

3.3 γ - and α -Energies in Energy-Order of Natural Isotopes

3.3.1 γ -Energies in Energy-Order of Natural Isotopes

Isotopes included: ^{238}U , ^{232}Th decay chains, ^{235}U , ^{231}Th , and the dominant part of ^{231}Pa and their daughters as well as ^{40}K , $^{137,134}\text{Cs}$, ^{60}Co , ^{207}Bi , ^7Be , ^{241}Am and SE, DE, $\sum E$. (cyan: γ -ray reference lines); gray-box highlighting energy interference, e.g. between 50.13 & 50.18 as well as between 53.20 & 53.228

energy keV	emiss. prob.%	isotopes	half-life
13.52 ₂	1.60 ₇	Ra-228	5.75y
15.54 ₂	0.16 ₃	Ra-228	5.75y
16.24 ₁	0.72 ₈	Ra-228	5.75y
16.5 ₁	0.30 ₉	Pa-231	3.276*10 ⁴ y
17.2 _?	0.23 _?	Th-231	25.52h
19	0.38 ₁₂	Pa-231	3.276*10 ⁴ y
19.1 _?	0.24 _?	Th-231	25.52h
19.55	(63 _?)	U -235	7.038* 10 ⁸ y
20.02 ₂	0.0050 ₂₀	Th-234	24.10d
20.27 ₅	0.012 ₄	Fr-223	22.00m
24.5 ₅	0.028 ₁₂	Ac-227	21.772y
25.51 ₆	0.117 ₁₈	Pa-231	3.276*10 ⁴ y
25.64 ₂	14.1 ₉	Th-231	25.52h
26.345 ₁	2.27 ₂	Am-241	432.6y
26.4 ₁	0.0149 _?	Ra-228	5.75y
27.36 ₁	10.3 ₇	Pa-231	3.276*10 ⁴ y
28.6 ₅	0.042 _?	Ac-227	21.772y
29.49 ₂	0.0120 ₁₄	Th-234	24.10d
29.96 ₂	0.109 ₉	Pa-231	3.276*10 ⁴ y
31.60 ₅	0.017 ₆	U -235	7.038*10 ⁸ y
31.82 Ba-X	1.95	Cs-137	30.07y
32.19 Ba-X	3.59	Cs-137	30.07y
33.196 ₁	0.126 ₃	Am-241	43262y
34.7 ₁	0.037 ₄	U -235	7.038*10 ⁸ y
36.4 Ba-X	1.055	Cs-137	30.07y
37.3 Ba-X	0.266	Cs-137	30.07y
37.9 ₅	0.049 _?	Ac-227	21.772y
39.857 ₄	1.06 ₉	Bi-212	60.55m
40.0 ₁₀	30.0	Ra-225	14.9d
41.4 ₃	0.030 ₁₀	U -235	7.038*10 ⁸ y
41.96 ₁₅	0.060 ₁₄	U -235	7.038*10 ⁸ y
46.35 ₂	0.223 ₁₆	Pa -231	3.276*10 ⁴ y
46.539 ₁	4.25 ₄	Pb-210	22.20y
49.55 ₆	0.064 ₈	U -238	4.468*10 ⁹ y
49.80 ₅	0.037 ₁₂	Fr-223	22.00m
49.82 ₅	0.43 ₁₀	Th-227	18.68d
50.13 ₁	8.4 ₈	Th-227	18.68d
50.094 ₁₅	0.497 ₂₉	Fr-223	22.00m
51.21 ₅	0.034 ₇	U -235	7.038*10 ⁸ y
53.20 ₂	0.1230 ₂₀	U -234	2.455*10 ⁵ y

energy keV	emiss. prob.%	isotopes	half-life
54.21 ₃	0.034 ₇	U -235	7.038*10 ⁸ y
57.766 ₅	0.47 ₃	Ac-228	6.15h
58.2284 ₁₈	1.075 _{7/1.2}	Pb-214	26.8m
58.5700 ₂₄	0.462 ₂₅	Th-231	25.52h
59.5409 ₁	35.9 ₄	Am-241	432.6y
62.86 ₂	0.016 ₃	Th-234	24.10d
63.29 ₂	3.7 ₄	Th-234	24.10d
63.81 ₁	0.263 ₁₃	Th-232	1.40*10 ¹⁰ y
64.37	0.01	U -235	7.038*10 ⁸ y
65.420 ₁₄	0.077 ₅	Pb-211	36.1m
67.672 ₂	0.38 ₃	Th-230	7.538*10 ⁴ y
72.7 ₂	0.120 ₁₂	U -235	7.038*10 ⁸ y
72.7510 ₂₅	0.252 ₁₃	Th-231	25.52h
72.80Pb-K α_2	2.14	Tl-208	3.053m
73.92 ₂	0.0130 ₁₄	Th-234	24.10d
74.82Bi-K α_2	6.52	Pb-214	26.8m
74.82Bi-K α_2	10.5	Pb-212	10.64h
74.97Pb-K α_1	3.60	Tl-208	3.053m
74.94 ₃	0.051 ₆	U -235	7.038*10 ⁸ y
77.11Bi-K α_1	11.0	Pb-214	26.8m
77.11Bi-K α_1	17.7	Pb-212	10.64h
79.65	0.125	Fr-223	22.00m
79.69 ₁	1.95 ₁₈	Th-227	18.68d
79.651 ₁₃	0.126 ₅	Fr-223	22.00m
81.2280 ₁₄	0.90 ₅	Th-231	25.52h
82.0870 ₁₄	0.42 ₃	Th-231	25.52h
83.30 ₅	0.060 ₆	Th-234	24.10d
84.2140 ₁₃	6.6 ₄	Th-231	25.52h
84.373 ₃	1.220 ₂₀	Th-228	1.9116y
84.78Pb-K β'_1	1.27	Tl-208	3.053m
87.02 ₂	0.019 ₃	Th-234	24.10d
87.19 Bi-K β'_1	3.88	Pb-214	26.8m
87.19 Bi-K β'_1	6.27	Pb-212	10.64h
87.36 Pb-K β'_2	0.367	Tl-208	3.053m
88.47 Ra-K α_1	3.08	Th-227	18.68d
89.79 Bi-K β'_2	1.15	Pb-214	26.8m
89.79 Bi-K β'_2	1.86	Pb-212	10.64h
89.95 ₂	1.00 ₆	Th-231	25.52h
89.96 Th-K α_2	3.4	Ac-228	6.15h
89.96 Th-K α_2	3.36	U -235	7.038*10 ⁸ y