cd	¹²³ ₄₇ Ag	1.368 μg	11.13 nM	552.6 TBq	403.9 EBq	β ^{123m} ₄₉ In	2.100 s	3.367 MeV	298.1 W	217.9 MW		
					30.975% →	β ¹²³ ₄₉ In						
¹²⁴ Cd	¹²⁴ ₄₇ Ag	2.562 μg	20.68 nM	502.6 TBq	196.2 EBq	β ¹²⁴ ₄₉ In	1.250 s	2.286 MeV	184.1 W	71.86 MW		
¹²⁵ Cd	¹²⁵ ₄₇ Ag	178.7 ng	1.431 nM	368.2 TBq	2.060 × 10 ¹²	β ^{125m} ₄₉ In	650.0 ms	4.038 MeV	238.2 W	1.333 GW		
					47.864% →	β ¹²⁵ ₄₉ In						
¹²⁶ Cd	¹²⁶ ₄₇ Ag	309.0 ng	2.454 nM	272.0 TBq	880.3 EBq	β ¹²⁶ ₄₉ In	515.0 ms	2.960 MeV	129.0 W	417.5 MW		
¹²⁷ Cd		32.13 ng	253.1 pM	160.4 TBq	4.992 × 10 ¹²	β ^{127m} ₄₉ In	370.0 ms	4.658 MeV	119.7 W	3.725 GW		
¹²⁸ Cd	¹²⁸ ₄₇ Ag	24.13 ng	188.6 pM	61.03 TBq	2.529 × 10 ¹²	β ^{128m} ₄₉ In	280.0 ms	3.695 MeV	36.13 W	1.497 GW		
¹²⁹ Cd		2.584 ng	20.04 pM	24.78 TBq	9.590 × 10 ¹²	β ^{129m} ₄₉ In	242.0 ms	5.426 MeV	21.54 W	8.336 GW		
¹³⁰ Cd		3.283 ng	25.27 pM	20.13 TBq	6.132 × 10 ¹²	β ¹³⁰ ₄₉ In	162.0 ms	4.577 MeV	14.76 W	4.496 GW		
					1.75% →	β n ¹²⁹ ₄₉ In						
¹³¹ Cd		121.4 pg	≤ 1 pM	3.245 TBq	2.673 × 10 ¹³	β ¹³¹ ₄₉ In	68.00 ms	7.402 MeV	3.848 W	31.70 GW		
					3.5% →	β n ¹³⁰ ₄₉ In						
¹³² Cd		13.40 pg	≤ 1 pM	292.9 GBq	2.186 × 10 ¹³	β n ^{131m} ₄₉ In	97.00 ms	6.687 MeV	313.8 mW	23.42 GW		
					4% →	β ¹³² ₄₉ In						
A ₄₈ Cd		196.1 gm	1.759 M	6.555 PBq	33.43 TBq				1.998 kW	10.19 W	1.601 MSv	8.166 kSv
⁷⁹ Br	⁷⁹ ₃₄ Se	186.6 μg	2.364 μM			γ ⁷⁹ ₃₅ Br	4.864 s	209.9 keV	25.89 μW	36.59 MW		
^{79m} Br		≤ 1 pg	≤ 1 pM	769.8 MBq	1.088 × 10 ¹²							
⁸⁰ Br	^{80m} ₃₅ Br	7.231 ng	90.48 pM	36.17 GBq	5.002 EBq	β ⁸⁰ ₃₆ Kr	17.60 m	801.3 keV	4.643 mW	642.1 kW	1.121 Sv	155.1 MSv
					8.3% →	ε ⁸⁰ ₃₄ Se						
^{80m} Br		70.53 ng	882.5 pM	23.15 GBq	328.2 PBq	γ ⁸⁰ ₃₅ Br	4.410 h	84.50 keV	313.4 μW	4.443 kW	2.546 Sv	36.11 MSv
⁸¹ Br	⁸¹ ₃₄ Se	31.96 gm	395.0 mM									
⁸² Br	^{82m} ₃₅ Br	7.124 mg	86.97 μM	285.5 TBq	40.08 PBq	β ⁸² ₃₆ Kr	1.472 d	2.779 MeV	127.1 W	17.84 kW	154.2 kSv	21.64 MSv
^{82m} Br		7.973 μg	97.33 nM	110.4 TBq	13.85 EBq	γ ⁸² ₃₅ Br	6.090 m	78.14 keV	1.382 W	173.3 kW		
					2.4% →	β ⁸² ₃₆ Kr						
⁸³ Br	⁸³ ₃₄ Se	6.750 mg	81.41 μM	3.949 PBq	585.0 PBq	β ^{83m} ₃₆ Kr	2.400 h	328.5 keV	207.8 W	30.79 kW	169.8 kSv	25.16 MSv
					0.089% →	β ⁸³ ₃₆ Kr						
⁸⁴ Br	⁸⁴ ₃₄ Se	2.540 mg	30.27 μM	6.617 PBq	2.605 EBq	β ⁸⁴ ₃₆ Kr	31.80 m	3.037 MeV	3.219 kW	1.267 MW	582.3 kSv	229.3 MSv
^{84m} Br	⁸⁴ ₃₄ Se	20.30 μg	241.9 nM	280.4 TBq	13.81 EBq	β ⁸⁴ ₃₆ Kr	6.000 m	3.664 MeV	164.6 W	8.108 MW		
⁸⁵ Br	⁸⁵ ₃₄ Se	275.0 μg	3.239 μM	7.857 PBq	28.57 EBq	β ^{85m} ₃₆ Kr	2.900 m	1.041 MeV	1.310 kW	4.764 MW		
					0.163% →	β ⁸⁵ ₃₆ Kr						
⁸⁶ Br	⁸⁶ ₃₄ Se	62.41 μg	726.4 nM	5.511 PBq	88.30 EBq	β ⁸⁶ ₃₆ Kr	55.00 s	5.092 MeV	4.496 kW	72.04 MW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
^{86m} Br		5.123 μg	60.14 nM	5.529 PBq	1.079×10 ¹²	γ ⁸⁶ ₃₅ Br	4.500 s	4.752 MeV	4.209 kW	821.6 MW		
⁸⁷ Br	⁸⁷ ₃₄ Se	145.9 μg	1.679 μM	12.55 PBq	86.02 EBq	β ⁸⁷ ₃₆ Kr	55.70 s	3.861 MeV	7.763 kW	53.21 MW		
					2.51% →	β n ⁸⁶ ₃₆ Kr						
⁸⁸ Br	⁸⁸ ₃₄ Se	44.19 μg	502.6 nM	12.87 PBq	291.2 EBq	β ⁸⁸ ₃₆ Kr	16.50 s	2.528 MeV	5.213 kW	118.0 MW		
					6.7% →	β n ⁸⁷ ₃₆ Kr						
⁸⁹ Br	⁸⁹ ₃₄ Se	8.233 μg	92.58 nM	8.586 PBq	1.043×10 ¹²	β ⁸⁹ ₃₆ Kr	4.370 s	4.796 MeV	6.597 kW	801.3 MW		
					14.1% →	β n ⁸⁸ ₃₆ Kr						
⁹⁰ Br	⁹⁰ ₃₄ Se	1.824 μg	20.28 nM	5.289 PBq	2.900×10 ¹²	β ⁹⁰ ₃₆ Kr	1.900 s	5.674 MeV	4.808 kW	2.636 GW		
					24.6% →	β n ⁸⁹ ₃₆ Kr						
⁹¹ Br	⁹¹ ₃₄ Se	247.5 ng	2.722 nM	1.894 PBq	7.653×10 ¹²	β ⁹¹ ₃₆ Kr	538.0 ms	5.388 MeV	1.635 kW	6.606 GW		
					2% →	β n ⁹⁰ ₃₆ Kr						
⁹² Br	⁹² ₃₄ Se	16.36 ng	177.9 pM	247.6 TBq	1.513×10 ¹³	β ⁹² ₃₆ Kr	343.0 ms	6.688 MeV	265.3 W	16.22 GW		
					33.1% →	β n ⁹¹ ₃₆ Kr						
⁹³ Br		1.880 ng	20.23 pM	41.97 TBq	2.232×10 ¹³	β n ⁹² ₃₆ Kr	102.0 ms	6.562 MeV	44.12 W	23.47 GW		
					32% →	β ⁹³ ₃₆ Kr						
⁹⁴ Br		89.67 pg	≤ 1 pM	3.606 TBq	4.021×10 ¹³	β n ⁹³ ₃₆ Kr	70.00 ms	8.454 MeV	4.884 W	54.47 GW		
					3% →	β ⁹⁴ ₃₆ Kr						
⁹⁵ Br		8.304 pg	≤ 1 pM	313.1 GBq	3.770×10 ¹³	β ⁹⁵ ₃₆ Kr	50.00 ms	7.496 MeV	376.0 mW	45.28 GW		
⁹⁶ Br		≤ 1 pg	≤ 1 pM	16.44 GBq	5.191×10 ¹³	β ⁹⁶ ₃₆ Kr	20.00 ms	9.371 MeV	24.68 mW	77.93 GW		
E ³⁵ Br		31.98 gm	395.2 mM	71.62 PBq	2.240 PBq				40.07 kW	1.253 kW	906.3 kSv	28.34 kSv
¹¹³ In	¹¹³ ₄₈ Cd	27.58 mg	244.3 μM			γ ¹¹³ ₄₉ In	1.658 h	392.9 keV	11.96 nW	38.97 kW	5.320 μSv	17.33 MSv
^{113m} In		≤ 1 pg	≤ 1 pM	190.0 kBq	619.1 PBq	γ ¹¹⁴ ₅₀ Sn	1.198 m	803.3 keV	76.87 mW	6.559 MW		
¹¹⁴ In	^{114m} ₄₉ In	11.72 ng	102.9 pM	597.3 GBq	50.96 EBq	ε ¹¹⁴ ₄₈ Cd						
					0.5% →	γ ¹¹⁴ ₄₉ In	50.00 d	239.4 keV	8.729 mW	32.84 W	933.2 Sv	3.511 MSv
^{114m} In		265.8 μg	2.334 μM	227.6 GBq	856.3 TBq	ε ¹¹⁴ ₄₈ Cd						
					3.5% →	β ¹¹⁵ ₅₀ Sn	441.0 Ty	241.9 keV	≤ 1 pW	≤ 1 pW	18.99 nSv	7.373 nSv
¹¹⁵ In	¹¹⁵ ₄₈ Cd	2.575 gm	22.41 mM	593.3 mBq	230.4 mBq	γ ¹¹⁵ ₄₉ In	4.486 h	336.3 keV	42.12 W	12.64 kW	67.23 kSv	20.18 MSv
^{115m} In	¹¹⁵ ₄₈ Cd	3.332 mg	29.00 μM	781.7 TBq	234.6 PBq	β ¹¹⁵ ₅₀ Sn						
					5% →	β ¹¹⁶ ₅₀ Sn	14.20 s	1.382 MeV	104.2 W	56.54 MW		
¹¹⁶ In		1.843 μg	15.90 nM	470.8 TBq	255.5 EBq	β ¹¹⁶ ₅₀ Sn	54.60 m	2.776 MeV	152.5 W	492.9 kW	21.95 kSv	70.93 MSv
^{116m} In		309.4 μg	2.669 μM	342.9 TBq	1.108 EBq	β ¹¹⁷ ₅₀ Sn	43.20 m	759.7 keV	46.98 W	164.6 kW	11.97 kSv	41.93 MSv
¹¹⁷ In	¹¹⁷ ₄₈ Cd	285.4 μg	2.441 μM	386.0 TBq	1.352 EBq	β ^{117m} ₅₀ Sn						
					0.341% →	β ¹¹⁷ ₅₀ Sn	1.937 h	637.1 keV	49.86 W	52.16 kW	58.62 kSv	61.32 MSv
^{117m} In	¹¹⁷ ₄₈ Cd	955.9 μg	8.177 μM	488.5 TBq	511.0 PBq	γ ¹¹⁷ ₄₉ In						
					47.1% →	β ¹¹⁸ ₅₀ Sn	5.000 s	2.037 MeV	206.9 W	231.0 MW		
¹¹⁸ In	¹¹⁸ ₄₈ Cd	895.6 ng	7.596 nM	634.0 TBq	707.9 EBq	β ¹¹⁸ ₅₀ Sn	4.450 m	3.302 MeV	148.7 mW	7.014 MW		
^{118m} In		21.20 ng	179.8 pM	281.1 GBq	13.26 EBq	β ^{119m} ₅₀ Sn	2.400 m	1.349 MeV	39.37 W	5.056 MW		
¹¹⁹ In	¹¹⁹ ₄₈ Cd	7.787 μg	65.49 nM	182.2 TBq	23.40 EBq							

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
^{119m}In	$^{119}_{48}\text{Cd}$	146.1 μg	1.229 μM	474.8 TBq	9.66% \rightarrow 3.250 EBq	β $^{119}_{50}\text{Sn}$ β $^{119}_{50}\text{Sn}$	18.00 m	1.425 MeV	108.4 W	742.0 kW	22.32 kSv	152.7 MSv
^{120}In	$^{120}_{48}\text{Cd}$	4.048 μg	33.76 nM	317.3 TBq	5.6% \rightarrow 78.38 EBq	γ $^{119}_{49}\text{In}$ β $^{120}_{50}\text{Sn}$	3.080 s	3.905 MeV	198.5 W	49.04 MW		
^{120m}In	$^{120}_{48}\text{Cd}$	280.8 ng	2.342 nM	317.3 TBq	1.130×10^{12}	β $^{120}_{50}\text{Sn}$	46.20 s	2.703 MeV	137.4 W	489.3 MW		
^{121}In	$^{121}_{48}\text{Cd}$	4.235 μg	35.03 nM	522.2 TBq	123.3 EBq	β $^{121}_{50}\text{Sn}$	23.10 s	2.031 MeV	169.9 W	40.12 MW		
^{121m}In	$^{121}_{48}\text{Cd}$	7.465 μg	61.74 nM	130.2 TBq	11.328% \rightarrow 17.44 EBq	β $^{121m}_{50}\text{Sn}$ β $^{121}_{50}\text{Sn}$	3.880 m	2.172 MeV	45.30 W	6.068 MW		
^{122}In	$^{122}_{48}\text{Cd}$	1.837 μg	15.07 nM	629.2 TBq	1.2% \rightarrow 342.5 EBq	γ $^{121}_{49}\text{In}$ β $^{122}_{50}\text{Sn}$	1.500 s	4.647 MeV	468.4 W	255.0 MW		
^{122m}In	$^{122}_{48}\text{Cd}$	20.23 ng	165.9 pM	46.15 TBq	2.281×10^{12}	β $^{122}_{50}\text{Sn}$	10.80 s	331.0 keV	2.447 W	121.0 MW		
^{123}In	$^{123}_{48}\text{Cd}$	910.2 ng	7.405 nM	517.8 TBq	568.9 EBq	β $^{123m}_{50}\text{Sn}$	5.980 s	2.340 MeV	194.1 W	213.2 MW		
^{123m}In	$^{123}_{48}\text{Cd}$	3.097 μg	25.20 nM	219.1 TBq	7.624% \rightarrow 70.75 EBq	β $^{123}_{50}\text{Sn}$ β $^{123m}_{50}\text{Sn}$	47.80 s	2.719 MeV	95.43 W	30.81 MW		
^{124}In	$^{124}_{48}\text{Cd}$	788.6 ng	6.364 nM	830.1 TBq	% \rightarrow 1.053×10^{12}	β $^{124}_{50}\text{Sn}$	3.110 s	4.454 MeV	592.3 W	751.1 MW		
^{125}In	$^{125}_{48}\text{Cd}$	378.7 ng	3.032 nM	543.3 TBq	1.435×10^{12}	β $^{125m}_{50}\text{Sn}$	2.360 s	3.230 MeV	281.1 W	742.3 MW		
^{125m}In	$^{125}_{48}\text{Cd}$	1.430 μg	11.45 nM	398.2 TBq	16.892% \rightarrow 278.5 EBq	β $^{125}_{50}\text{Sn}$ β $^{125m}_{50}\text{Sn}$	12.20 s	3.350 MeV	213.7 W	149.4 MW		
^{126}In	$^{126}_{48}\text{Cd}$	549.9 ng	4.367 nM	1.192 PBq	2.168×10^{12}	β $^{126}_{50}\text{Sn}$	1.530 s	5.129 MeV	979.4 W	1.781 GW		
^{127}In	$^{127}_{48}\text{Cd}$	438.4 ng	3.454 nM	721.0 TBq	1.645×10^{12}	β $^{127m}_{50}\text{Sn}$	1.090 s	4.065 MeV	469.5 W	1.071 GW		
^{127m}In	$^{127}_{48}\text{Cd}$	798.3 ng	6.290 nM	721.3 TBq	38.978% \rightarrow 903.5 EBq	β $^{127}_{50}\text{Sn}$ β $^{127m}_{50}\text{Sn}$	3.670 s	4.247 MeV	490.8 W	614.8 MW		
^{128}In	$^{128}_{48}\text{Cd}$	1.303 μg	10.19 nM	1.150 PBq	0.69% \rightarrow 882.6 EBq	β n $^{126}_{50}\text{Sn}$ β $^{128}_{50}\text{Sn}$	840.0 ms	5.867 MeV	1.081 kW	829.6 MW		
^{129}In	$^{130}_{48}\text{Cd}$	241.9 ng	1.876 nM	979.3 TBq	4.048×10^{12}	β $^{129}_{50}\text{Sn}$	610.0 ms	4.617 MeV	724.4 W	2.995 GW		
^{130}In	$^{130}_{48}\text{Cd}$	162.1 ng	1.248 nM	982.6 TBq	10.646% \rightarrow 6.062×10^{12}	β $^{129m}_{50}\text{Sn}$ β $^{130}_{50}\text{Sn}$	290.0 ms	5.372 MeV	845.6 W	5.217 GW		
^{131}In	$^{131}_{48}\text{Cd}$	33.57 ng	256.4 pM	356.9 TBq	1.063×10^{13}	β $^{131}_{50}\text{Sn}$	280.0 ms	5.416 MeV	309.7 W	9.225 GW		
^{132}In	$^{132}_{48}\text{Cd}$	3.318 ng	25.15 pM	87.49 TBq	2.637×10^{13}	β $^{132}_{50}\text{Sn}$	201.0 ms	8.483 MeV	118.9 W	35.83 GW		
^{133}In	$^{133}_{48}\text{Cd}$	370.4 pg	2.786 pM	10.21 TBq	2.756×10^{13}	β n $^{132}_{50}\text{Sn}$	165.0 ms	7.801 MeV	12.76 W	34.45 GW		
^{134}In	$^{134}_{48}\text{Cd}$	14.78 pg	≤ 1 pM	594.4 GBq	15% \rightarrow 4.022×10^{13}	β $^{133}_{50}\text{Sn}$ β n $^{133}_{50}\text{Sn}$	140.0 ms	9.144 MeV	870.7 mW	58.91 GW		
E $_{49}\text{In}$	$^{134}_{48}\text{Cd}$	2.608 gm	22.70 mM	14.43 PBq	31% \rightarrow 4% \rightarrow 5.535 PBq	β $^{134}_{50}\text{Sn}$ β n n $^{132}_{50}\text{Sn}$			8.182 kW	3.137 kW	183.0 kSv	70.17 kSv
^{152}Gd	$^{152}_{63}\text{Eu}$	73.66 mg	484.9 μM	59.40 mBq	806.4 mBq	α $^{148}_{62}\text{Sm}$	108.0 Ty	2.197 MeV	≤ 1 pW	≤ 1 pW	2.435 nSv	33.06 nSv
^{153}Gd	$^{153}_{63}\text{Eu}$	6.755 mg	44.17 μM	881.9 GBq	130.6 TBq	ϵ $^{153}_{63}\text{Eu}$	240.4 d	152.4 keV	21.53 mW	3.187 W	238.1 Sv	35.25 kSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †										
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm									
¹⁵⁴ Gd	¹⁵⁴ Eu	6.044 gm	39.27 mM	50.59 GBq	8.695×10 ¹³	γ ¹⁵⁵ ₆₄ Gd	32.00 ms	121.4 keV	984.2 μ W	1.692 GW	158.5 kSv	19.22 MSv									
¹⁵⁵ Gd	¹⁵⁵ ₆₃ Eu	216.6 mg	1.398 mM																		
^{155m} Gd	¹⁵⁵ ₆₃ Eu	≤ 1 pg	≤ 1 pM																		
¹⁵⁶ Gd	¹⁵⁶ ₆₃ Eu	120.5 gm	772.8 mM																		
¹⁵⁷ Gd	¹⁵⁷ ₆₃ Eu	171.7 mg	1.094 mM																		
¹⁵⁸ Gd	¹⁵⁸ ₆₃ Eu	33.19 gm	210.2 mM																		
¹⁵⁹ Gd	¹⁵⁹ ₆₃ Eu	8.244 mg	51.87 μ M										323.4 TBq	39.23 PBq	β ¹⁵⁹ ₆₅ Tb	18.48 h	549.9 keV	28.49 W	3.456 kW	158.5 kSv	19.22 MSv
¹⁶⁰ Gd	¹⁶⁰ ₆₃ Eu	2.102 gm	13.14 mM										1.337 mBq	636.2 μ Bq	2 β ¹⁶⁰ ₆₆ Dy	130.0 Py	1.729 MeV	≤ 1 pW	≤ 1 pW		
¹⁶¹ Gd	¹⁶¹ ₆₃ Eu	4.502 μ g	27.98 nM										52.59 TBq	11.68 EBq	β ¹⁶¹ ₆₅ Tb	3.660 m	1.224 MeV	10.31 W	2.290 MW		
¹⁶² Gd	¹⁶² ₆₃ Eu	5.418 μ g	33.46 nM										23.29 TBq	4.299 EBq	β ¹⁶² ₆₅ Tb	8.400 m	612.7 keV	2.286 W	421.9 kW		
¹⁶³ Gd	¹⁶³ ₆₃ Eu	333.7 ng	2.048 nM	9.219 TBq	27.63 EBq	β ¹⁶³ ₆₅ Tb	1.133 m	1.666 MeV	2.461 W	7.375 MW											
¹⁶⁴ Gd	¹⁶⁴ ₆₃ Eu	1.828 μ g	11.15 nM	3.579 TBq	1.958 EBq	β ¹⁶⁴ ₆₅ Tb	45.00 s	1.075 MeV	616.3 mW	337.1 kW											
¹⁶⁵ Gd	¹⁶⁵ ₆₃ Eu	46.64 ng	282.8 pM	1.178 TBq	25.26 EBq	β ¹⁶⁵ ₆₅ Tb	10.30 s	2.327 MeV	439.2 mW	9.417 MW											
E ⁶⁴ Gd		162.3 gm	1.038 M	414.2 TBq	2.552 TBq				44.63 W	274.9 mW	158.7 kSv	977.8 Sv									
¹⁵⁹ Tb	¹⁵⁹ ₆₄ Gd	4.329 gm	27.24 mM	67.21 TBq	418.0 TBq	β ¹⁶⁰ ₆₆ Dy	72.30 d	1.374 MeV	14.79 W	91.98 W	107.5 kSv	668.8 kSv									
¹⁶⁰ Tb		160.8 mg	1.005 mM	65.95 TBq	4.339 PBq	β ¹⁶¹ ₆₆ Dy	6.890 d	337.9 keV	3.570 W	234.9 W	47.48 kSv	3.124 MSv									
¹⁶¹ Tb	¹⁶¹ ₆₄ Gd	15.20 mg	94.45 μ M	23.06 TBq	5.753 EBq	β ¹⁶² ₆₆ Dy	7.600 m	1.681 MeV	6.211 W	1.550 MW	155.0 kSv	34.41 kSv									
¹⁶² Tb	¹⁶² ₆₄ Gd	4.008 μ g	24.75 nM	702.8 GBq	321.1 PBq	γ ¹⁶² ₆₅ Tb	2.230 h	1.832 MeV	206.3 mW	94.24 kW											
^{162m} Tb		2.189 μ g	13.64 nM	9.956 TBq	2.191 EBq	β ¹⁶³ ₆₆ Dy	19.50 m	1.018 MeV	1.623 W	357.1 kW											
¹⁶³ Tb	¹⁶³ ₆₄ Gd	4.545 μ g	27.90 nM	4.449 TBq	14.16 EBq	β ¹⁶⁴ ₆₆ Dy	3.000 m	2.361 MeV	1.683 W	5.355 MW											
¹⁶⁴ Tb	¹⁶⁴ ₆₄ Gd	314.3 ng	1.917 nM	1.932 TBq	77.28 EBq	β ¹⁶⁵ ₆₆ Dy	2.110 m	1.703 MeV	527.0 mW	21.08 MW											
¹⁶⁵ Tb	¹⁶⁵ ₆₄ Gd	25.00 ng	151.6 pM	173.3 TBq	38.46 TBq				28.61 W	6.351 W											
E ⁶⁵ Tb		4.505 gm	28.34 mM																		
⁷⁶ Se	⁷⁶ ₃₂ Ge	12.19 mg	160.6 μ M	280.8 GBq	310.0 EBq	γ ⁷⁷ ₃₄ Se	17.55 s	249.9 keV	11.24 mW	12.41 MW			66.35 Sv	7.480 Sv							
⁷⁷ Se	⁷⁷ ₃₃ As	1.512 gm	19.66 mM																		
^{77m} Se		905.7 pg	11.77 pM																		
⁷⁸ Se	⁷⁸ ₃₃ As	3.686 gm	47.31 mM																		
⁷⁹ Se	⁷⁹ ₃₃ As	8.870 gm	112.4 mM								22.88 GBq	2.579 GBq			β ⁷⁹ ₃₅ Br	377.0 ky	41.99 keV	153.9 μ W	17.35 μ W		
^{79m} Se	⁷⁹ ₃₃ As	22.35 μ g	283.2 nM								506.3 TBq	22.65 EBq			γ ⁷⁹ ₃₄ Se	3.900 m	94.97 keV	7.703 W	344.7 kW		
												0.056% →			β ⁷⁹ ₃₅ Br						
⁸⁰ Se	⁸⁰ ₃₃ As	20.17 gm	252.4 mM																		
⁸¹ Se	⁸¹ ₃₃ As	387.3 μ g	4.786 μ M								1.799 PBq	4.645 EBq			β ⁸¹ ₃₅ Br	18.39 m	612.7 keV	176.6 W	456.0 kW	48.57 kSv	125.4 MSv
^{81m} Se	⁸¹ ₃₃ As	31.53 μ g	389.7 nM								47.30 TBq	1.500 EBq			γ ⁸¹ ₃₄ Se	57.28 m	102.9 keV	780.1 mW	24.74 kW	2.507 kSv	79.51 MSv
					0.068% →	β ⁸¹ ₃₅ Br															
⁸² Se	⁸² ₃₃ As	50.43 gm	615.6 mM	67.30 μ Bq	1.334 μ Bq	2 β ⁸² ₃₆ Kr	121.0 Ey	2.995 MeV	≤ 1 pW	≤ 1 pW	73.84 kSv	175.2 MSv									
⁸³ Se	⁸³ ₃₃ As	421.4 μ g	5.082 μ M	1.571 PBq	3.728 EBq	β ⁸³ ₃₅ Br	22.30 m	3.000 MeV	755.1 W	1.792 MW											
^{83m} Se	⁸³ ₃₃ As	31.67 μ g	381.9 nM	2.277 PBq	71.90 EBq	β ⁸³ ₃₅ Br	1.168 m	2.211 MeV	806.4 W	25.46 MW											
⁸⁴ Se	⁸⁴ ₃₃ As	252.7 μ g	3.011 μ M	6.347 PBq	25.12 EBq	β ⁸⁴ ₃₅ Br	3.100 m	938.7 keV	954.5 W	3.777 MW											

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
⁸⁵ Se	⁸⁵ As	28.24 μg	332.5 nM	3.559 PBq	126.0 EBq	β ^{84m} Br						
^{85m} Se		10.27 μg	122.0 nM	2.657 PBq	258.7 EBq	β ⁸⁵ Br	31.70 s	3.353 MeV	1.912 kW	67.71 MW		
⁸⁶ Se	⁸⁶ As	23.18 μg	269.8 nM	6.784 PBq	292.7 EBq	γ ⁸⁵ Se	19.00 s	3.493 MeV	1.487 kW	144.8 MW		
⁸⁷ Se	⁸⁷ As	6.543 μg	75.27 nM	5.611 PBq	857.6 EBq	β ⁸⁶ Br	15.30 s	2.437 MeV	2.649 kW	114.3 MW		
⁸⁸ Se	⁸⁸ As	667.5 ng	7.591 nM	2.112 PBq	3.164×10 ¹²	β ⁸⁷ Br	5.500 s	4.236 MeV	3.808 kW	582.0 MW		
					0.99% →	β ⁸⁵ Br	1.530 s	3.727 MeV	1.261 kW	1.889 GW		
⁸⁹ Se	⁸⁹ As	53.89 ng	605.9 pM	617.0 TBq	1.145×10 ¹³	β n ⁸⁷ Br						
					7.8% →	β ⁸⁹ Br	410.0 ms	5.093 MeV	503.4 W	9.341 GW		
⁹⁰ Se		21.44 ng	238.4 pM	179.5 TBq	8.372×10 ¹²	β n ⁸⁸ Br						
⁹¹ Se		1.138 ng	12.51 pM	28.31 TBq	2.488×10 ¹³	β ⁹⁰ Br	300.0 ms	4.587 MeV	131.9 W	6.152 GW		
					21% →	β ⁹¹ Br	270.0 ms	6.544 MeV	29.68 W	26.08 GW		
⁹² Se		92.68 pg	1.008 pM	1.698 TBq	1.832×10 ¹³	β n ⁹⁰ Br						
E ³⁴ Se		84.68 gm	1.048 M	34.10 PBq	402.7 TBq	β ⁹² Br	100.0 ms	5.569 MeV	1.515 W	16.35 GW	125.0 kSv	1.476 kSv
⁷⁵ As	⁷⁵ Ge	298.2 mg	3.980 mM									
⁷⁶ As	⁷⁶ Ge	33.58 μg	442.3 nM	1.948 TBq	58.01 PBq	β ⁷⁶ Se	1.092 d	1.494 MeV	466.1 mW	13.88 kW	3.117 kSv	92.82 MSv
⁷⁷ As	⁷⁷ Ge	2.359 mg	30.67 μM	91.60 TBq	38.83 PBq	β ⁷⁷ Se	1.618 d	237.6 keV	3.486 W	1.478 kW	36.64 kSv	15.53 MSv
⁷⁸ As	⁷⁸ Ge	218.6 μg	2.805 μM	215.1 TBq	984.0 PBq	β ⁷⁸ Se	1.512 h	2.636 MeV	90.84 W	415.6 kW	45.17 kSv	206.6 MSv
⁷⁹ As	⁷⁹ Ge	51.50 μg	652.6 nM	504.1 TBq	9.788 EBq	β ^{79m} Se	9.010 m	879.0 keV	70.99 W	1.378 MW		
					2.369% →	β ⁷⁹ Se						
⁸⁰ As	⁸⁰ Ge	3.398 μg	42.52 nM	1.075 PBq	316.4 EBq	β ⁸⁰ Se	15.20 s	3.129 MeV	538.8 W	158.6 MW		
⁸¹ As	⁸¹ Ge	10.32 μg	127.5 nM	1.662 PBq	161.0 EBq	β ⁸¹ Se	33.30 s	1.669 MeV	444.4 W	43.06 MW		
					3.59% →	β ^{81m} Se						
⁸² As	⁸² Ge	5.673 μg	69.25 nM	1.376 PBq	242.6 EBq	β ⁸² Se	19.10 s	3.488 MeV	769.0 W	135.6 MW		
^{82m} As	⁸² Ge	1.502 μg	18.33 nM	588.5 TBq	391.8 EBq	β ⁸² Se	13.60 s	5.702 MeV	537.6 W	357.9 MW		
⁸³ As	⁸³ Ge	6.378 μg	76.91 nM	2.378 PBq	372.8 EBq	β ^{83m} Se	13.40 s	2.659 MeV	1.013 kW	158.8 MW		
					36% →	β ⁸³ Se						
⁸⁴ As	⁸⁴ Ge	2.279 μg	27.15 nM	1.954 PBq	857.4 EBq	β ⁸⁴ Se	4.020 s	5.865 MeV	1.836 kW	805.6 MW		
					0.14% →	β n ⁸³ Se						
					0.14% →	β n ^{83m} Se						
⁸⁵ As	⁸⁵ Ge	454.1 ng	5.347 nM	1.099 PBq	2.420×10 ¹²	β ⁸⁵ Se	2.040 s	5.037 MeV	886.9 W	1.953 GW		
					22% →	β n ⁸⁴ Se						
⁸⁶ As	⁸⁶ Ge	106.5 ng	1.239 nM	574.8 TBq	5.397×10 ¹²	β ⁸⁶ Se	945.0 ms	6.805 MeV	626.6 W	5.884 GW		
					33% →	β n ⁸⁵ Se						
⁸⁷ As	⁸⁷ Ge	16.80 ng	193.2 pM	268.9 TBq	1.601×10 ¹³	β ⁸⁷ Se	610.0 ms	5.896 MeV	254.0 W	15.12 GW		
					15.4% →	β n ⁸⁶ Se						
⁸⁸ As	⁸⁸ Ge	690.7 pg	7.854 pM	25.24 TBq	3.654×10 ¹³	β ⁸⁸ Se	300.0 ms	7.904 MeV	31.96 W	46.27 GW		
⁸⁹ As		75.30 pg	≤ 1 pM	2.731 TBq	3.627×10 ¹³	β ⁸⁹ Se	200.0 ms	7.332 MeV	3.208 W	42.60 GW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
E $_{33}\text{As}$		300.9 mg	4.015 mM	11.82 PBq	39.27 PBq				7.107 kW	23.62 kW	84.93 kSv	282.3 kSv
^{70}Ge	$^{70}_{31}\text{Ga}$	33.14 ng	473.9 pM									
^{72}Ge	$^{72}_{31}\text{Ga}$	32.94 mg	458.0 μM									
^{73}Ge	$^{73}_{31}\text{Ga}$	66.58 mg	913.0 μM									
^{73m}Ge	$^{73}_{31}\text{Ga}$	480.4 pg	6.588 pM	5.185 TBq	1.079×10^{13}	γ $^{73}_{32}\text{Ge}$	500.0 ms	67.01 keV	55.66 mW	115.9 MW		
^{74}Ge	$^{74}_{31}\text{Ga}$	147.3 mg	1.993 mM									
^{75}Ge	$^{75}_{31}\text{Ga}$	17.92 μg	239.2 nM	20.09 TBq	1.121 EBq	β $^{75}_{33}\text{As}$	1.380 h	466.1 keV	1.500 W	83.71 kW	924.1 Sv	51.57 MSv
^{75m}Ge	$^{75}_{31}\text{Ga}$	8.122 ng	108.4 pM	925.2 GBq	113.9 EBq	γ $^{75}_{32}\text{Ge}$	47.70 s	139.0 keV	20.60 mW	2.536 MW		
^{76}Ge	$^{76}_{31}\text{Ga}$	748.2 mg	9.855 mM	82.50 nBq	110.3 nBq	2β $^{76}_{34}\text{Se}$	$\geq 10^{21}$ y	2.039 MeV	≤ 1 pW	≤ 1 pW		
^{77}Ge	$^{77m}_{32}\text{Ge}$	253.0 μg	3.289 μM	33.73 TBq	133.3 PBq	β $^{77}_{33}\text{As}$	11.30 h	1.733 MeV	9.363 W	37.01 kW	11.13 kSv	44.00 MSv
^{77m}Ge	$^{77}_{31}\text{Ga}$	728.3 ng	9.468 nM	72.76 TBq	99.90 EBq	β $^{77}_{33}\text{As}$	52.90 s	1.034 MeV	12.05 W	16.55 MW		
					19% \rightarrow	γ $^{77}_{32}\text{Ge}$						
^{78}Ge	$^{78}_{31}\text{Ga}$	203.1 μg	2.606 μM	208.4 TBq	1.026 EBq	β $^{78}_{33}\text{As}$	1.467 h	514.9 keV	17.19 W	84.64 kW	25.01 kSv	123.1 MSv
^{79}Ge	$^{79}_{31}\text{Ga}$	3.514 μg	44.52 nM	431.9 TBq	122.9 EBq	β $^{79}_{33}\text{As}$	18.98 s	2.145 MeV	148.4 W	42.23 MW		
^{80}Ge	$^{80}_{31}\text{Ga}$	3.708 μg	46.39 nM	806.8 TBq	217.6 EBq	β $^{80}_{33}\text{As}$	29.50 s	1.028 MeV	132.9 W	35.84 MW		
^{81}Ge	$^{81}_{31}\text{Ga}$	1.827 μg	22.58 nM	932.7 TBq	510.5 EBq	β $^{81}_{33}\text{As}$	8.000 s	3.246 MeV	485.0 W	265.5 MW		
^{82}Ge	$^{82}_{31}\text{Ga}$	710.4 ng	8.671 nM	786.5 TBq	1.107×10^{12}	β $^{82}_{33}\text{As}$	4.550 s	2.063 MeV	260.0 W	366.0 MW		
^{83}Ge	$^{83}_{31}\text{Ga}$	210.7 ng	2.541 nM	558.1 TBq	2.649×10^{12}	β $^{83}_{33}\text{As}$	1.850 s	5.040 MeV	450.6 W	2.139 GW		
^{84}Ge	$^{84}_{31}\text{Ga}$	46.66 ng	555.9 pM	193.4 TBq	4.145×10^{12}	β $^{84}_{33}\text{As}$	954.0 ms	4.335 MeV	134.3 W	2.878 GW		
					10.8% \rightarrow	β n $^{83}_{33}\text{As}$						
^{85}Ge		2.172 ng	25.57 pM	45.56 TBq	2.098×10^{13}	β $^{85}_{33}\text{As}$	540.0 ms	6.069 MeV	44.30 W	20.40 GW		
					7% \rightarrow	β n $^{84}_{33}\text{As}$						
^{86}Ge		461.5 pg	5.370 pM	8.657 TBq	1.876×10^{13}	β $^{86}_{33}\text{As}$	300.0 ms	5.556 MeV	7.705 W	16.70 GW		
^{87}Ge		30.30 pg	≤ 1 pM	1.159 TBq	3.825×10^{13}	β $^{87}_{33}\text{As}$	150.0 ms	7.125 MeV	1.323 W	43.66 GW		
^{88}Ge		1.538 pg	≤ 1 pM	51.15 GBq	3.326×10^{13}	β $^{88}_{33}\text{As}$	80.00 ms	6.497 MeV	53.24 mW	34.62 GW		
E $_{32}\text{Ge}$		995.5 mg	13.22 mM	4.106 PBq	4.124 PBq				1.705 kW	1.712 kW	37.06 kSv	37.23 kSv
^{165}Ho	$^{165}_{66}\text{Dy}$	285.6 mg	1.732 mM									
^{166}Ho	$^{166}_{66}\text{Dy}$	336.2 μg	2.026 μM	8.768 TBq	26.08 PBq	β $^{166}_{68}\text{Er}$	1.117 d	722.6 keV	1.015 W	3.019 kW	12.28 kSv	36.51 MSv
^{166m}Ho		3.525 mg	21.24 μM	234.2 MBq	66.44 GBq	β $^{166}_{68}\text{Er}$	1.200 ky	1.869 MeV	70.11 μW	19.89 mW	468.4 mSv	132.9 Sv
E $_{67}\text{Ho}$		289.5 mg	1.755 mM	8.768 TBq	30.29 TBq				1.015 W	3.507 W	12.28 kSv	42.41 kSv
^{160}Dy	$^{160}_{64}\text{Gd}$	452.0 mg	2.826 mM									
^{161}Dy	$^{161}_{65}\text{Tb}$	697.2 mg	4.332 mM									
^{162}Dy	$^{162}_{65}\text{Tb}$	572.7 mg	3.537 mM									
^{163}Dy	$^{163}_{65}\text{Tb}$	537.5 mg	3.299 mM									
^{164}Dy	$^{164}_{65}\text{Tb}$	133.0 mg	811.3 μM									
^{165}Dy	$^{165}_{65}\text{Tb}$	107.2 μg	650.0 nM	32.07 TBq	299.2 PBq	β $^{165}_{67}\text{Ho}$	2.334 h	780.9 keV	4.012 W	37.43 kW	3.528 kSv	32.91 MSv
^{165m}Dy		595.9 ng	3.613 nM	20.02 TBq	33.60 EBq	γ $^{165}_{66}\text{Dy}$	1.257 m	126.0 keV	404.0 mW	678.0 kW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹⁶⁶ Dy E ₆₆ Dy		163.3 μg 2.393 gm	984.1 nM 14.81 mM	1.400 TBq 53.49 TBq	2.24% → 8.573 PBq 22.36 TBq	β ¹⁶⁵ Ho β ¹⁶⁶ Ho	3.401 d	197.0 keV	44.19 mW 4.460 W	270.6 W 1.864 W	2.240 kSv 5.768 kSv	13.72 MSv 2.411 kSv
⁶⁹ Ga ⁷⁰ Ga	⁶⁹ Zn ₃₀ Zn	5.670 μg 1.789 pg	82.26 nM ≤ 1 pM	8.431 MBq	4.713 EBq 0.41% →	β ⁷⁰ Ge ϵ ⁷⁰ Zn	21.14 m	652.9 keV	881.9 nW	493.0 kW	261.4 μSv	146.1 MSv
⁷¹ Ga ⁷² Ga ⁷³ Ga	⁷¹ Zn ₃₀ Zn ⁷² Zn ₃₀ Zn ⁷³ Zn ₃₀ Zn	2.257 μg 23.66 μg 15.91 μg	31.82 nM 328.9 nM 218.2 nM	2.705 TBq 5.181 TBq	114.3 PBq 325.6 PBq 1.468% →	β ⁷² Ge β ^{73m} Ge β ⁷³ Ge	14.10 h 4.860 h	3.205 MeV 763.0 keV	1.389 W 633.3 mW	58.71 kW 39.81 kW	2.976 kSv 1.347 kSv	125.8 MSv 84.67 MSv
⁷⁴ Ga ⁷⁵ Ga	⁷⁴ Zn ⁷⁵ Zn ₃₀ Zn	835.6 ng 405.5 ng	11.30 nM 5.412 nM	9.704 TBq 19.81 TBq	11.61 EBq 48.85 EBq 4% →	β ⁷⁴ Ge β ⁷⁵ Ge β ^{75m} Ge	8.120 m 2.100 m	4.341 MeV 1.381 MeV	6.748 W 4.382 W	8.076 MW 10.81 MW		
⁷⁶ Ga ⁷⁷ Ga ⁷⁸ Ga ⁷⁹ Ga	⁷⁶ Zn ₃₀ Zn ⁷⁷ Zn ₃₀ Zn ⁷⁸ Zn ₃₀ Zn ⁷⁹ Zn ₃₀ Zn	202.6 ng 173.3 ng 112.4 ng 76.97 ng	2.668 nM 2.253 nM 1.442 nM 975.1 pM	41.08 TBq 72.32 TBq 122.9 TBq 142.3 TBq	202.8 EBq 417.3 EBq 1.093 × 10 ¹² 1.849 × 10 ¹² 0.089% →	β ⁷⁶ Ge β ^{77m} Ge β ⁷⁸ Ge β ⁷⁹ Ge β n ⁷⁸ Ge	32.60 s 13.00 s 5.090 s 2.847 s	4.868 MeV 2.558 MeV 4.582 MeV 3.501 MeV	32.04 W 29.64 W 90.21 W 79.81 W	158.1 MW 171.0 MW 802.6 MW 1.037 GW		
⁸⁰ Ga ⁸¹ Ga	⁸⁰ Zn ₃₀ Zn ⁸¹ Zn ₃₀ Zn	43.66 ng 10.81 ng	546.2 pM 133.6 pM	134.1 TBq 79.05 TBq	3.071 × 10 ¹² 7.313 × 10 ¹² 11.9% →	β ⁸⁰ Ge β ⁸¹ Ge β n ⁸⁰ Ge	1.697 s 1.217 s	5.623 MeV 4.480 MeV	120.8 W 56.74 W	2.767 GW 5.249 GW		
⁸² Ga ⁸³ Ga ⁸⁴ Ga	⁸² Zn ₃₀ Zn ⁸³ Zn ₃₀ Zn	900.6 pg 244.1 pg 22.70 pg	10.99 pM 2.943 pM ≤ 1 pM	29.83 TBq 8.316 TBq 1.142 TBq	3.312 × 10 ¹³ 3.407 × 10 ¹³ 37% → 5.031 × 10 ¹³ 3% →	β ⁸² Ge β n ⁸¹ Ge β ⁸³ Ge β n ⁸² Ge β n ⁸³ Ge β ⁸⁴ Ge	599.0 ms 308.0 ms 85.00 ms	7.587 MeV 7.137 MeV 8.543 MeV	36.26 W 9.508 W 1.563 W	40.26 GW 38.95 GW 68.85 GW		
E ₃₁ Ga		49.36 μg	685.9 nM	668.4 TBq	13.54 EBq				469.7 W	9.516 MW	4.323 kSv	87.57 MSv
⁶⁶ Zn ⁶⁷ Zn ⁶⁸ Zn ⁶⁹ Zn ^{69m} Zn ⁷⁰ Zn ⁷¹ Zn ^{71m} Zn ⁷² Zn	⁶⁶ Cu ₂₉ Cu ⁶⁷ Cu ₂₉ Cu ^{69m} Zn ₃₀ Zn ⁷⁰ Ga ₃₁ Ga ⁷¹ Ga ₃₁ Ga ⁷² Cu ₂₉ Cu	53.48 ng 2.226 ng 2.128 mg 549.2 pg 534.6 pg 7.588 mg 3.388 pg 34.81 pg 77.77 μg	811.2 pM 33.26 pM 31.33 μM 7.968 pM 7.756 pM 108.5 μM ≤ 1 pM ≤ 1 pM 1.081 μM	972.3 MBq 65.32 MBq	1.770 EBq 122.2 PBq 0.033% →	β ⁶⁹ Ga γ ⁶⁹ Zn β ⁶⁹ Ga β ⁷¹ Ga β ⁷¹ Ga β ⁷² Ga	56.40 m 13.78 h	320.7 keV 438.7 keV	49.96 μW 4.591 μW	90.97 kW 8.588 kW	30.14 mSv 21.56 mSv	54.88 MSv 40.32 MSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
⁷³ Zn	⁷³ Cu	20.16 ng	276.4 pM	4.908 TBq	243.5 EBq	β ⁷³ Ga	23.50 s	2.455 MeV	1.930 W	95.73 MW		
⁷⁴ Zn	⁷⁴ Cu	152.0 ng	2.056 nM	9.034 TBq	59.43 EBq	β ^{74m} Ga	1.593 m	1.083 MeV	1.568 W	10.32 MW		
⁷⁵ Zn	⁷⁵ Cu	26.33 ng	351.4 pM	16.30 TBq	619.1 EBq	β ⁷⁵ Ga	10.20 s	3.276 MeV	8.556 W	325.0 MW		
⁷⁶ Zn	⁷⁶ Cu	26.14 ng	344.2 pM	26.60 TBq	1.018×10 ¹²	β ⁷⁶ Ga	5.700 s	2.199 MeV	9.370 W	358.5 MW		
⁷⁷ Zn	⁷⁷ Cu	7.447 ng	96.79 pM	28.86 TBq	3.875×10 ¹²	β ⁷⁷ Ga	2.080 s	4.226 MeV	19.54 W	2.624 GW		
⁷⁸ Zn	⁷⁸ Cu	12.45 ng	159.7 pM	27.46 TBq	2.206×10 ¹²	β ⁷⁸ Ga	1.470 s	3.094 MeV	13.61 W	1.093 GW		
⁷⁹ Zn	⁷⁹ Cu	1.367 ng	17.32 pM	18.91 TBq	1.383×10 ¹³	β ⁷⁹ Ga	995.0 ms	5.262 MeV	15.94 W	11.66 GW		
⁸⁰ Zn	⁸⁰ Cu	901.3 pg	11.27 pM	6.617 TBq	7.342×10 ¹²	β ⁸⁰ Ga	545.0 ms	4.063 MeV	4.307 W	4.779 GW		
⁸¹ Zn	⁸¹ Cu	38.90 pg	≤ 1 pM	1.550 TBq	3.985×10 ¹³	β ⁸¹ Ga	290.0 ms	7.265 MeV	1.804 W	46.38 GW		
⁸² Zn		5.476 pg	≤ 1 pM	206.1 GBq	3.764×10 ¹³	β ⁸² Ga	100.0 ms	6.730 MeV	222.2 mW	40.58 GW		
⁸³ Zn		≤ 1 pg	≤ 1 pM	19.40 GBq	6.002×10 ¹³	β ⁸³ Ga	80.00 ms	8.224 MeV	25.56 mW	79.08 GW		
E ₃₀ Zn		9.794 mg	140.9 μM	143.2 TBq	14.62 PBq				76.98 W	7.860 kW	3.773 kSv	385.2 kSv
G ₁ H		86.08 mg	28.54 mM	30.76 TBq	357.3 TBq	β ³ He	12.33 y	5.678 keV	27.98 mW	325.0 mW	1.292 kSv	15.01 kSv
¹⁶⁶ Er	¹⁶⁶ Ho	88.04 mg	530.6 μM									
¹⁶⁷ Er	^{167m} Er	5.663 mg	33.92 μM									
^{167m} Er		203.6 pg	1.220 pM	221.4 GBq	1.087×10 ¹²	γ ¹⁶⁷ Er	2.270 s	208.0 keV	7.376 mW	36.23 MW		
¹⁶⁸ Er		11.31 mg	67.35 μM									
¹⁶⁹ Er		4.681 μg	27.71 nM	14.25 GBq	3.044 PBq	β ¹⁶⁹ Tm	9.400 d	339.8 keV	775.7 μW	165.7 W	5.273 Sv	1.126 MSv
¹⁷⁰ Er	¹⁷⁰ Tm	36.03 ng	212.0 pM									
¹⁷¹ Er		≤ 1 pg	≤ 1 pM	37.68 kBq	90.25 PBq	β ¹⁷¹ Tm	7.516 h	806.4 keV	4.868 nW	11.66 kW	13.56 μSv	32.49 MSv
¹⁷² Er		≤ 1 pg	≤ 1 pM	10.52 Bq	13.76 PBq	β ¹⁷² Tm	2.054 d	910.2 keV	1.534 pW	2.007 kW	10.52 nSv	13.76 MSv
E ₆₈ Er		105.0 mg	631.9 μM	235.7 GBq	2.244 TBq				8.152 mW	77.62 mW	5.273 Sv	50.21 Sv
¹⁶⁹ Tm	¹⁶⁹ Er	90.62 μg	536.4 nM									
¹⁷⁰ Tm	^{170m} Tm	15.97 μg	93.98 nM	3.533 GBq	221.2 TBq	β ¹⁷⁰ Yb	128.6 d	334.6 keV	189.4 μW	11.86 W	4.593 Sv	287.6 kSv
^{170m} Tm		≤ 1 pg	≤ 1 pM	376.4 MBq	6.043×10 ¹⁷	ϵ ¹⁷⁰ Er	4.100 μs					
¹⁷¹ Tm	¹⁷¹ Er	1.812 μg	10.60 nM	73.06 MBq	40.32 TBq	β ¹⁷¹ Yb	1.917 y	26.15 keV	306.1 nW	168.9 mW	8.037 mSv	4.435 kSv
¹⁷² Tm	¹⁷² Er	669.6 pg	3.894 pM	7.102 MBq	10.61 PBq	β ¹⁷² Yb	2.650 d	1.880 MeV	2.139 μW	3.194 kW	12.07 mSv	18.03 MSv
E ₆₉ Tm		108.4 μg	641.0 nM	3.990 GBq	36.80 TBq				191.8 μW	1.770 W	4.613 Sv	42.55 kSv
E ₆ C		40.22 μg	2.872 μM	6.636 MBq	165.0 GBq	β ¹⁴ N	5.700 ky	49.47 keV	52.59 nW	1.308 mW	3.849 mSv	95.70 Sv
⁹ Be		29.79 μg	3.306 μM									
¹⁰ Be		198.9 μg	19.86 μM	164.6 kBq	827.6 MBq	β ¹⁰ B	1.600 My	202.4 keV	5.338 nW	26.84 μW	181.1 μSv	910.3 mSv
E ₄ Be		228.7 μg	23.17 μM	164.6 kBq	719.8 MBq				5.338 nW	23.34 μW	181.1 μSv	791.7 mSv
⁶⁶ Cu		≤ 1 pg	≤ 1 pM	2.547 MBq	20.67 EBq	β ⁶⁶ Zn	5.100 m	1.155 MeV	471.2 nW	3.825 MW		
⁶⁷ Cu		≤ 1 pg	≤ 1 pM	3.875 Bq	27.98 PBq	β ⁶⁷ Zn	2.579 d	270.9 keV	≤ 1 pW	1.214 kW	1.317 nSv	9.513 MSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
⁷² Cu	⁷² Ni	2.355 ng	32.74 pM	2.276 TBq	966.5 EBq	β ⁷² Zn	6.600 s	4.690 MeV	1.710 W	726.1 MW		
⁷³ Cu	⁷³ Ni	2.028 ng	27.80 pM	2.939 TBq	1.449×10 ¹²	β ⁷³ Zn	4.200 s	3.458 MeV	1.628 W	802.8 MW		
⁷⁴ Cu	⁷⁴ Ni	385.0 pg	5.207 pM	3.794 TBq	9.855×10 ¹²	β ⁷⁴ Zn	1.594 s	5.602 MeV	3.405 W	8.844 GW		
⁷⁵ Cu	⁷⁵ Ni	509.6 pg	6.800 pM	3.701 TBq	7.263×10 ¹²	β ⁷⁵ Zn	1.224 s	4.507 MeV	2.672 W	5.243 GW		
⁷⁶ Cu	⁷⁶ Ni	109.1 pg	1.437 pM	2.713 TBq	2.487×10 ¹³	β n ⁷⁴ Zn						
					3.5% →	β ⁷⁶ Zn	641.0 ms	6.626 MeV	2.880 W	26.40 GW		
					3% →	β n ⁷⁵ Zn						
⁷⁷ Cu	⁷⁷ Ni	67.83 pg	≤ 1 pM	1.249 TBq	1.841×10 ¹³	β ⁷⁷ Zn	469.0 ms	5.522 MeV	1.105 W	16.29 GW		
⁷⁸ Cu	⁷⁸ Ni	10.02 pg	≤ 1 pM	445.2 GBq	4.443×10 ¹³	β ⁷⁸ Zn	342.0 ms	7.587 MeV	541.1 mW	54.00 GW		
⁷⁹ Cu	⁷⁹ Ni	3.805 pg	≤ 1 pM	136.5 GBq	3.587×10 ¹³	β n ⁷⁸ Zn	188.0 ms	6.535 MeV	142.9 mW	37.56 GW		
					45% →	β ⁷⁹ Zn						
⁸⁰ Cu		≤ 1 pg	≤ 1 pM	14.22 GBq	5.729×10 ¹³	β ⁸⁰ Zn	100.0 ms	9.539 MeV	21.73 mW	87.55 GW		
⁸¹ Cu		≤ 1 pg	≤ 1 pM	1.061 GBq	6.926×10 ¹³	β ⁸¹ Zn	632.0 ns	9.107 MeV	1.548 mW	101.0 GW		
A ₂₉ Cu		5.469 ng	75.05 pM	17.27 TBq	3.158×10 ¹²				14.11 W	2.580 GW	1.317 nSv	240.9 mSv
⁶ Li		241.9 μg	40.22 μM									
⁷ Li		15.49 μg	2.208 μM									
E ₃ Li		257.4 μg	42.42 μM									
⁷² Co		1.267 pg	≤ 1 pM	59.88 GBq	4.726×10 ¹³	β ⁷² Ni	90.00 ms	8.579 MeV	82.30 mW	64.96 GW		
⁷³ Co		≤ 1 pg	≤ 1 pM	19.43 GBq	4.954×10 ¹³	β ⁷³ Ni	80.00 ms	7.623 MeV	23.73 mW	60.50 GW		
⁷⁴ Co		≤ 1 pg	≤ 1 pM	3.712 GBq	5.250×10 ¹³	β ⁷⁴ Ni	50.00 ms	9.536 MeV	5.671 mW	80.20 GW		
⁷⁵ Co		≤ 1 pg	≤ 1 pM	490.4 MBq	6.947×10 ¹³	β ⁷⁵ Ni	40.00 ms	8.567 MeV	673.1 μW	95.35 GW		
A ₂₇ Co		1.737 pg	≤ 1 pM	83.51 GBq	4.808×10 ¹³				112.4 mW	64.70 GW		
⁷² Ni	⁷² Co	479.3 pg	6.662 pM	1.150 TBq	2.399×10 ¹²	β ⁷² Cu	1.570 s	3.205 MeV	590.4 mW	1.232 GW		
⁷³ Ni	⁷³ Co	65.79 pg	≤ 1 pM	956.7 GBq	1.454×10 ¹³	β ⁷³ Cu	840.0 ms	5.374 MeV	823.6 mW	12.52 GW		
⁷⁴ Ni	⁷⁴ Co	64.49 pg	≤ 1 pM	561.4 GBq	8.705×10 ¹²	β ⁷⁴ Cu	680.0 ms	4.250 MeV	382.2 mW	5.927 GW		
⁷⁵ Ni	⁷⁵ Co	7.299 pg	≤ 1 pM	226.4 GBq	3.102×10 ¹³	β ⁷⁵ Cu	600.0 ms	6.416 MeV	232.7 mW	31.88 GW		
					1.6% →	β n ⁷⁴ Cu						
⁷⁶ Ni		2.817 pg	≤ 1 pM	57.70 GBq	2.048×10 ¹³	β ⁷⁶ Cu	470.0 ms	5.271 MeV	48.72 mW	17.29 GW		
⁷⁷ Ni		≤ 1 pg	≤ 1 pM	9.867 GBq	5.279×10 ¹³	β ⁷⁷ Cu	300.0 ms	7.389 MeV	11.68 mW	62.49 GW		
⁷⁸ Ni		≤ 1 pg	≤ 1 pM	1.148 GBq	3.892×10 ¹³	β ⁷⁸ Cu	200.0 ms	6.302 MeV	1.159 mW	39.29 GW		
A ₂₈ Ni		619.9 pg	8.574 pM	2.963 TBq	4.780×10 ¹²				2.090 W	3.372 GW		
⁷⁹ Kr		1.093 pg	≤ 1 pM	45.97 kBq	42.06 PBq	ϵ ⁷⁹ Br	1.460 d	281.5 keV	2.073 nW	1.897 kW		
⁸⁰ Kr	⁸⁰ Br	358.7 μg	4.488 μM									
⁸¹ Kr	^{81m} ₃₆ Kr	42.36 μg	523.5 nM	32.98 kBq	778.6 MBq	ϵ ⁸¹ Br	210.0 ky	20.80 keV	109.9 pW	2.594 μW		
^{81m} Kr		4.155 pg	≤ 1 pM	1.611 GBq	387.7 EBq	γ ⁸¹ Kr	13.20 s	190.0 keV	49.03 μW	11.80 MW		
					0.002% →	ϵ ⁸¹ Br						
⁸² Kr	⁸² Se	2.015 gm	24.60 mM									

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
⁸³ Kr	⁸³ Br	57.84 gm	697.6 mM									
^{83m} Kr	⁸³ Br	5.191 mg	62.61 μM	3.964 PBq	763.6 PBq	γ ⁸³ Br	1.830 h	40.77 keV	25.89 W	4.987 kW		
⁸⁴ Kr	⁸⁴ Br	172.8 gm	2.059 M									
⁸⁵ Kr	⁸⁵ Br	34.40 gm	405.1 mM	499.6 TBq	14.52 TBq	β ⁸⁵ Rb	10.75 y	252.6 keV	20.22 W	587.8 mW		
^{85m} Kr	⁸⁵ Br	26.17 mg	308.2 μM	7.972 PBq	304.6 PBq	β ⁸⁵ Rb	4.480 h	413.0 keV	527.5 W	20.16 kW		
					21.4% →	γ ⁸⁵ Br						
⁸⁶ Kr	⁸⁶ Br	282.3 gm	3.286 M									
⁸⁷ Kr	⁸⁷ Br	14.22 mg	163.6 μM	14.92 PBq	1.049 EBq	β ⁸⁷ Rb	1.272 h	2.119 MeV	5.064 kW	356.1 kW		
⁸⁸ Kr	⁸⁸ Br	44.99 mg	511.7 μM	20.90 PBq	464.5 PBq	β ⁸⁸ Rb	2.840 h	2.318 MeV	7.761 kW	172.5 kW		
⁸⁹ Kr	⁸⁹ Br	1.010 mg	11.36 μM	24.92 PBq	24.67 EBq	β ⁸⁹ Rb	3.150 m	3.199 MeV	12.77 kW	12.64 MW		
⁹⁰ Kr	⁹⁰ Br	171.3 μg	1.905 μM	24.59 PBq	143.5 EBq	β ⁹⁰ Rb	32.32 s	2.592 MeV	10.21 kW	59.60 MW		
					13.08% →	β ^{90m} Rb						
⁹¹ Kr	⁹¹ Br	34.70 μg	381.6 nM	18.31 PBq	527.7 EBq	β ⁹¹ Rb	8.570 s	3.300 MeV	9.679 kW	278.9 MW		
⁹² Kr	⁹² Br	3.819 μg	41.54 nM	9.423 PBq	2.467×10 ¹²	β ⁹² Rb	1.840 s	3.188 MeV	4.813 kW	1.260 GW		
⁹³ Kr	⁹³ Br	1.006 μg	10.83 nM	3.557 PBq	3.536×10 ¹²	β ⁹³ Rb	1.286 s	4.796 MeV	2.733 kW	2.717 GW		
⁹⁴ Kr	⁹⁴ Br	55.13 ng	586.9 pM	1.167 PBq	2.117×10 ¹³	β ⁹⁴ Rb	210.0 ms	3.866 MeV	722.7 W	13.11 GW		
					1.11% →	β n ⁹³ Rb						
⁹⁵ Kr	⁹⁵ Br	20.93 ng	220.5 pM	184.0 TBq	8.791×10 ¹²	β ⁹⁵ Rb	114.0 ms	5.889 MeV	173.6 W	8.294 GW		
					2.87% →	β n ⁹⁴ Rb						
⁹⁶ Kr	⁹⁶ Br	2.827 ng	29.47 pM	27.93 TBq	9.880×10 ¹²	β ⁹⁶ Rb	80.00 ms	4.852 MeV	21.71 W	7.680 GW		
					3.7% →	β n ⁹⁵ Rb						
⁹⁷ Kr		60.17 pg	≤ 1 pM	1.745 TBq	2.900×10 ¹³	β ⁹⁷ Rb	63.00 ms	6.993 MeV	1.955 W	32.49 GW		
					3.35% →	β n ⁹⁶ Rb						
⁹⁸ Kr		10.40 pg	≤ 1 pM	197.7 GBq	1.901×10 ¹³	β ^{98m} Rb	46.00 ms	5.705 MeV	180.7 mW	17.38 GW		
					7% →	β n ⁹⁷ Rb						
G ³⁶ Kr		549.4 gm	6.474 M	130.4 PBq	237.4 TBq				54.52 kW	99.23 W		
¹²⁷ Xe		3.941 μg	31.05 nM	4.119 GBq	1.045 PBq	ε ¹²⁷ I	36.40 d	309.1 keV	204.0 μW	51.76 W		
¹²⁸ Xe	¹²⁸ Te	7.057 gm	55.17 mM									
¹²⁹ Xe	¹²⁹ I	52.18 mg	404.8 μM									
^{129m} Xe		104.5 μg	810.7 nM	489.6 GBq	4.685 PBq	γ ¹²⁹ Xe	8.880 d	235.9 keV	18.50 mW	177.0 W		
¹³⁰ Xe	¹³⁰ Te	23.08 gm	177.7 mM									
¹³¹ Xe	¹³¹ I	557.8 gm	4.261 M									
^{131m} Xe	¹³¹ I	132.5 mg	1.012 mM	410.8 TBq	3.100 PBq	γ ¹³¹ Xe	11.93 d	162.3 keV	10.68 W	80.60 W		
¹³² Xe	¹³² I	1.748 kg	13.25 M									
¹³³ Xe	¹³³ I	10.50 gm	79.00 mM	72.80 PBq	6.933 PBq	β ¹³³ Cs	5.244 d	180.6 keV	2.106 kW	200.6 W		
^{133m} Xe	¹³³ I	138.8 mg	1.044 mM	2.305 PBq	16.61 PBq	γ ¹³³ Xe	2.188 d	231.6 keV	85.53 W	616.2 W		
¹³⁴ Xe	¹³⁴ I	2.246 kg	16.77 M	20.17 Bq	8.980 mBq	2β ¹³⁴ Ba	11.00 Py	830.0 keV	2.682 pW	≤ 1 pW		
^{134m} Xe	^{134m} I	56.12 ng	419.1 pM	603.3 TBq	1.075×10 ¹³	γ ¹³⁴ Xe	290.0 ms	1.904 MeV	184.0 W	3.279 GW		

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹³⁵ Xe	¹³⁵ I ₅₃	203.1 mg	1.505 mM	19.21 PBq	94.58 PBq	β ¹³⁵ Cs ₅₅	9.140 h	564.4 keV	1.737 kW	8.552 kW		
^{135m} Xe	¹³⁵ I ₅₃	4.380 mg	32.47 μ M	14.77 PBq	3.372 EBq	γ ¹³⁵ Xe ₅₄	15.29 m	526.6 keV	1.246 kW	284.5 kW		
					0.6% \rightarrow	β ¹³⁵ Cs ₅₅						
¹³⁶ Xe	¹³⁶ I ₅₃	3.429 kg	25.23 M	1.589 mBq	463.5 nBq	2β ¹³⁶ Ba ₅₆	210.0 Ey	2.467 MeV	≤ 1 pW	≤ 1 pW		
¹³⁷ Xe	¹³⁷ I ₅₃	4.768 mg	34.83 μ M	63.25 PBq	13.27 EBq	β ¹³⁷ Cs ₅₅	3.818 m	1.963 MeV	19.89 kW	4.172 MW		
¹³⁸ Xe	¹³⁸ I ₅₃	16.29 mg	118.1 μ M	57.99 PBq	3.560 EBq	β ¹³⁸ Cs ₅₅	14.08 m	1.801 MeV	16.73 kW	1.027 MW		
¹³⁹ Xe	¹³⁹ I ₅₃	589.1 μ g	4.241 μ M	44.82 PBq	76.08 EBq	β ¹³⁹ Cs ₅₅	39.68 s	2.671 MeV	19.18 kW	32.56 MW		
¹⁴⁰ Xe	¹⁴⁰ I ₅₃	130.0 μ g	929.1 nM	28.52 PBq	219.4 EBq	β ¹⁴⁰ Cs ₅₅	13.60 s	2.243 MeV	10.25 kW	78.85 MW		
¹⁴¹ Xe	¹⁴¹ I ₅₃	5.857 μ g	41.56 nM	10.09 PBq	1.723×10^{12}	β ¹⁴¹ Cs ₅₅	1.730 s	3.839 MeV	6.206 kW	1.060 GW		
					0.044% \rightarrow	β n ¹⁴⁰ Cs ₅₅						
¹⁴² Xe	¹⁴² I ₅₃	1.428 μ g	10.06 nM	3.444 PBq	2.412×10^{12}	β ¹⁴² Cs ₅₅	1.220 s	2.862 MeV	1.579 kW	1.106 GW		
					0.36% \rightarrow	β n ¹⁴¹ Cs ₅₅						
¹⁴³ Xe	¹⁴³ I ₅₃	61.45 ng	429.9 pM	598.5 TBq	9.740×10^{12}	β ¹⁴³ Cs ₅₅	511.0 ms	4.486 MeV	430.1 W	6.999 GW		
					1% \rightarrow	β n ¹⁴² Cs ₅₅						
¹⁴⁴ Xe	¹⁴⁴ I ₅₃	36.40 ng	252.9 pM	105.6 TBq	2.901×10^{12}	β ¹⁴⁴ Cs ₅₅	388.0 ms	3.203 MeV	54.18 W	1.488 GW		
					3% \rightarrow	β n ¹⁴³ Cs ₅₅						
¹⁴⁵ Xe		3.752 ng	25.89 pM	12.01 TBq	3.201×10^{12}	β ¹⁴⁵ Cs ₅₅	188.0 ms	5.035 MeV	9.687 W	2.582 GW		
					2.5% \rightarrow	β n ¹⁴⁴ Cs ₅₅						
¹⁴⁶ Xe		248.1 pg	1.700 pM	757.6 GBq	3.054×10^{12}	β ¹⁴⁶ Cs ₅₅	146.0 ms	3.952 MeV	479.6 mW	1.933 GW		
					6.9% \rightarrow	β n ¹⁴⁵ Cs ₅₅						
¹⁴⁷ Xe		6.233 pg	≤ 1 pM	67.14 GBq	1.077×10^{13}	β ¹⁴⁷ Cs ₅₅	130.0 ms	5.714 MeV	61.46 mW	9.860 GW		
					4% \rightarrow	β n ¹⁴⁶ Cs ₅₅						
G ₅₄ Xe		8.022 kg	59.83 M	318.9 PBq	39.76 TBq				79.70 kW	9.935 W		
¹⁷⁰ Yb	¹⁷⁰ Tm ₆₉	23.49 μ g	138.2 nM									
¹⁷¹ Yb	¹⁷¹ Tm ₆₉	1.614 μ g	9.442 nM									
¹⁷² Yb	¹⁷² Tm ₆₉	143.2 ng	832.9 pM									
E ₇₀ Yb		25.25 μ g	148.5 nM									
Total		52.18 kg	443.6 M	6.307 EBq	120.9 TBq				1.999 MW	38.31 W	14.65 MSv	280.7 Sv

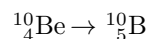
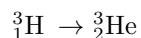
ICRP Publication 119 does not report dose factors for isotopes with half lives less than ten minutes or greater than 10^9 years.

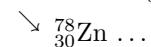
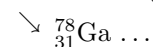
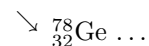
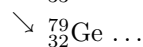
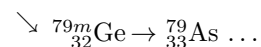
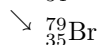
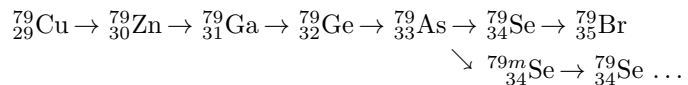
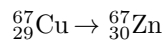
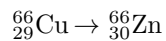
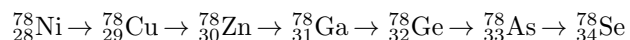
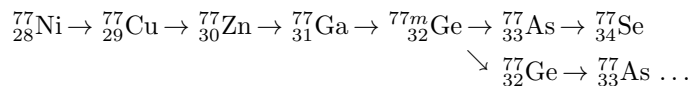
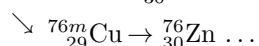
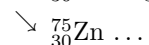
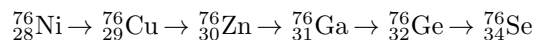
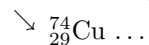
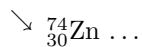
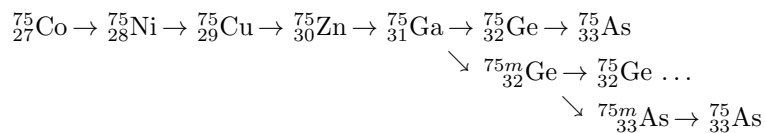
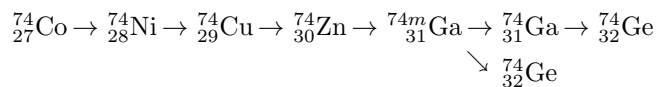
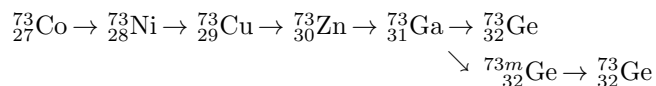
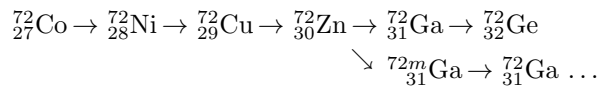
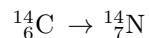
Total radiotoxicity is not the sum of the "Sv" column because ICRP Publication 119 includes radiotoxicity of daughter in radiotoxicity of parent.

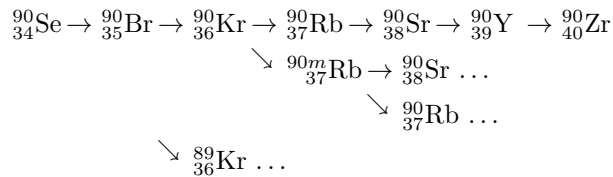
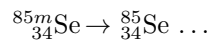
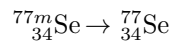
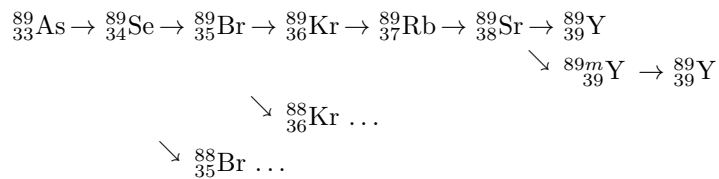
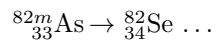
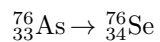
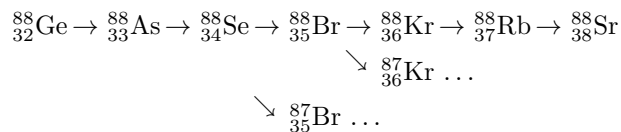
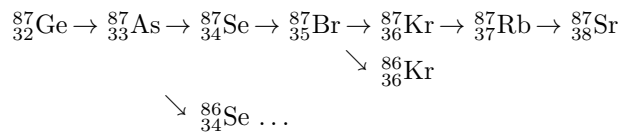
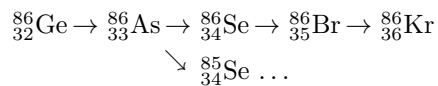
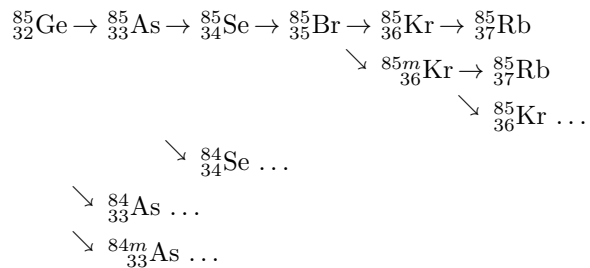
Dose factors for gases are given as Sv/day per Bq/m³. Radiotoxicity is not computed for gases.

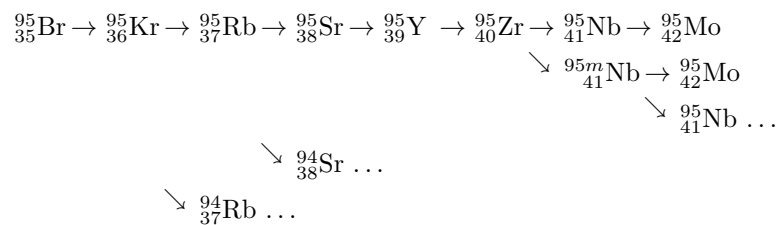
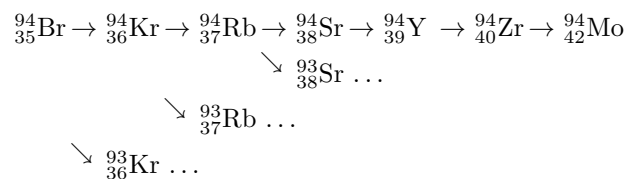
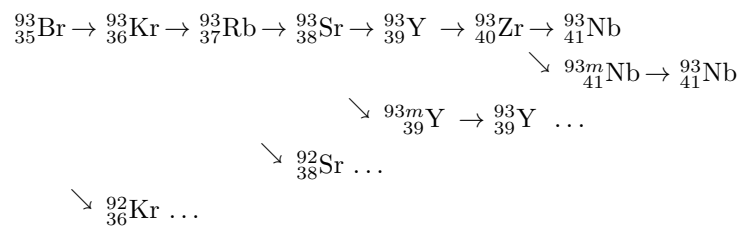
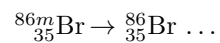
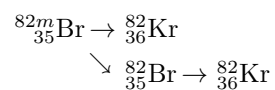
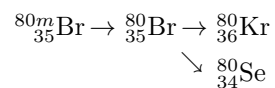
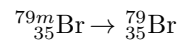
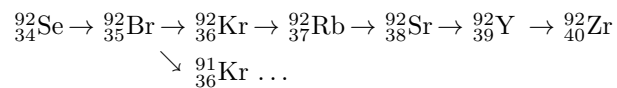
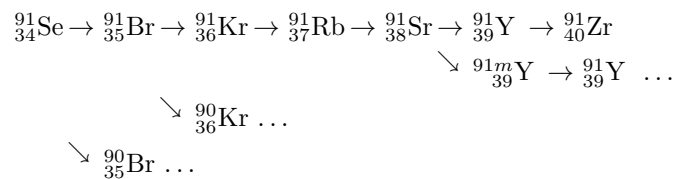
‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

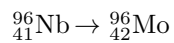
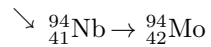
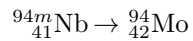
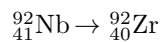
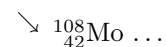
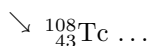
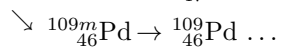
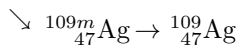
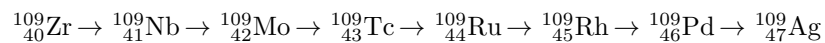
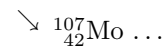
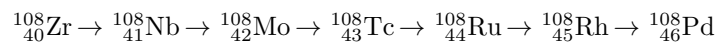
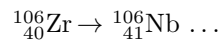
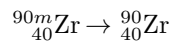
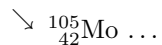
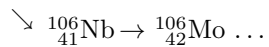
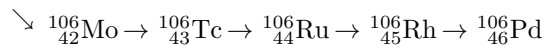
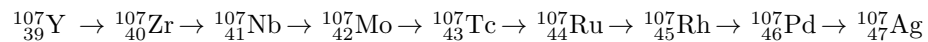
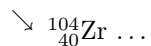
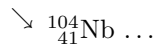
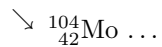
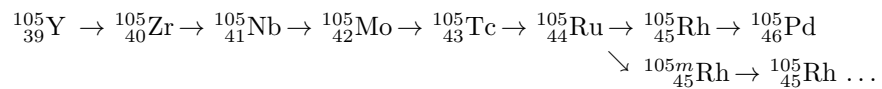
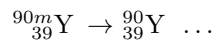
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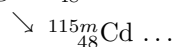
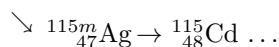
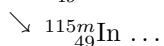
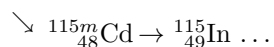
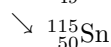
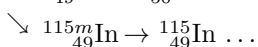
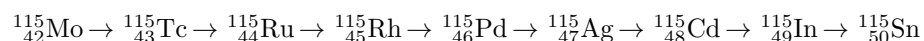
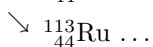
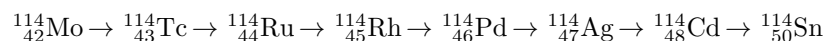
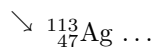
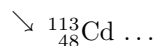
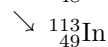
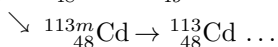
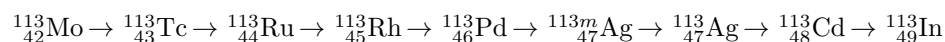
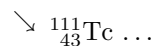
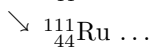
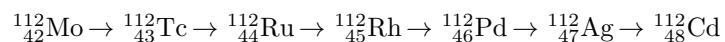
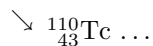
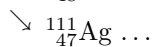
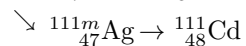
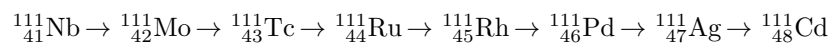
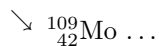
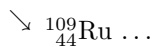
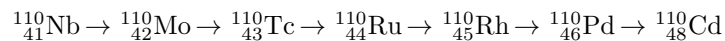
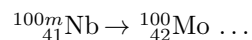
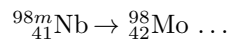


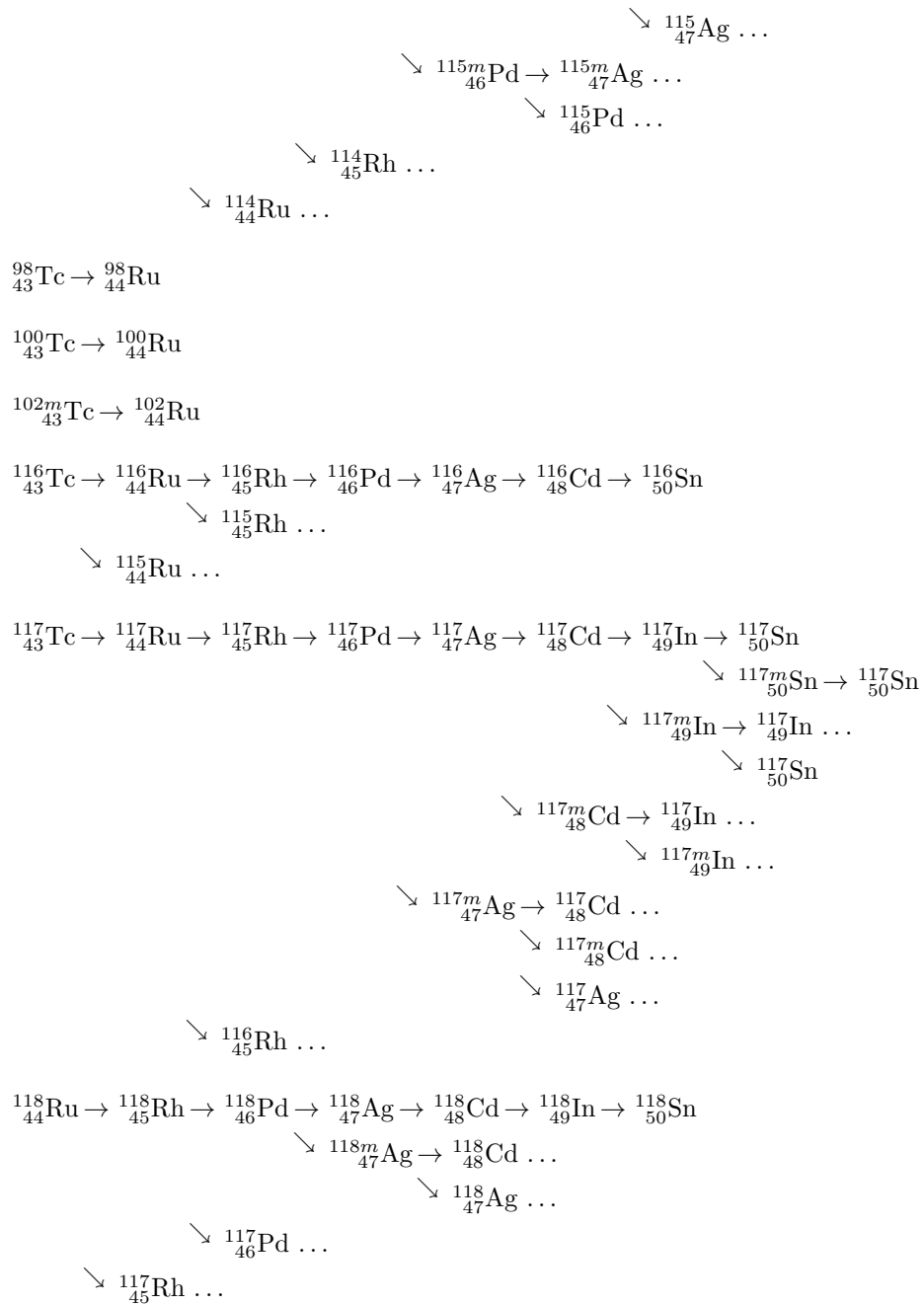


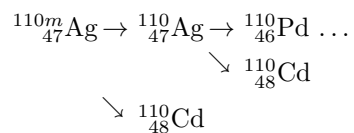
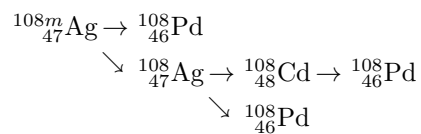
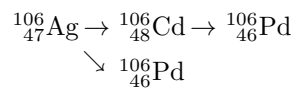
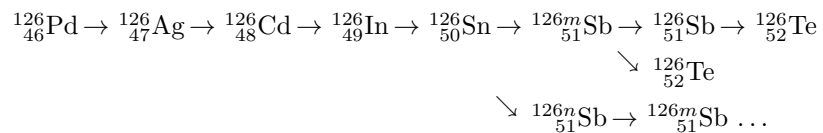
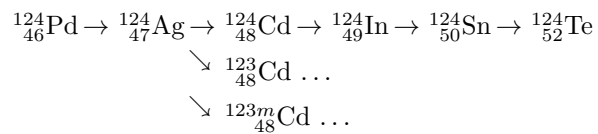
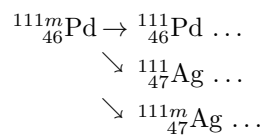
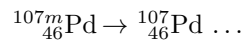
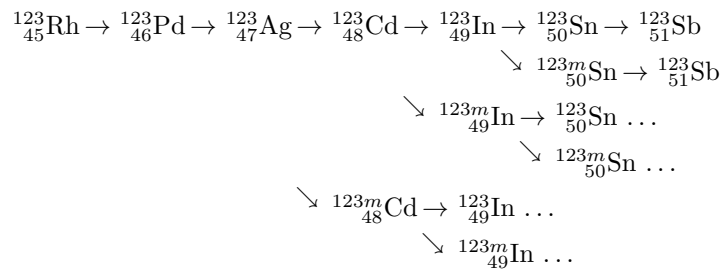
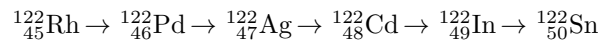


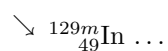
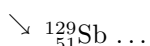
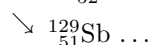
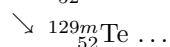
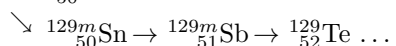
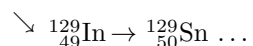
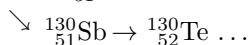
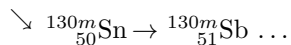
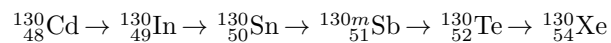
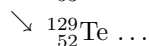
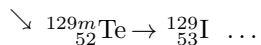
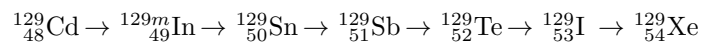
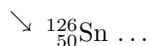
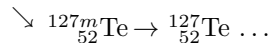
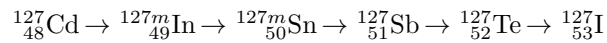
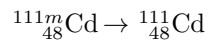
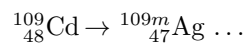
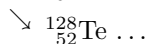
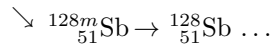
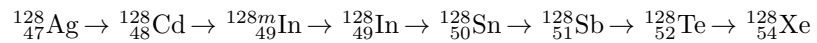
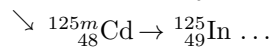
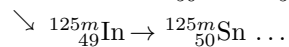
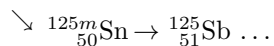
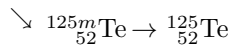
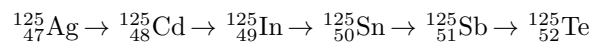
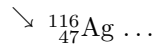
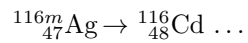


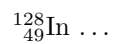
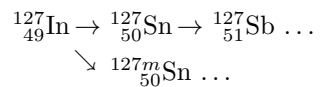
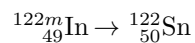
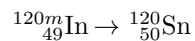
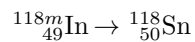
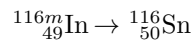
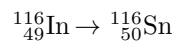
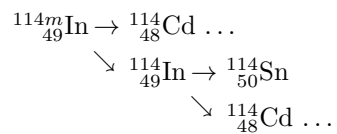
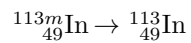
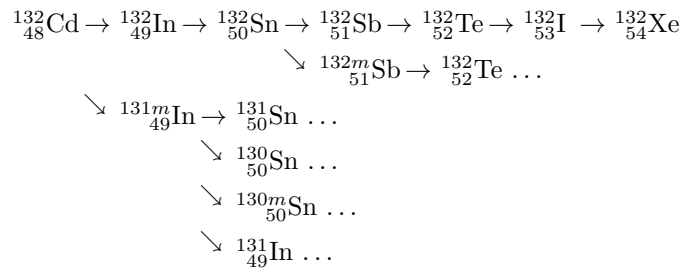
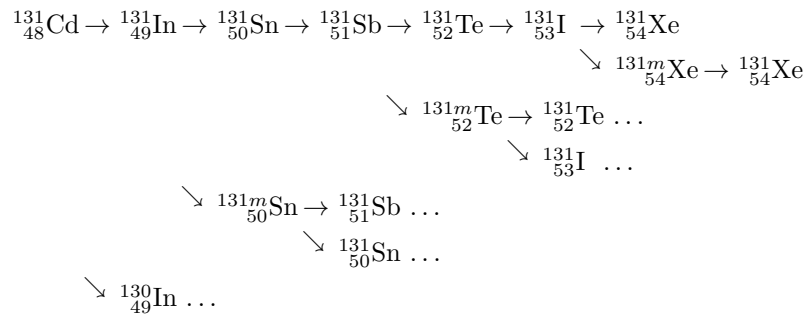


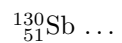
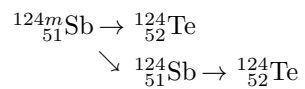
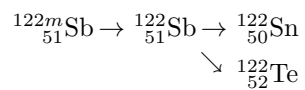
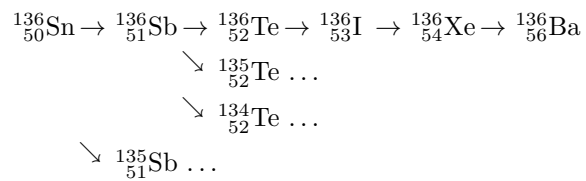
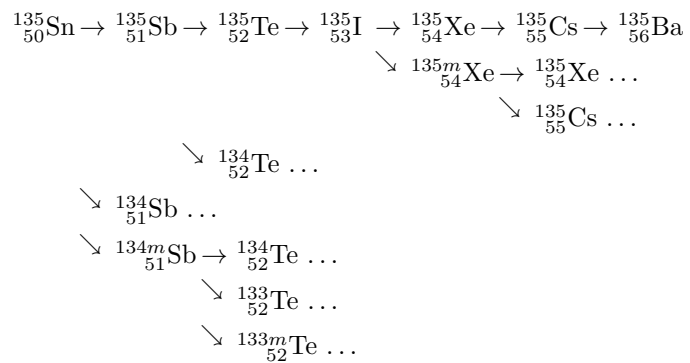
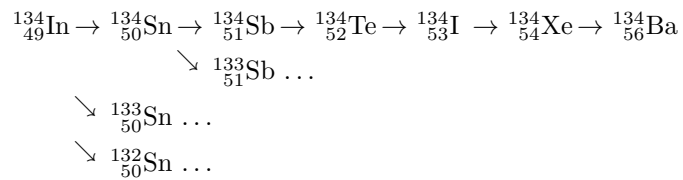
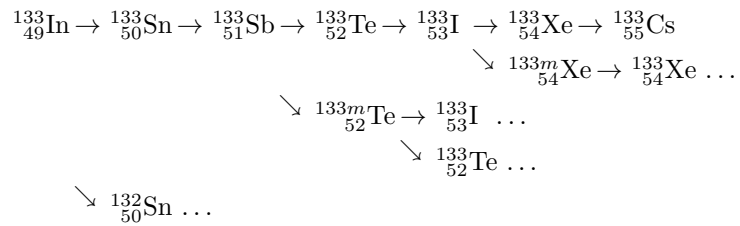


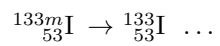
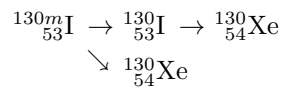
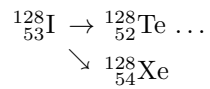
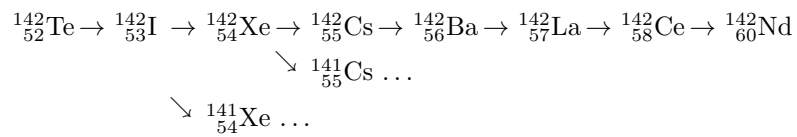
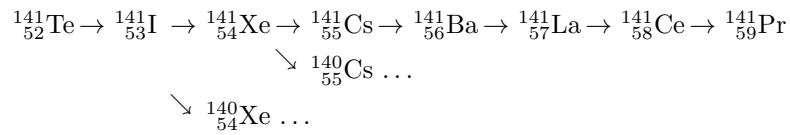
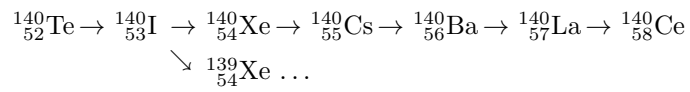
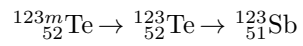
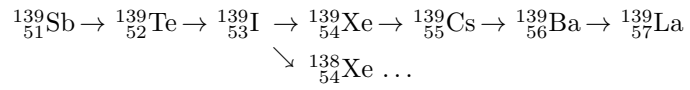
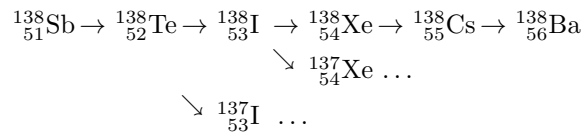
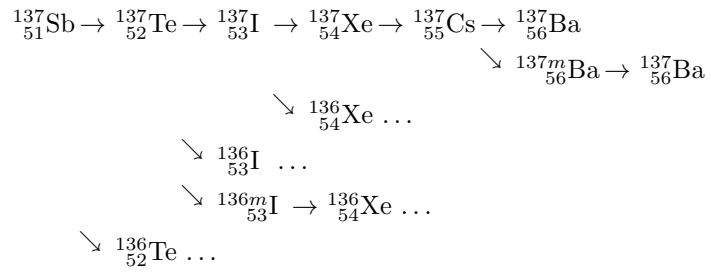


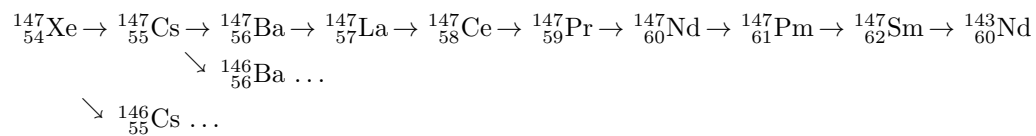
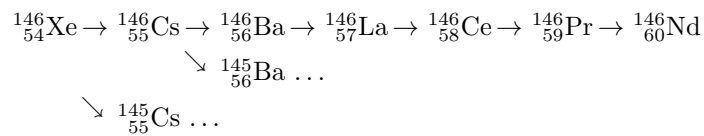
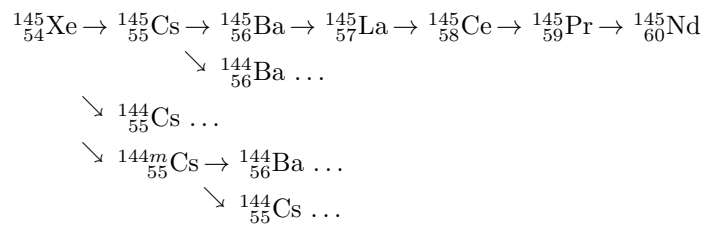
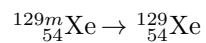
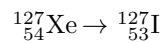
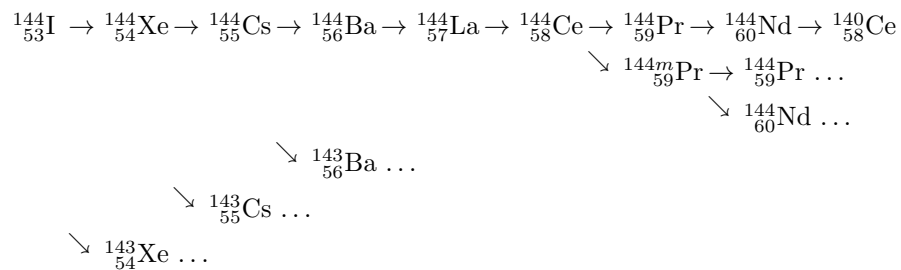
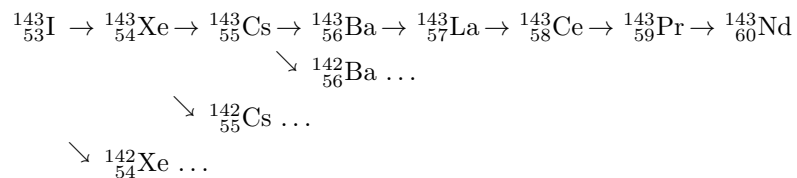
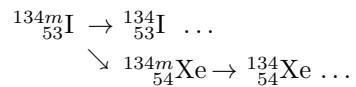


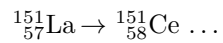
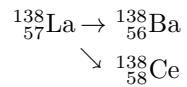
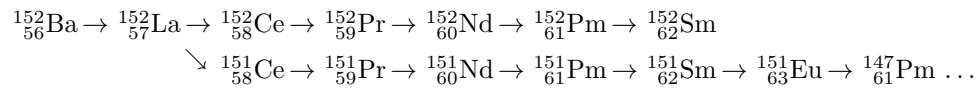
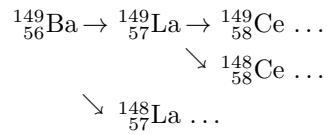
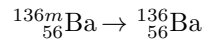
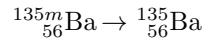
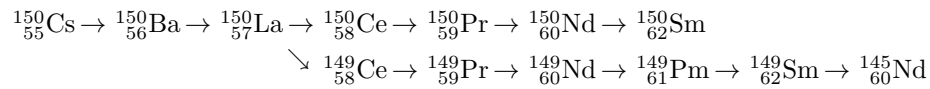
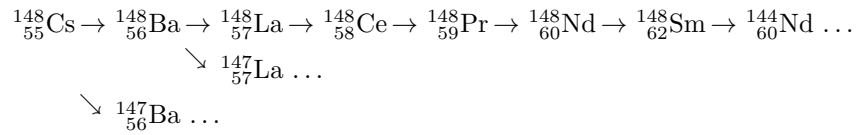
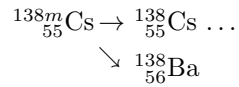
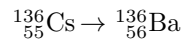
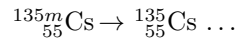
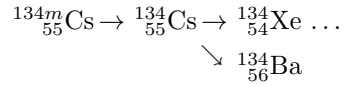
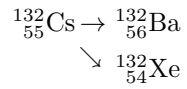


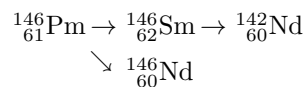
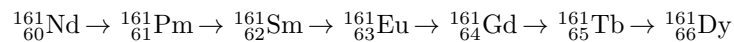
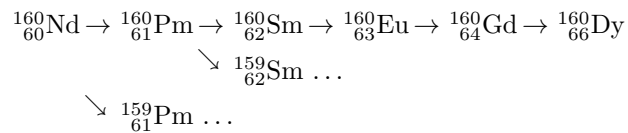
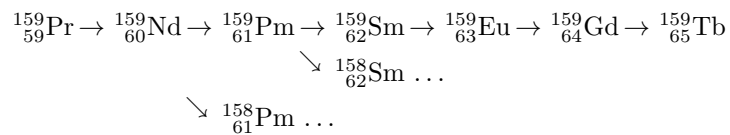
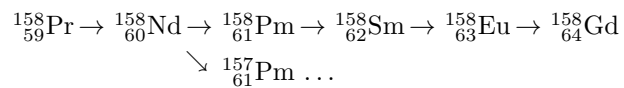
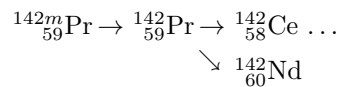
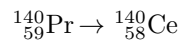
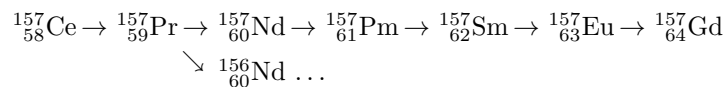
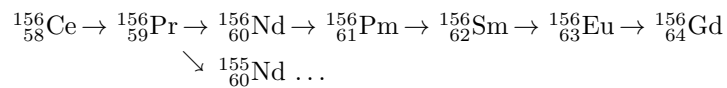
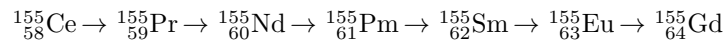
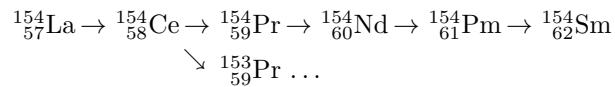
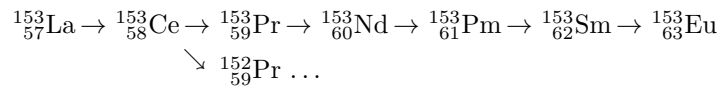


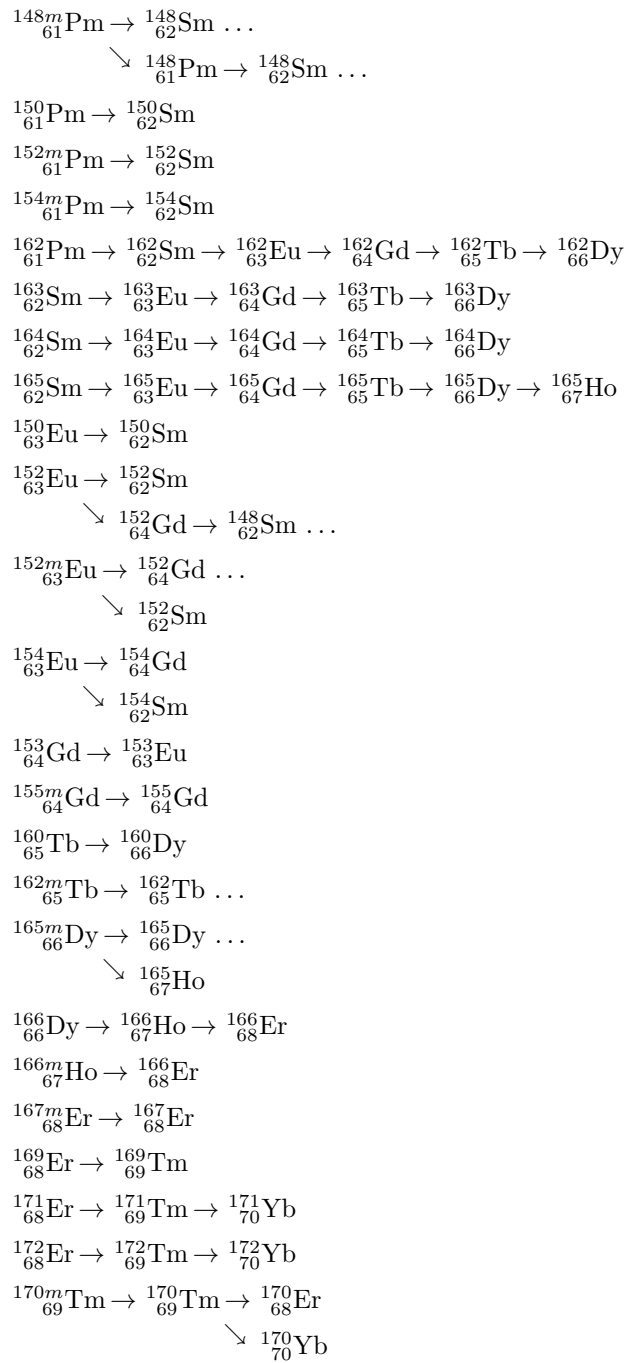












Actinides and Daughters Per Tonne of Fuel

used for 50.68 GWth-day LWR burnup at power of 36.54 MWth and $3.14 \times 10^{14} N/cm^2/s$ neutron flux,
at discharge, as calculated by ORIGEN2 version 2.1 on 9 October 2013.

Radiotoxicity in Sieverts computed for adult ingestion using dose factors from ICRP publication 119

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
²³⁶ Np	²⁴⁰ ₉₅ Am	2.483 mg	10.52 μM	1.211 MBq	487.7 MBq	ε ²³⁶ ₉₂ U β ²³⁶ ₉₄ Pu α ²³² ₉₁ Pa	152.0 ky	340.2 keV	66.00 nW	26.58 μW	20.59 mSv	8.291 Sv
²³⁷ Np	²³⁷ ₉₂ U	636.3 gm	2.684 M	16.61 GBq	26.10 MBq	α ²³³ ₉₁ Pa	2.140 My	5.152 MeV	13.71 mW	21.55 μW	1.827 kSv	2.871 Sv
²³⁸ Np	^{242m} ₉₅ Am	2.063 gm	8.666 mM	19.79 PBq	9.593 PBq	β ²³⁸ ₉₄ Pu	2.117 d	808.1 keV	2.562 kW	1.242 kW	18.01 MSv	8.729 MSv
²³⁹ Np	²³⁹ ₉₂ U	94.80 gm	396.6 mM	814.2 PBq	8.589 PBq	β ²³⁹ ₉₄ Pu	2.355 d	407.7 keV	53.18 kW	561.0 W	651.4 MSv	6.871 MSv
²⁴⁰ Np	²⁴⁰ ₉₂ U	2.817 mg	11.73 μM	1.257 PBq	446.2 PBq	β ²⁴⁰ ₉₄ Pu	1.083 h	1.788 MeV	360.0 W	127.8 kW	103.1 kSv	36.59 MSv
^{240m} Np		238.0 ng	991.4 pM	933.0 GBq	3.920 EBq	β ²⁴⁰ ₉₄ Pu γ ²⁴⁰ ₉₃ Np	7.400 m	977.4 keV	146.1 mW	613.9 kW		
²⁴¹ Np	²⁴¹ ₉₂ U	≤ 1 pg	≤ 1 pM	1.744 MBq	1.805 EBq	β ²⁴¹ ₉₄ Pu	13.90 m	471.0 keV	131.6 nW	136.2 kW		
C ⁹³ Np		733.2 gm	3.090 M	835.2 PBq	1.139 PBq				56.10 kW	76.52 W	669.5 MSv	913.1 kSv
²³⁶ Pu	²³⁶ ₉₃ Np	1.109 ng	4.698 pM	21.82 kBq	19.68 TBq	α ²³² ₉₂ U	2.858 y	5.867 MeV	20.51 nW	18.49 W	1.898 mSv	1.712 MSv
²³⁷ Pu	²⁴¹ ₉₆ Cm	91.38 μg	385.5 nM	40.90 GBq	447.6 TBq	ε ²³⁷ ₉₃ Np α ²³³ ₉₂ U	45.30 d	62.15 keV	407.2 μW	4.456 W	4.090 Sv	44.76 kSv
²³⁸ Pu	²³⁸ ₉₃ Np	297.9 gm	1.251 M	188.8 TBq	633.8 GBq	α ²³⁴ ₉₂ U	87.70 y	5.591 MeV	169.1 W	567.6 mW	43.42 MSv	145.8 kSv
²³⁹ Pu	²³⁹ ₉₃ Np	6.089 kg	25.47 M	14.02 TBq	2.303 GBq	α ^{235m} ₉₂ U	24.11 ky	5.196 MeV	11.67 W	1.917 mW	3.505 MSv	575.6 Sv
²⁴⁰ Pu	²⁴⁰ ₉₃ Np	2.933 kg	12.22 M	24.74 TBq	8.435 GBq	α ²³⁵ ₉₂ U	6.563 ky	5.253 MeV	20.82 W	7.099 mW	6.185 MSv	2.109 kSv
²⁴¹ Pu	²⁴¹ ₉₃ Np	1.794 kg	7.442 M	6.843 PBq	3.814 TBq	β ²⁴¹ ₉₅ Am	14.33 y	5.229 keV	5.733 W	3.196 mW	32.85 MSv	18.31 kSv
²⁴² Pu	²⁴² ₉₅ Am	873.8 gm	3.610 M	123.5 GBq	141.3 MBq	α ²³⁸ ₉₂ U	373.5 ky	4.982 MeV	98.57 mW	112.8 μW	29.64 kSv	33.92 Sv
²⁴³ Pu	²⁴⁷ ₉₆ Cm	214.6 mg	882.9 μM	20.67 PBq	96.32 PBq	β ²⁴³ ₉₅ Am	4.956 h	194.7 keV	644.7 W	3.004 kW	1.757 MSv	8.187 MSv
²⁴⁴ Pu	²⁴⁸ ₉₆ Cm	31.02 mg	127.1 μM	20.37 kBq	656.7 kBq	α ²⁴⁰ ₉₂ U	80.00 My	4.891 MeV	15.96 nW	514.5 nW	4.889 mSv	157.6 mSv
²⁴⁵ Pu		695.7 ng	2.839 nM	31.08 GBq	44.67 PBq	β ²⁴⁵ ₉₅ Am	10.50 h	399.9 keV	1.991 mW	2.862 kW	22.38 Sv	32.17 MSv
²⁴⁶ Pu	²⁵⁰ ₉₆ Cm	4.855 ng	19.73 pM	8.794 MBq	1.811 PBq	β ^{246m} ₉₅ Am	10.85 d	142.0 keV	200.0 nW	41.19 W	29.02 mSv	5.977 MSv
C ⁹⁴ Pu		11.99 kg	49.99 M	27.74 PBq	2.314 TBq				852.1 W	71.08 mW	87.75 MSv	7.320 kSv
²⁴¹ Cm		14.06 μg	58.33 nM	7.835 GBq	557.3 TBq	ε ²⁴¹ ₉₅ Am α ²³⁷ ₉₄ Pu	32.80 d	693.4 keV	870.3 μW	61.90 W	7.130 Sv	507.1 kSv
²⁴² Cm	²⁴² ₉₅ Am	25.30 gm	104.5 mM	3.097 PBq	122.4 TBq	α ²³⁸ ₉₄ Pu	162.9 d	6.214 MeV	3.083 kW	121.9 W	37.16 MSv	1.469 MSv
²⁴³ Cm		747.0 mg	3.073 mM	1.427 TBq	1.910 TBq	α ²³⁹ ₉₄ Pu	30.00 y	6.190 MeV	1.415 W	1.894 W	214.1 kSv	286.5 kSv
²⁴⁴ Cm	²⁴⁴ ₉₅ Am	84.78 gm	347.4 mM	254.0 TBq	2.996 TBq	ε ²⁴³ ₉₅ Am α ²⁴⁰ ₉₄ Pu	18.00 y	5.898 MeV	240.0 W	2.831 W	30.48 MSv	359.5 kSv
²⁴⁵ Cm	²⁴⁵ ₉₅ Am	5.620 gm	22.93 mM	35.73 GBq	6.358 GBq	α ²⁴¹ ₉₄ Pu	8.500 ky	5.596 MeV	32.03 mW	5.699 mW	7.503 kSv	1.335 kSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
²⁴⁶ Cm	²⁴⁶ ₉₅ Am	717.6 mg	2.916 mM	8.161 GBq	11.37 GBq	α ²⁴² ₉₄ Pu	4.730 ky	5.522 MeV	7.220 mW	10.06 mW	1.714 kSv	2.388 kSv
²⁴⁷ Cm	²⁵¹ ₉₈ Cf	9.829 mg	39.78 μ M	33.76 kBq	3.435 MBq	α ²⁴³ ₉₄ Pu	16.00 My	5.390 MeV	29.15 nW	2.966 μ W	6.414 mSv	652.6 mSv
²⁴⁸ Cm	²⁵² ₉₈ Cf	759.5 μ g	3.062 μ M	119.6 kBq	157.5 MBq	α ²⁴⁴ ₉₄ Pu	340.0 ky	20.99 MeV	402.1 nW	529.4 μ W	92.09 mSv	121.3 Sv
²⁴⁹ Cm	²⁵³ ₉₈ Cf	9.720 ng	39.02 pM	4.238 GBq	436.0 PBq	β ²⁴⁹ ₉₇ Bk	1.069 h	293.4 keV	199.2 μ W	20.49 kW	131.4 mSv	13.52 MSv
²⁵⁰ Cm	²⁵⁴ ₉₈ Cf	4.600 pg	≤ 1 pM	14.00 mBq	3.043 GBq	SF	8.000 ky	123.2 MeV	≤ 1 pW	60.09 mW	61.60 nSv	13.39 kSv
C ⁹⁶ Cm		117.2 gm	480.9 mM	3.352 PBq	28.61 TBq	3% \rightarrow α ²⁴⁶ ₉₄ Pu			3.324 kW	28.37 W	67.87 MSv	579.2 kSv
²³⁰ U		2.768 pg	≤ 1 pM	2.798 kBq	1.011 PBq	α ²²⁶ ₉₀ Th	20.80 d	5.988 MeV	2.684 nW	969.7 W	156.7 μ Sv	56.61 MSv
²³¹ U		169.2 pg	≤ 1 pM	842.7 kBq	4.980 PBq	ϵ ²³¹ ₉₁ Pa	4.200 d	139.5 keV	18.83 nW	111.3 W	236.0 μ Sv	1.395 MSv
²³² U	²³² ₉₁ Pa	441.1 μ g	1.901 μ M	349.5 MBq	792.3 GBq	α ²²⁸ ₉₀ Th	69.80 y	5.415 MeV	303.2 μ W	687.4 mW	115.3 Sv	261.5 kSv
²³³ U	²³³ ₉₁ Pa	1.920 mg	8.239 μ M	688.4 kBq	358.5 MBq	α ²²⁹ ₉₀ Th	159.3 ky	4.902 MeV	540.6 nW	281.6 μ W	35.11 mSv	18.29 Sv
²³⁴ U	²³⁴ ₉₁ Pa	168.9 gm	721.7 mM	39.08 GBq	231.4 MBq	α ²³⁰ ₉₀ Th	245.7 ky	4.859 MeV	30.42 mW	180.1 μ W	1.915 kSv	11.34 Sv
²³⁵ U	²³⁹ ₉₄ Pu	7.416 kg	31.55 M	593.6 MBq	80.04 kBq	α ²³¹ ₉₀ Th	703.8 My	4.417 MeV	420.0 μ W	56.63 nW	27.90 Sv	3.762 mSv
²³⁶ U	²³⁶ ₉₃ Np	5.523 kg	23.40 M	13.23 GBq	2.395 MBq	α ²³² ₉₀ Th	23.70 My	4.569 MeV	9.683 mW	1.753 μ W	621.8 Sv	112.6 mSv
²³⁷ U	²⁴¹ ₉₄ Pu	11.55 gm	48.72 mM	34.90 PBq	3.022 PBq	β ²³⁷ ₉₃ Np	6.750 d	319.1 keV	1.784 kW	154.5 W	26.52 MSv	2.296 MSv
²³⁸ U	²⁴² ₉₄ Pu	921.7 kg	3.872 kM	11.47 GBq	12.44 kBq	α ²³⁴ ₉₀ Th	4.468 Gy	4.279 MeV	7.863 mW	8.531 nW	516.2 Sv	560.0 μ Sv
²³⁹ U		658.8 mg	2.756 mM	815.3 PBq	1.238 EBq	β ²³⁹ ₉₃ Np	23.47 m	454.1 keV	59.31 kW	90.03 kW	22.01 MSv	33.41 MSv
²⁴⁰ U	²⁴⁴ ₉₄ Pu	27.21 μ g	113.3 nM	933.0 GBq	34.29 PBq	β ²⁴⁰ ₉₃ Np	14.10 h	138.4 keV	20.68 mW	760.0 W	1.026 kSv	37.72 MSv
²⁴¹ U		≤ 1 pg	≤ 1 pM	1.744 MBq	1.734×10^{12}	β ²⁴¹ ₉₃ Np	5.000 m	404.1 keV	112.9 nW	112.2 MW		
C ⁹² U		934.8 kg	3.928 kM	850.2 PBq	909.5 GBq				61.09 kW	65.35 mW	48.54 MSv	51.93 Sv
²⁴⁰ Am		3.533 μ g	14.72 nM	33.62 GBq	9.516 PBq	ϵ ²⁴⁰ ₉₄ Pu	2.117 d	1.104 MeV	5.945 mW	1.683 kW	19.50 Sv	5.519 MSv
²⁴¹ Am	²⁴¹ ₉₄ Pu	59.86 gm	248.3 mM	7.606 TBq	127.1 GBq	α ²³⁶ ₉₃ Np	432.8 y	5.604 MeV	6.828 W	114.1 mW	1.521 MSv	25.41 kSv
²⁴² Am	^{242m} ₉₅ Am	166.7 mg	688.7 μ M	4.989 PBq	29.93 PBq	β ²⁴² ₉₆ Cm	16.04 h	191.4 keV	153.0 W	917.8 W	1.497 MSv	8.978 MSv
^{242m} Am		793.9 mg	3.280 mM	285.6 GBq	359.7 GBq	ϵ ²⁴² ₉₄ Pu						
²⁴³ Am	²⁴³ ₉₄ Pu	196.8 gm	809.7 mM	1.453 TBq	7.383 GBq	γ ²⁴² ₉₅ Am	141.0 y	66.64 keV	3.049 mW	3.841 mW	54.26 kSv	68.35 kSv
²⁴⁴ Am		188.9 mg	774.0 μ M	8.894 PBq	47.08 PBq	α ²³⁸ ₉₃ Np						
²⁴⁵ Am	²⁴⁵ ₉₄ Pu	135.9 ng	554.5 pM	31.08 GBq	228.7 PBq	α ²³⁹ ₉₃ Np	7.365 ky	5.421 MeV	1.262 W	6.413 mW	290.6 kSv	1.477 kSv
²⁴⁶ Am		7.769 pg	≤ 1 pM	8.794 MBq	1.132 EBq	β ²⁴⁴ ₉₆ Cm	10.10 h	883.6 keV	1.259 kW	6.665 kW	4.091 MSv	21.66 MSv
C ⁹⁵ Am		257.8 gm	1.063 M	13.89 PBq	53.89 TBq	β ²⁴⁵ ₉₆ Cm	2.050 h	312.9 keV	1.558 mW	11.46 kW	1.927 Sv	14.18 MSv
²⁴⁶ Am		7.769 pg	≤ 1 pM	8.794 MBq	1.132 EBq	β ²⁴⁶ ₉₆ Cm	39.00 m	1.361 MeV	1.918 μ W	246.9 kW	510.1 μ Sv	65.65 MSv
C ⁹⁵ Am		257.8 gm	1.063 M	13.89 PBq	53.89 TBq				1.420 kW	5.508 W	7.454 MSv	28.91 kSv
²²⁶ Th	²³⁰ ₉₂ U	≤ 1 pg	≤ 1 pM	2.798 kBq	994.0 PBq	α ²²² ₈₈ Ra	30.57 m	6.447 MeV	2.890 nW	1.027 MW	979.3 nSv	347.9 MSv
²²⁷ Th	²²⁷ ₈₉ Ac	26.70 pg	≤ 1 pM	30.39 kBq	1.138 PBq	α ²²³ ₈₈ Ra	18.72 d	6.156 MeV	29.97 nW	1.122 kW	267.4 μ Sv	10.02 MSv
²²⁸ Th	²²⁸ ₈₉ Ac	2.941 μ g	12.90 nM	89.23 MBq	30.34 TBq	α ²²⁴ ₈₈ Ra	1.913 y	5.517 MeV	78.86 μ W	26.81 W	6.425 Sv	2.184 MSv
²²⁹ Th	²³³ ₉₂ U	870.1 ng	3.799 nM	6.854 kBq	7.877 GBq	α ²²⁵ ₈₈ Ra	7.340 ky	5.159 MeV	5.665 nW	6.511 mW	3.358 mSv	3.860 kSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
²³⁰ Th	²³⁴ ₉₂ U	1.626 mg	7.069 μM	1.215 MBq	747.2 MBq	α ²²⁶ ₈₈ Ra	75.40 ky	4.773 MeV	929.0 nW	571.3 μW	255.1 mSv	156.9 Sv
²³¹ Th	²³⁵ ₉₂ U	1.895 μg	8.202 nM	37.31 GBq	19.69 PBq	β ²³¹ ₉₁ Pa	1.063 d	94.63 keV	565.6 μW	298.5 W	12.69 Sv	6.694 MSv
²³² Th	²³² ₉₁ Pa	372.9 μg	1.607 μM	1.514 Bq	4.060 kBq	α ²²⁸ ₈₈ Ra	14.05 Gy	4.083 MeV	≤ 1 pW	2.656 nW	348.2 nSv	933.8 μSv
²³³ Th		763.9 pg	3.278 pM	1.033 GBq	1.352 EBq	β ²³³ ₉₁ Pa	22.30 m	426.8 keV	70.63 μW	92.46 kW		
²³⁴ Th	²³⁸ ₉₂ U	13.39 μg	57.21 nM	11.48 GBq	857.4 TBq	β ^{234m} ₉₁ Pa	24.09 d	68.40 keV	125.8 μW	9.395 W	39.03 Sv	2.915 MSv
C ₉₀ Th		2.018 mg	8.758 μM	49.91 GBq	24.73 TBq				841.9 μW	417.2 mW	58.40 Sv	28.94 kSv
²³¹ Pa	²³¹ ₉₀ Th	491.0 μg	2.125 μM	858.6 kBq	1.749 GBq	α ²²⁷ ₈₉ Ac	32.76 ky	5.082 MeV	699.1 nW	1.424 mW	609.6 mSv	1.242 kSv
²³² Pa	²³⁶ ₉₃ Np	1.849 μg	7.969 nM	29.41 GBq	15.91 PBq	β ²³² ₉₂ U	1.310 d	1.103 MeV	5.196 mW	2.810 kW	21.18 Sv	11.45 MSv
²³³ Pa	²³³ ₉₀ Th	21.80 μg	93.55 nM	16.75 GBq	768.3 TBq	ε ²³² ₉₀ Th						
²³⁴ Pa	^{234m} ₉₁ Pa	3.601 ng	15.39 pM	266.5 MBq	74.01 PBq	β ²³³ ₉₂ U	27.00 d	383.1 keV	1.028 mW	47.16 W	14.57 Sv	668.5 kSv
^{234m} Pa	²³⁴ ₉₀ Th	461.6 pg	1.972 pM	11.74 GBq	25.43 EBq	β ²³⁴ ₉₂ U	6.780 h	2.422 MeV	103.4 μW	28.71 kW	135.9 mSv	37.74 MSv
²³⁵ Pa		≤ 1 pg	≤ 1 pM	9.127 kBq	1.229 EBq	β ²³⁴ ₉₂ U	1.170 m	833.2 keV	1.567 mW	3.395 MW		
C ₉₁ Pa		514.7 μg	2.227 μM	58.17 GBq	113.0 TBq	γ ²³⁴ ₉₁ Pa						
^{235m} Pa						β ^{235m} ₉₂ U	24.20 m	470.8 keV	688.4 pW	92.73 kW		
									7.895 mW	15.34 W	36.49 Sv	70.91 kSv
²²² Ra	²²⁶ ₉₀ Th	≤ 1 pg	≤ 1 pM	2.798 kBq	49.52 EBq	α ²¹⁸ ₈₆ Rn	38.00 s	6.677 MeV	2.993 nW	52.97 MW		
²²³ Ra	²²³ ₈₇ Fr	16.30 pg	≤ 1 pM	30.91 kBq	1.896 PBq	α ²¹⁹ ₈₆ Rn	11.43 d	6.006 MeV	29.74 nW	1.825 kW	3.091 mSv	189.6 MSv
²²⁴ Ra	²²⁸ ₉₀ Th	15.22 ng	67.94 pM	89.75 MBq	5.897 PBq	α ²²⁶ ₈₆ Rn	3.640 d	5.789 MeV	83.24 μW	5.469 kW	5.834 Sv	383.3 MSv
²²⁵ Ra	²²⁹ ₉₀ Th	12.46 pg	≤ 1 pM	18.09 kBq	1.452 PBq	β ²²⁵ ₈₉ Ac	14.80 d	118.2 keV	342.7 pW	27.50 W	1.791 mSv	143.7 MSv
²²⁶ Ra	²³⁰ ₉₀ Th	34.01 ng	150.5 pM	1.245 kBq	36.61 GBq	α ²²² ₈₆ Rn	1.600 ky	4.869 MeV	971.2 pW	28.56 mW	348.6 μSv	10.25 kSv
²²⁸ Ra	²³² ₉₀ Th	≤ 1 pg	≤ 1 pM	197.2 mBq	8.664 TBq	β ²²⁸ ₈₉ Ac	5.750 y	13.00 keV	≤ 1 pW	18.04 mW	136.1 nSv	5.978 MSv
E ₈₈ Ra		49.26 ng	218.5 pM	89.80 MBq	1.823 PBq				83.27 μW	1.691 kW	5.839 Sv	118.5 MSv
²⁴⁹ Cf	²⁴⁹ ₉₇ Bk	1.521 μg	6.107 nM	230.7 kBq	151.7 GBq	α ²⁴⁵ ₉₆ Cm	351.0 y	7.806 MeV	288.5 nW	189.7 mW	80.74 mSv	53.09 kSv
²⁵⁰ Cf	²⁵⁰ ₉₇ Bk	2.037 μg	8.146 nM	8.246 MBq	4.048 TBq	α ²⁴⁶ ₉₆ Cm	13.08 y	6.265 MeV	8.276 μW	4.063 W	1.319 Sv	647.7 kSv
²⁵¹ Cf	²⁵¹ ₉₇ Bk	984.1 ng	3.919 nM	57.77 kBq	58.70 GBq	α ²⁴⁷ ₉₆ Cm	898.0 y	6.028 MeV	55.79 nW	56.69 mW	20.80 mSv	21.13 kSv
²⁵² Cf		661.6 ng	2.625 nM	13.18 MBq	19.92 TBq	α ²⁴⁸ ₉₆ Cm	2.645 y	12.03 MeV	25.40 μW	38.39 W	1.186 Sv	1.793 MSv
²⁵³ Cf		1.033 ng	4.082 pM	1.108 MBq	1.073 PBq	β ²⁵³ ₉₉ Es	17.81 d	97.80 keV	17.36 nW	16.81 W	1.551 mSv	1.502 MSv
²⁵⁴ Cf	^{254m} ₉₉ Es	48.02 pg	≤ 1 pM	15.11 kBq	314.7 TBq	α ²⁴⁹ ₉₆ Cm						
²⁵⁵ Cf		≤ 1 pg	≤ 1 pM	1.737 kBq	303.5 PBq	SF	60.50 d	199.3 MeV	482.5 nW	10.05 kW	6.044 mSv	125.9 MSv
C ₉₈ Cf		5.205 μg	20.80 nM	22.84 MBq	4.388 TBq	α ²⁵⁰ ₉₆ Cm						
						β ²⁵⁵ ₉₉ Es	1.417 h	99.94 keV	27.81 pW	4.858 kW		
									34.52 μW	6.632 W	2.615 Sv	502.4 kSv
²⁴⁹ Bk	²⁴⁹ ₉₆ Cm	9.142 μg	36.70 nM	554.8 MBq	60.69 TBq	β ²⁴⁹ ₉₈ Cf	320.0 d	124.9 keV	11.10 μW	1.214 W	538.2 mSv	58.87 kSv
²⁵⁰ Bk	²⁵⁴ ₉₉ Es	11.32 ng	45.27 pM	1.630 GBq	144.0 PBq	α ²⁴⁵ ₉₅ Am						
²⁵¹ Bk	²⁵³ ₉₉ Es	1.374 pg	≤ 1 pM	668.4 kBq	486.5 PBq	β ²⁵⁰ ₉₈ Cf	3.217 h	1.172 MeV	306.0 μW	27.03 kW	228.2 mSv	20.16 MSv
C ₉₇ Bk		9.153 μg	36.75 nM	2.185 GBq	238.8 TBq	β ²⁵¹ ₉₈ Cf	55.60 m	1.100 MeV	117.8 nW	85.74 kW	766.4 mSv	83.72 kSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
²⁰⁶ Pb	²¹⁰ Po	≤ 1 pg	≤ 1 pM									
²⁰⁷ Pb	²⁰⁷ Tl	466.3 pg	2.253 pM									
²⁰⁸ Pb	²⁰⁸ Tl	945.7 ng	4.547 nM									
²⁰⁹ Pb	²⁰⁹ Tl	≤ 1 pg	≤ 1 pM	18.17 kBq	168.2 PBq	β ²⁰⁹ Bi	3.253 h	194.0 keV	564.6 pW	5.228 kW	1.036 μ Sv	9.590 MSv
²¹⁰ Pb	²¹⁰ Po	51.67 pg	≤ 1 pM	146.0 Bq	2.826 TBq	β ²¹⁰ Bi	22.16 y	39.09 keV	≤ 1 pW	17.69 mW	100.7 μ Sv	1.950 MSv
²¹¹ Pb	²¹⁵ Po	≤ 1 pg	≤ 1 pM	30.91 kBq	913.7 PBq	β ²¹¹ Bi	36.10 m	505.5 keV	2.503 nW	73.99 kW	5.564 μ Sv	164.5 MSv
²¹² Pb	²¹⁶ Po	1.745 ng	8.231 pM	89.75 MBq	51.43 PBq	β ²¹² Bi	10.64 h	321.2 keV	4.618 μ W	2.646 kW	538.5 mSv	308.6 MSv
²¹⁴ Pb	²¹⁸ Po	≤ 1 pg	≤ 1 pM	1.246 kBq	1.214 EBq	β ²¹⁴ Bi	26.80 m	537.5 keV	107.3 pW	104.6 kW	174.4 nSv	170.0 MSv
A ⁸² Pb		948.0 ng	4.558 nM	89.80 MBq	94.73 TBq				4.621 μ W	4.875 W	538.6 mSv	568.2 kSv
²²⁵ Ac	²²⁵ Ra	8.441 pg	≤ 1 pM	18.14 kBq	2.149 PBq	α ²²¹ Fr	10.00 d	5.891 MeV	17.12 nW	2.028 kW	435.4 μ Sv	51.58 MSv
²²⁷ Ac	²³¹ Pa	11.98 ng	52.77 pM	32.09 kBq	2.679 TBq	β ²²⁷ Th	21.77 y	81.68 keV	419.9 pW	35.05 mW	35.30 mSv	2.946 MSv
²²⁸ Ac	²²⁸ Ra	5.040 pg	≤ 1 pM	418.6 kBq	83.06 PBq	β ²²⁸ Th	6.150 h	1.457 MeV	97.71 nW	19.39 kW	180.0 μ Sv	35.71 MSv
E ⁸⁹ Ac		11.99 ng	52.83 pM	468.8 kBq	39.09 TBq				115.2 nW	9.609 W	35.91 mSv	2.994 MSv
²⁰⁸ Bi		≤ 1 pg	≤ 1 pM	119.3 nBq	172.9 MBq	ϵ ²⁰⁸ Pb	368.0 ky	2.653 MeV	≤ 1 pW	73.51 μ W		
²⁰⁹ Bi	²⁰⁹ Pb	195.7 pg	≤ 1 pM	≤ 1 pBq	3.331 μ Bq	α ²⁰⁵ Tl	19.00 Ey	3.137 MeV	≤ 1 pW	≤ 1 pW		
²¹⁰ Bi	²¹⁰ Pb	≤ 1 pg	≤ 1 pM	146.9 Bq	4.595 PBq	β ²¹⁰ Po	5.012 d	388.8 keV	9.151 pW	286.2 W	191.0 nSv	5.973 MSv
^{210m} Bi		≤ 1 pg	≤ 1 pM	90.34 nBq	21.01 MBq	α ²⁰⁶ Tl	3.000 My	5.295 MeV	≤ 1 pW	17.82 μ W	≤ 1 pSv	315.1 mSv
²¹¹ Bi	²¹¹ Pb	≤ 1 pg	≤ 1 pM	30.91 kBq	15.49 EBq	α ²⁰⁷ Tl	2.170 m	6.729 MeV	33.32 nW	16.69 MW		
²¹² Bi	²¹² Pb	165.5 pg	≤ 1 pM	89.75 MBq	542.3 PBq	β ²¹¹ Po						
					0.273% →	β ²¹² Po	1.009 h	2.869 MeV	41.25 μ W	249.2 kW	23.33 mSv	141.0 MSv
					0.014% →	β α ²⁰⁸ Pb						
					35.93% →	α ²⁰⁸ Tl						
²¹³ Bi	²¹⁷ At	≤ 1 pg	≤ 1 pM	18.14 kBq	716.1 PBq	β ²¹³ Po	45.59 m	708.8 keV	2.060 nW	81.33 kW	3.628 μ Sv	143.2 MSv
					2.16% →	α ²⁰⁹ Tl						
²¹⁴ Bi	²¹⁴ Pb	≤ 1 pg	≤ 1 pM	1.246 kBq	1.635 EBq	β ²¹⁴ Po	19.90 m	2.161 MeV	431.3 pW	566.0 kW	137.1 nSv	179.9 MSv
A ⁸³ Bi		361.3 pg	1.717 pM	89.80 MBq	248.6 PBq				41.29 μ W	114.3 kW	23.34 mSv	64.60 MSv
²⁵³ Es	²⁵³ Cf	815.0 pg	3.220 pM	760.9 kBq	933.6 TBq	α ²⁴⁹ Bk	20.47 d	97.79 keV	11.92 nW	14.63 W	4.641 mSv	5.695 MSv
²⁵⁴ Es	^{254m} Es	155.8 pg	≤ 1 pM	10.76 kBq	69.06 TBq	α ²⁵⁰ Bk	275.7 d	6.619 MeV	11.41 nW	73.23 W	301.3 μ Sv	1.934 MSv
^{254m} Es		4.902 pg	≤ 1 pM	57.00 kBq	11.63 PBq	β ²⁵⁴ Fm	1.638 d	8.168 MeV	74.59 nW	15.22 kW	239.4 μ Sv	48.84 MSv
					2.959% →	γ ²⁵⁴ Es						
					0.316% →	α ²⁵⁰ Bk						
					0.075% →	ϵ ²⁵⁴ Cf						
²⁵⁵ Es	²⁵⁵ Cf	2.789 pg	≤ 1 pM	1.356 kBq	486.2 TBq	β ²⁵⁵ Fm	39.80 d	7.370 MeV	1.601 nW	574.0 W		
					8% →	α ²⁵¹ Bk						
C ⁹⁹ Es		978.5 pg	3.864 pM	830.0 kBq	848.3 TBq				99.52 nW	101.7 W	5.182 mSv	5.296 MSv
²¹⁰ Po	²¹⁰ Bi	≤ 1 pg	≤ 1 pM	95.12 Bq	166.3 TBq	α ²⁰⁶ Pb	138.4 d	5.407 MeV	82.39 pW	144.1 W	114.1 μ Sv	199.6 MSv

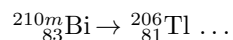
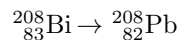
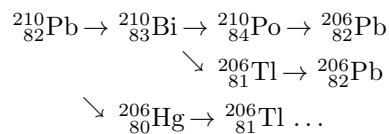
‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

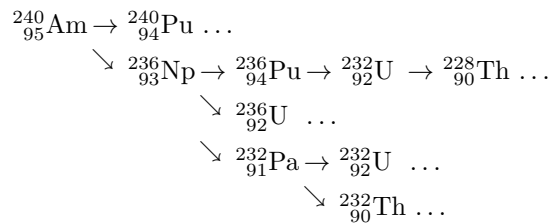
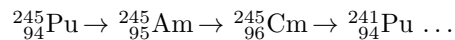
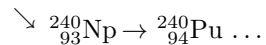
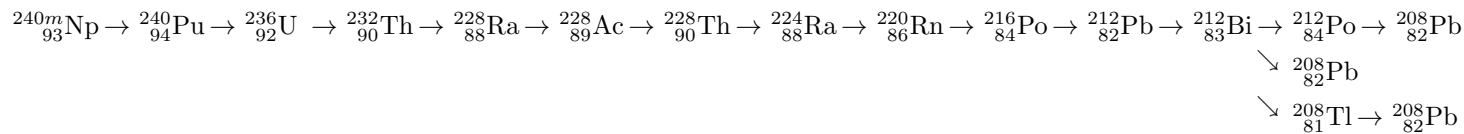
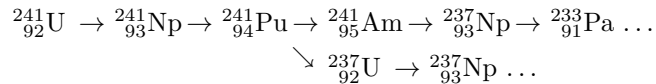
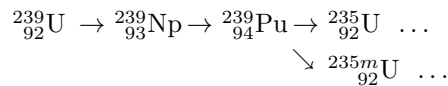
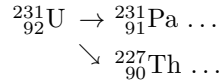
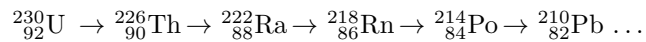
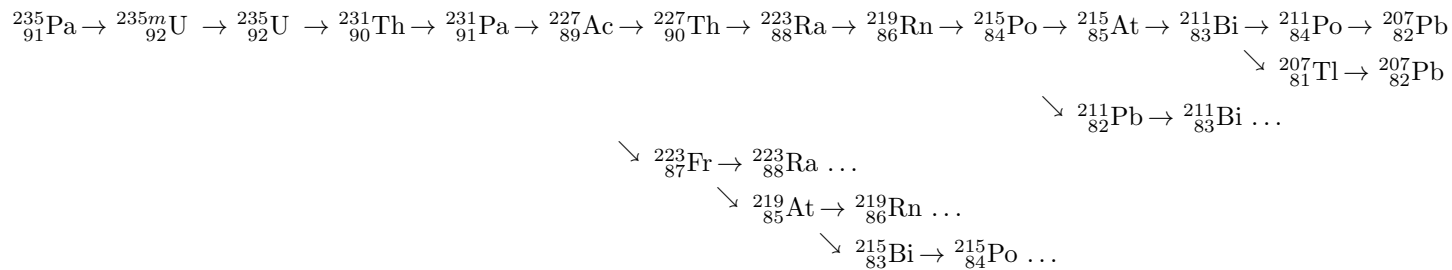
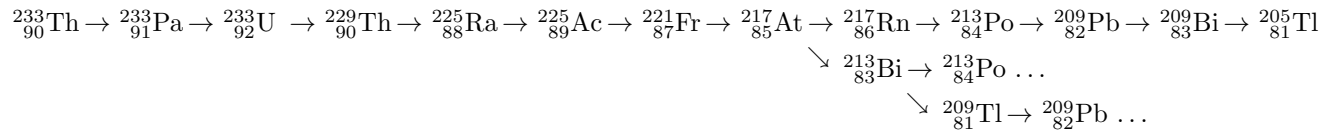
Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
²¹¹ Po	²¹¹ ₈₃ Bi	≤ 1 pg	≤ 1 pM	86.57 Bq	3.535×10 ¹²	α ²⁰⁷ ₈₂ Pb	516.0 ms	7.592 MeV	105.3 pW	4.300 GW		
²¹⁵ Po	²¹⁵ ₈₆ Rn	≤ 1 pg	≤ 1 pM	30.91 kBq	1.091×10 ¹⁵	α ²¹¹ ₈₂ Pb	1.780 ms	7.530 MeV	37.29 nW	1.317×10 ¹²		
²¹⁶ Po	²²⁰ ₈₆ Rn	≤ 1 pg	≤ 1 pM	89.75 MBq	1.289×10 ¹³	α ²¹² ₈₂ Pb	150.0 ms	6.905 MeV	99.29 μW	14.26 GW		
²¹⁸ Po	²²² ₈₆ Rn	≤ 1 pg	≤ 1 pM	1.246 kBq	10.47 EBq	α ²¹⁴ ₈₂ Pb	3.098 m	6.112 MeV	1.220 nW	10.25 MW		
A ₈₄ Po		≤ 1 pg	≤ 1 pM	89.78 MBq	155.1 EBq				99.33 μW	171.6 MW	114.1 μSv	197.1 MSv
²²¹ Fr	²²⁵ ₈₉ Ac	≤ 1 pg	≤ 1 pM	18.14 kBq	6.563 EBq	α ²¹⁷ ₈₅ At	4.900 m	6.507 MeV	18.91 nW	6.842 MW		
²²³ Fr	²²⁷ ₈₉ Ac	≤ 1 pg	≤ 1 pM	443.0 Bq	1.433 EBq	β ²²³ ₈₈ Ra	21.80 m	437.8 keV	31.07 pW	100.5 kW	1.063 μSv	3.439 GSv
C ₈₇ Fr		≤ 1 pg	≤ 1 pM	18.58 kBq	6.047 EBq				18.94 nW	6.163 MW	1.063 μSv	346.0 MSv
²⁵⁰ ₀ Sf		6.304 μg										
G ₂ He		838.3 mg	209.4 mM									
²⁰⁷ Tl	²¹¹ ₈₃ Bi	≤ 1 pg	≤ 1 pM	30.83 kBq	7.052 EBq	β ²⁰⁷ ₈₂ Pb	4.770 m	495.2 keV	2.446 nW	559.5 kW		
²⁰⁸ Tl	²¹² ₈₃ Bi	2.958 pg	≤ 1 pM	32.25 MBq	10.90 EBq	β ²⁰⁸ ₈₂ Pb	3.053 m	3.970 MeV	20.51 μW	6.934 MW		
²⁰⁹ Tl	²¹³ ₈₃ Bi	≤ 1 pg	≤ 1 pM	391.9 Bq	15.15 EBq	β ²⁰⁹ ₈₂ Pb	2.200 m	2.802 MeV	175.9 pW	6.799 MW		
A ₈₁ Tl		2.962 pg	≤ 1 pM	32.28 MBq	10.90 EBq				20.51 μW	6.924 MW		
A ₈₅ At	²²¹ ₈₇ Fr	≤ 1 pg	≤ 1 pM	18.14 kBq	5.961×10 ¹³	α ²¹³ ₈₃ Bi	32.30 ms	7.195 MeV	20.91 nW	68.72 GW		
²¹⁹ Rn	²²³ ₈₈ Ra	≤ 1 pg	≤ 1 pM	30.91 kBq	481.6 EBq	α ²¹⁵ ₈₄ Po	3.960 s	6.999 MeV	34.66 nW	540.0 MW		
²²⁰ Rn	²²⁴ ₈₈ Ra	2.629 pg	≤ 1 pM	89.75 MBq	34.14 EBq	α ²¹⁶ ₈₄ Po	55.80 s	6.405 MeV	92.09 μW	35.03 MW		
²²² Rn	²²⁶ ₈₈ Ra	≤ 1 pg	≤ 1 pM	1.246 kBq	5.695 PBq	α ²¹⁸ ₈₄ Po	3.823 d	5.586 MeV	1.115 nW	5.096 kW		
G ₈₆ Rn		2.848 pg	≤ 1 pM	89.78 MBq	31.53 EBq				92.13 μW	32.35 MW		
Total		947.9 kg	3.982 kM	1.731 EBq	1.826 TBq				122.8 kW	129.5 mW	26.37 MSv	27.82 Sv

ICRP Publication 119 does not report dose factors for isotopes with half lives less than ten minutes or greater than 10⁹ years.
Total radiotoxicity is not the sum of the “Sv” column because ICRP Publication 119 includes radiotoxicity of daughter in radiotoxicity of parent.
Dose factors for gases are given as Sv/day per Bq/m³. Radiotoxicity is not computed for gases.

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Decay Chains





Activation Products Per Tonne of Fuel

used for 50.68 GWt_g-day LWR burnup at power of 36.54 MW_{th} and $3.14 \times 10^{14} N/cm^2/s$ neutron flux,
at discharge, as calculated by ORIGEN2 version 2.1 on 9 October 2013.

Radiotoxicity in Sieverts computed for adult ingestion using dose factors from ICRP publication 119

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
⁹⁰ Zr	⁹⁰ Y	120.7 kg	1.343 kM									
⁹¹ Zr	⁹¹ Y	26.41 kg	290.5 M									
⁹² Zr	⁹² Y	41.10 kg	447.2 M									
⁹³ Zr	⁹³ Y	160.7 gm	1.730 M	14.95 GBq	93.03 MBq	β ^{93m} ₄₁ Nb	1.530 My	19.59 keV	46.93 μW	292.0 nW	16.44 Sv	102.3 mSv
					2.5% →	β ⁹³ ₄₁ Nb						
⁹⁴ Zr	⁹⁴ Y	42.60 kg	453.6 M	1.000 kBq	23.48 mBq	2β ⁹⁴ ₄₂ Mo	6.000 Py	1.144 MeV	183.2 pW	≤ 1 pW		
⁹⁵ Zr	⁹⁵ Y	2.447 gm	25.78 mM	1.947 PBq	795.7 TBq	β ⁹⁵ ₄₁ Nb	64.03 d	854.1 keV	266.4 W	108.9 W	1.850 MSv	755.9 kSv
					1.08% →	β ^{95m} ₄₁ Nb						
⁹⁶ Zr	⁹⁶ Y	6.957 kg	72.54 M	24.60 mBq	3.536 μBq	2β ⁹⁶ ₄₂ Mo	39.00 Ey	3.350 MeV	≤ 1 pW	≤ 1 pW		
⁹⁷ Zr	⁹⁷ Y	43.49 mg	448.8 μM	3.078 PBq	70.77 PBq	β ^{97m} ₄₁ Nb	16.74 h	878.9 keV	433.4 W	9.966 kW	6.464 MSv	148.6 MSv
					4.952% →	β ⁹⁷ ₄₁ Nb						
A ₄₀ Zr		237.9 kg	2.608 kM	5.025 PBq	21.12 GBq				699.8 W	2.941 mW	8.313 MSv	34.94 Sv
⁹² Nb		2.172 pg	≤ 1 pM	11.24 kBq	5.175 PBq	ϵ ⁹² ₄₀ Zr	35.00 My	1.509 MeV	2.717 nW	1.251 kW		
⁹³ Nb	⁹³ Zr	13.59 μg	146.3 nM									
^{93m} Nb	⁹³ Zr	114.9 μg	1.237 μM	1.202 GBq	10.46 TBq	γ ⁹³ ₄₁ Nb	16.13 y	29.90 keV	5.757 μW	50.10 mW	144.2 mSv	1.255 kSv
⁹⁴ Nb		63.43 ng	675.5 pM	440.0 Bq	6.937 GBq	β ⁹⁴ ₄₂ Mo	19.99 ky	1.718 MeV	121.1 pW	1.909 mW	748.0 nSv	11.79 Sv
⁹⁵ Nb	⁹⁵ Zr	1.329 gm	14.00 mM	1.924 PBq	1.448 PBq	β ⁹⁵ ₄₂ Mo	34.99 d	809.1 keV	249.4 W	187.7 W	1.116 MSv	839.7 kSv
^{95m} Nb	⁹⁵ Zr	978.7 μg	10.31 μM	13.80 TBq	14.10 PBq	γ ⁹⁵ ₄₁ Nb	3.608 d	234.3 keV	518.1 mW	529.4 W	7.728 kSv	7.896 MSv
					5.6% →	β ⁹⁵ ₄₂ Mo						
⁹⁶ Nb		52.85 μg	551.0 nM	2.736 TBq	51.77 PBq	β ⁹⁶ ₄₂ Mo	23.35 h	2.804 MeV	1.229 W	23.25 kW	3.010 kSv	56.95 MSv
⁹⁷ Nb	⁹⁷ Zr	3.092 mg	31.91 μM	3.078 PBq	995.5 PBq	β ⁹⁷ ₄₂ Mo	1.202 h	1.123 MeV	553.6 W	179.0 kW	209.3 kSv	67.69 MSv
^{97m} Nb	⁹⁷ Zr	40.58 μg	418.7 nM	2.913 PBq	71.78 EBq	γ ⁹⁷ ₄₁ Nb	52.70 s	742.5 keV	346.5 W	8.539 MW		
⁹⁸ Nb		≤ 1 pg	≤ 1 pM	2.579 MBq	1.522×10 ¹²	β ⁹⁸ ₄₂ Mo	2.860 s	2.081 MeV	860.0 nW	507.7 MW		
A ₄₁ Nb		1.333 gm	14.05 mM	7.932 PBq	5.949 PBq				1.151 kW	863.5 W	1.336 MSv	1.002 MSv
⁸⁹ Y	⁸⁹ Sr	23.22 mg	261.2 μM									
⁹⁰ Y	⁹⁰ Sr	3.073 mg	34.18 μM	61.88 TBq	20.14 PBq	β ⁹⁰ ₄₀ Zr	2.671 d	935.0 keV	9.269 W	3.016 kW	167.1 kSv	54.37 MSv
^{90m} Y		10.72 pg	≤ 1 pM	4.460 MBq	416.0 PBq	γ ⁹⁰ ₃₉ Y	3.190 h	682.8 keV	487.9 nW	45.51 kW	758.2 μSv	70.73 MSv
⁹¹ Y	⁹¹ Sr	4.690 mg	51.59 μM	4.260 TBq	908.3 TBq	β ⁹¹ ₄₀ Zr	58.51 d	605.6 keV	413.3 mW	88.12 W	10.22 kSv	2.180 MSv
⁹² Y		30.61 μg	333.0 nM	10.91 TBq	356.4 PBq	β ⁹² ₄₀ Zr	3.540 h	1.698 MeV	2.967 W	96.93 kW	5.346 kSv	174.6 MSv
⁹³ Y	⁹³ Sr	9.032 ng	97.21 pM	1.116 GBq	123.6 PBq	β ⁹³ ₄₀ Zr	10.18 h	1.261 MeV	225.5 μW	24.97 kW	1.339 Sv	148.3 MSv
⁹⁴ Y		59.97 ng	638.6 pM	232.5 GBq	3.877 EBq	β ⁹⁴ ₄₀ Zr	18.70 m	2.811 MeV	104.7 mW	1.746 MW	18.83 Sv	314.0 MSv
⁹⁶ Y		47.09 pg	≤ 1 pM	1.485 GBq	31.54 EBq	β ⁹⁶ ₄₀ Zr	5.340 s	3.868 MeV	920.2 μW	19.54 MW		
E ₃₉ Y		31.01 mg	347.3 μM	77.29 TBq	2.492 PBq				12.76 W	411.3 W	182.7 kSv	5.890 MSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
⁸⁷ Sr		3.321 mg	38.21 μM									
⁸⁸ Sr		325.3 mg	3.701 mM									
⁸⁹ Sr		1.564 mg	17.59 μM	1.683 TBq	1.076 PBq	β ⁸⁹ Y	50.57 d	583.0 keV	157.2 mW	100.5 W	4.376 kSv	2.798 MSv
⁹⁰ Sr		34.17 μg	380.1 nM	172.6 MBq	5.051 TBq	β ⁹⁰ Y	28.79 y	195.7 keV	5.412 μW	158.4 mW	4.833 Sv	141.4 kSv
⁹¹ Sr		2.422 μg	26.64 nM	325.1 GBq	134.2 PBq	β ^{91m} Y	9.630 h	1.352 MeV	70.39 mW	29.06 kW	211.3 Sv	87.25 MSv
⁹³ Sr		111.8 pg	1.203 pM	1.116 GBq	9.982 EBq	β ⁹¹ Y						
⁹³ Sr		330.2 mg	3.757 mM	2.009 TBq	6.085 TBq	β ⁹³ Y	7.423 m	2.554 MeV	456.7 μW	4.085 MW	4.592 kSv	13.91 kSv
E ₃₈ Sr									228.1 mW	690.6 mW		
⁹⁴ Mo	⁹⁴ Zr	1.739 pg	≤ 1 pM									
⁹⁵ Mo	⁹⁵ Nb	25.25 gm	266.1 mM									
⁹⁶ Mo	⁹⁶ Zr	1.824 gm	19.02 mM									
⁹⁷ Mo	⁹⁷ Nb	48.76 gm	503.2 mM									
⁹⁸ Mo	⁹⁸ Nb	616.9 mg	6.301 mM	833.5 mBq	1.351 Bq	2β ⁹⁸ Ru	100.0 Ty	112.0 keV	≤ 1 pW	≤ 1 pW		
⁹⁹ Mo	⁹⁹ Nb	102.8 μg	1.039 μM	1.826 TBq	17.76 PBq	β ^{99m} Tc	2.747 d	541.5 keV	158.4 mW	1.541 kW	1.096 kSv	10.66 MSv
						β ⁹⁹ Tc						
¹⁰⁰ Mo		1.234 μg	12.35 nM	16.50 pBq	13.37 μBq	2β ¹⁰⁰ Ru	9.900 Ey	3.034 MeV	≤ 1 pW	≤ 1 pW		
¹⁰¹ Mo		≤ 1 pg	≤ 1 pM	426.4 kBq	4.716 EBq	β ¹⁰¹ Tc	14.61 m	1.926 MeV	131.6 nW	1.455 MW	17.48 μSv	193.3 MSv
A ₄₂ Mo		76.45 gm	794.5 mM	1.826 TBq	23.88 GBq				158.4 mW	2.072 mW	1.096 kSv	14.33 Sv
⁹⁸ Tc		4.887 ng	49.91 pM	157.2 mBq	32.17 MBq	β ⁹⁸ Ru	4.200 My	1.532 MeV	≤ 1 pW	7.892 μW	314.4 pSv	64.33 mSv
⁹⁹ Tc	⁹⁹ Mo	1.139 mg	11.52 μM	715.0 kBq	627.7 MBq	β ⁹⁹ Ru	214.0 ky	84.58 keV	9.688 nW	8.506 μW	457.6 μSv	401.8 mSv
¹⁰⁰ Tc		89.42 pg	≤ 1 pM	23.64 GBq	264.4 EBq	β ¹⁰⁰ Ru	15.80 s	1.484 MeV	5.622 mW	62.87 MW		
¹⁰¹ Tc	¹⁰¹ Mo	≤ 1 pg	≤ 1 pM	426.4 kBq	4.855 EBq	β ¹⁰¹ Ru	14.20 m	809.2 keV	55.28 nW	629.5 kW	8.102 μSv	92.25 MSv
A ₄₃ Tc		1.139 mg	11.52 μM	23.64 GBq	20.76 TBq				5.622 mW	4.936 W	465.7 μSv	408.9 mSv
⁹⁸ Ru	⁹⁸ Mo	≤ 1 pg	≤ 1 pM									
⁹⁹ Ru	⁹⁹ Tc	3.054 ng	30.88 pM									
¹⁰⁰ Ru	¹⁰⁰ Mo	99.42 μg	995.2 nM									
¹⁰¹ Ru	¹⁰¹ Tc	500.4 ng	4.959 nM									
¹⁰² Ru	¹⁰² Rh	9.511 ng	93.33 pM									
¹⁰³ Ru		3.277 pg	≤ 1 pM	3.916 kBq	1.195 PBq	β ^{103m} Rh	39.26 d	564.3 keV	354.0 pW	108.0 W	2.859 μSv	872.3 kSv
						β ¹⁰³ Rh						
¹⁰⁴ Ru	¹⁰⁴ Rh	≤ 1 pg	≤ 1 pM									
¹⁰⁵ Ru		≤ 1 pg	≤ 1 pM	25.48 mBq	248.8 PBq	β ¹⁰⁵ Rh	4.440 h	1.184 MeV	≤ 1 pW	47.19 kW	6.625 pSv	64.70 MSv
A ₄₄ Ru		99.93 μg	1.000 μM	3.916 kBq	39.19 MBq				354.0 pW	3.542 μW	2.859 μSv	28.61 mSv
¹ H		12.73 mg	12.63 mM									
² H		10.72 μg	5.322 μM									
³ H		7.107 pg	2.356 pM	2.539 kBq	357.3 TBq	β ³ He	12.33 y	5.679 keV	2.310 pW	325.0 mW	106.6 nSv	15.00 kSv
G ₁ H		12.74 mg	12.64 mM	2.539 kBq	199.3 kBq				2.310 pW	181.3 pW	106.6 nSv	8.370 μSv

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Isotope ‡	Decay From	Mass grams	Moles	Radioactivity		Decay To	Half Life	Energy per Bq-s	Thermal Power		Radiotoxicity †	
				GBq	GBq/gm				Watts	Watts/gm	Sv	Sv/gm
¹⁰² Rh		≤ 1 pg	≤ 1 pM	24.56 μBq	44.74 TBq	ε ¹⁰² ₄₄ Ru	2.902 y	2.152 MeV	≤ 1 pW	15.42 W	≤ 1 pSv	53.69 kSv
¹⁰³ Rh	¹⁰³ ₄₄ Ru	≤ 1 pg	≤ 1 pM									
¹⁰⁴ Rh	^{104m} ₄₅ Rh	≤ 1 pg	≤ 1 pM	65.03 Bq	94.96 EBq	β ¹⁰⁴ ₄₆ Pd	42.30 s	997.3 keV	10.39 pW	15.17 MW		
					0.45% →	ε ¹⁰⁴ ₄₄ Ru						
^{104m} Rh		≤ 1 pg	≤ 1 pM	4.256 Bq	15.43 EBq	γ ¹⁰⁴ ₄₅ Rh	4.340 m	139.9 keV	≤ 1 pW	345.8 kW		
					0.13% →	β ¹⁰⁴ ₄₆ Pd						
¹⁰⁵ Rh	¹⁰⁵ ₄₄ Ru	≤ 1 pg	≤ 1 pM	23.56 mBq	31.25 PBq	β ¹⁰⁵ ₄₆ Pd	1.473 d	230.8 keV	≤ 1 pW	1.156 kW	8.717 pSv	11.56 MSv
A ₄₅ Rh		≤ 1 pg	≤ 1 pM	69.31 Bq	88.62 TBq				10.49 pW	13.41 W	8.747 pSv	11.18 Sv
³ He	³ ₁ H	≤ 1 pg	≤ 1 pM									
⁴ He		16.30 mg	4.072 mM									
G ₂ He		16.30 mg	4.072 mM									
¹⁰⁴ Pd	¹⁰⁴ ₄₅ Rh	≤ 1 pg	≤ 1 pM									
¹⁰⁵ Pd	¹⁰⁵ ₄₅ Rh	≤ 1 pg	≤ 1 pM									
¹⁰⁶ Pd		≤ 1 pg	≤ 1 pM									
A ₄₆ Pd		≤ 1 pg	≤ 1 pM									
Total		238.0 kg	2.609 kM	13.04 PBq	54.79 GBq				1.864 kW	7.832 mW	8.328 MSv	34.99 Sv

ICRP Publication 119 does not report dose factors for isotopes with half lives less than ten minutes or greater than 10⁹ years.
Total radiotoxicity is not the sum of the “Sv” column because ICRP Publication 119 includes radiotoxicity of daughter in radiotoxicity of parent.
Dose factors for gases are given as Sv/day per Bq/m³. Radiotoxicity is not computed for gases.

‡Electrorefiner destination: A = anode, C = cathode, E = electrolyte, G = gas; †Radiotoxicity of daughters is included in parents.

Decay Chains

