

↑



JUN 9 1998

W. J. J. VAN DER LINDEN

4

Fertilab Library



0 1160 0061876 3

[illegible]

Tsutomu ICHIMIYA*, Tsutomu NARITA and Kensuke KITAO**

日本原子力研究所
Japan Atomic Energy Research Institute

本レポートは、日本原子力研究所が不定期に公刊している研究報告書です。

入手の問合わせは、日本原子力研究所研究情報部研究情報課（〒319-1195 茨城県那珂郡東海村）あて、お申し越してください。なお、このほかに財団法人原子力弘済会資料センター（〒319-1195 茨城県那珂郡東海村日本原子力研究所内）で複写による実費領布をおこなっております。

This report is issued irregularly.

Inquiries about availability of the reports should be addressed to Research Information Division, Department of Intellectual Resources, Japan Atomic Energy Research Institute, Tokai-mura, Naka-gun, Ibaraki-ken 319-1195, Japan.

© Japan Atomic Energy Research Institute, 1998

編集兼発行 日本原子力研究所
印刷 ㈱原子力資料サービス

Natural Background Gamma-ray Spectrum
— List of Gamma-rays Ordered in Energy from Natural Radionuclides —

Tsutomu ICHIMIYA*, Tsutomu NARITA and Kensuke KITAO**

Department of Reactor Engineering
Tokai Research Establishment
Japan Atomic Energy Research Institute
Tokai-mura, Naka-gun, Ibaraki-ken

(Received January 27, 1998)

A quick index to γ -rays and X-rays from natural radionuclides is presented. In the list, γ -rays are arranged in order of increasing energy. The list also contains γ -rays from radioactive nuclides produced in a germanium detector and its surrounding materials by interaction with cosmic neutrons, as well as direct γ -rays from interaction with the neutrons. Artificial radioactive nuclides emitting γ -rays with same or near energy value as that of the natural γ -rays and X-rays are also listed. In appendix, γ -ray spectra from a rock, uranium ore, thorium, monazite and uraninite and also background spectra obtained with germanium detectors placed in iron or lead shield have been given. The list is designed for use in γ -ray spectroscopy under the conditions of highly natural background, such as in-situ environmental radiation monitoring or low-level activity measurements, with a germanium detector.

Keywords: Gamma-rays, Natural Background Radiation, Natural Radioactive Nuclides, Artificial Radioactive Nuclides, Gamma-ray Spectrometry, Environmental Radiation Monitoring.

* The Japan Radioisotope Association

** Data Engineering, Inc

自然バックグラウンド γ 線スペクトル
—— エネルギー順に並べた自然放射性核種からの γ 線表 ——

日本原子力研究所東海研究所原子炉工学部

一宮 勉*・成田 孟・喜多尾憲助**

(1998年1月27日受理)

この表は、自然放射性核種からの γ 線をエネルギー順に並べたものであって、自然バックグラウンド γ 線の同定、あるいは人工放射性核種からの γ 線の同定に役立つ早見表である。これら核種の壊変に伴う特性X線もあわせて並べてある。また宇宙線中性子と、検出器自身や検出器の周辺にある物質との相互作用による直接 γ 線や、相互作用の結果生成した放射性核種の放出する γ 線のうち、放出の割合の大きいものをこの表に含めた。さらに、これら γ 線とほぼ等しいエネルギー値の γ 線を放出する人工放射性核種を併記した。なお自然石、ウラン鉱石、トリウム及びモナズ石からの γ 線スペクトル、遮へい体内に置かれたゲルマニウム検出器のバックグラウンド・スペクトルの例を付録として掲げた。

東海研究所：319-1195 茨城県那珂郡東海村白方白根 2-4

* (社)日本アイソトープ協会

** (株)データ工学

Contents

1. Introduction 1

2. Data Source 1

3. Gamma-ray Emitters and Interactions 1

Acknowledgement 3

References 3

List of Gamma-rays from Natural Radionuclides 4

Appendix A. Natural Radioactive Families 66

Appendix B. Some Examples of Natural Gamma-ray Spectrum 69

目 次

1. まえがき 1

2. データソース 1

3. γ 線放出核種と相互作用 1

謝 辞 3

参考文献 3

自然 γ 線の表 4

付録A 放射系列を作る自然放射性核種 66

付録B 自然 γ 線スペクトルの例 69

1. Introduction

In in-situ gamma-ray measurements for environmental radiation monitoring or in gamma-ray measurements for low-level radioactive samples, spectral lines from background gamma-rays may mask weak lines of gamma-rays emitted from artificial radioactive nuclides. Although germanium detectors have excellent energy-resolution, it is very difficult to identify such weak lines in a gamma-ray spectrum. This list is designed as a convenient tool to identify background gamma-rays, while identifying weak gamma-rays from artificial radionuclides, in a gamma-ray spectrum obtained with a germanium detector.

Background peaks observed in a gamma-ray spectrum are not only those formed by gamma-rays from natural radioactive nuclides, but also from radioactive nuclides produced in the detector and its surrounding materials by interaction with the cosmic radiation, as well as from direct interaction with the cosmic radiation.^{1) 2) 3) 4)} These gamma-rays are listed together with characteristic X-rays following the decay of natural radionuclides in the table.

Artificial radioactive nuclides to emit a γ -ray with same or near energy value as that of the listed γ - and X-ray are also given in the same line of the table. Selection of these corresponding artificial nuclides is based on a list of strong gamma-rays from radioactive nuclide provided by authors, previously.^{5) 6)}

Furthermore, γ -ray spectra obtained from a rock, uranium ore, thorium, monazite, and uraninite with a germanium detector, and also background spectra obtained by shielded detectors with iron or lead have been shown in appendix B.

Authors wish to use this table not only in environmental radiation monitoring, but also in field of research on natural radioactivity.

2. Data source

All energies and their intensities of γ -rays given in this table are those retrieved from Evaluated Nuclear Structure Data File (ENSDF, file as September 1997) maintained by National Nuclear Data Center at Brookhaven National Laboratory, USA, on behalf of the International Network for Nuclear Structure and Decay Data evaluation.⁷⁾

Energies of characteristic X-rays are those from Table of Isotopes.⁸⁾

3. Gamma-ray emitters and interactions

Gamma-rays listed are those from radionuclides and interactions as follows.

3.1 Natural radionuclides (see Appendix A.)

Nuclides belong to the thorium, $4n$, series.

Nuclides belong to the uranium, $4n+2$, series.

Nuclides belong to the actinium, $4n+3$, series.

Natural radionuclide not belong to any natural series:

^{40}K (EC, β^-)

^{50}V (EC, β^-)

^{138}La (EC, β^-)

^{176}Lu (β^-)

3.2 Nuclides produced by the cosmic radiation in terrestrial environment:

^7Be (EC)

^{22}Na (EC)

^{28}Al (β^-)

3.3 Nuclides produced by radiative capture and inelastic scattering with the cosmic neutrons in germanium crystal.

$^{71\text{m}}\text{Ge}$ (IT)

$^{73\text{m}}\text{Ge}$ (IT)

$^{75\text{m}}\text{Ge}$ (IT, β^-)

$^{77\text{m}}\text{Ge}$ (IT, β^-)

Reaction products from (n, α) , (n, p) , $(n, 2n)$, $(n, xnyp)$, and $(p, xnyp)$ reactions are not listed.

3.4 Reaction and inelastic scattering:

$^1\text{H}(n, \gamma)$

$^{19}\text{F}(n, n' \gamma)$

$^{56, 57}\text{Fe}(n, n' \gamma)$

$^{56}\text{Fe}(n, \gamma)$

$^{63, 65}\text{Cu}(n, n' \gamma)$

$^{63, 65}\text{Cu}(n, \gamma)$

$^{70, 72, 74, 76}\text{Ge}(n, n' \gamma)$

$^{70, 73}\text{Ge}(n, \gamma)$

$^{110, 111, 112, 113, 114}\text{Cd}(n, n' \gamma)$

$^{113}\text{Cd}(n, \gamma)$

$^{116, 117, 118, 120}\text{Sn}(n, n' \gamma)$

$^{115, 117, 119}\text{Sn}(n, \gamma)$

$^{204}\text{Pb}(n, \gamma)$

$^{206, 207, 208}\text{Pb}(n, n' \gamma)$

Acknowledgement

Authors wish to thank to Drs. M. Noguchi, M. Matsui, R. Ozaki and T. Koshijima for permission to use the gamma-ray spectrum measured by them.

References

- 1) A. K. Entwistle, C. S. Dyer, J. J. Quenby, A. J. Evans and M. Joshi: J. Phys. E:Instrum. **22**, 601-611(1989)
- 2) R. M. Lindstrom, D. J. Lindstrom, L. A. Slaback and J. K. Langland: Nucl. Instr. Meth. **A299**, 425-429(1990)
- 3) G. Heusser: Nucl. Instr. Meth. **A369**, 539-543(1996)
- 4) R. Wordel, D. Mouchel, T. Altitzoglou, G. Heusser, B. Quintana Arnes and P. Meynendonckx: Nucl. Instr. Meth. **A369**, 557-562(1996)
- 5) T. Ichimiya, T. Narita and K. Kitao: Radioisotopes, **45**, 320-348 (1996); *ibid* **45**, 378-405 (1996), and *ibid* **45**, 446-475 (1996).
- 6) T. Ichimiya, T. Narita and K. Kitao: Private communications (1997)
- 7) Evaluated Nuclear Structure Data File (ENSDF)- A computer file of evaluated experimental nuclear structure data maintained by National Nuclear Data Center,
Brookhaven National Laboratory (File as of September 1997)
- 8) R.B.Firestone and V. S. Shirley (Ed.): Table of Isotopes, 8th edition, John Wiley & Sons, Inc. (1996).

List of gamma-rays from natural radionuclides

Explanation of the table.

1. Col. 1 "Energy"

Energy of gamma-rays and X-rays in keV, except for 691.43 keV, that is the transition energy. Gamma-rays at 2103.5 and 1592.5 keV are single and double escape peak of the 2614.53 keV γ -ray, respectively. See section 3 for energy values of X-rays.

2. Col. 2 "Intensity"

Photons per 100 decays of the parent nuclides in equilibrium with its daughter nuclides. For nuclide to belong to no any decay chain, photons per 100 decays of the nuclide in col. 3.

3 Col. 3 "Nuclide"

Parent nuclide emitting the γ -ray of col. 1 unless otherwise noted. The nuclide is indicated with a chemical symbol and a mass number. The letter "m" after the mass number means that the nuclide is an isomer. The letter before the chemical symbol means:

a: belongs to actinium series

t: belongs to thorium series

u: belongs to uranium series

c: produced by interaction with cosmic neutrons or the target nuclide in that interaction.

x: not nuclide, but the characteristic X-ray is given. For example, Bi Ka1 is $K\alpha_1$ X-rays of Bi. Kb1, La, Lb, and Lg are as follows:

Kb1 : $K\beta_1 + K\beta_3$ X-ray

La : $L\alpha_1 + L\alpha_2$ X-ray

Lb : $L\beta_1 + L\beta_{2,15}$ X-ray

Lg : $L\gamma_1$ X-ray

Values of energies of these X-rays are those obtained by a weighted average of each components.

4 Col. 4 "Decay mode"

Mode of decay of nuclide or type of interaction emitting γ -rays in col. 1.

Symbols using in this column:

A: α decay

B-: β^- decay

EC: Electron capture and β^+ decay

IT: Isomeric decay

NN: $(n, n' \gamma)$

NG: (n, γ)

5 Col. 5 "Half life"

Half-life of the nuclide in col.3. Units and their symbols using in this column:

US: Microsecond

MS: Millisecond

S: Second

M: Minute

H: Hour

D: Day

Y: Year

6 Col. 6 "Relational artificial radionuclides"

Artificial radionuclides emitting the γ -ray with energy value equal or near to that in col.1 are listed. The nuclides are shown with a chemical symbol and a mass number. The letter "m" after the mass number indicates that the nuclide is the isomer, and "m1" for the first (low energy) isomer and "m2" for the second isomer. Symbol "gm" indicates that the artificial nuclide has two decay modes, ground-state decay and metastable state decay, and emits their γ -ray corresponding to one in col.1.

7 Other symbols using in the table.

= Approximately equal to

> Greater or equal to

< Less than or equal to

-- Not reported, or reported in ENSDF but not given here

Energy 4.4 ~ 15.5 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
4.4	--	a Ra-223	A	11.435 D	Hf-181	Ba-146	At-208	Lu-167	
4.47	--	x Ba La							
4.5	--	x Ti Ka2							
4.51	--	x Ti Kal			Po-204				
4.93	--	x Ti Kb			Pb-203m1	Se- 86	Po-204		
6.28	1.4E-06	t Ra-228	B-	5.75 Y	Tl-201	W-181	Bi-204		
6.3	--	a Th-227	A	18.72 D	In-121	Sn-121m	Hf-181		
6.67	3.1E-05	t Ra-228	B-	5.75 Y	Er-159	Po-201m	Br- 75	Ag-104m	Sr- 85m
					Eu-154m	Er-160			
7.98	--	x Hf La			W-179m	Sm-153m	Es-254		
8.2	--	a Th-227	A	18.72 D	Th-233	Fm-251	Er-169	Eu-154m	
9.03	--	x Hf Lb			W-179m	At-200m2	At-200m1		
9.2	0.5	a Th-231	B-	25.52 H	U-231				
9.3	--	a Ac-227	B-	21.773 Y	Ag-102m	Eu-154m	Mo-101	Eu-157	
9.5	--	u Pb-214	B-	26.8 M	Kr- 83m	Po-204			
9.98	--	x Hg La			Y- 81	Kr- 74			
10.	0.014	a Ra-223	A	11.435 D	Ho-162m				
< 10.	--	u Th-234	B-	24.10 D					
< 10.	--	u Pa-234m	IT	1.17 M					
10.25	0.76	a Th-231	B-	25.52 H	Y- 86m	Np-235			
10.26	--	x Tl La			Tm-157				
10.52	--	x Hf Lg							
10.54	--	x Pb La			Po-205	Ce-137	Sr-100		
10.83	--	x Bi La			Sb-124m1				
10.9	--	a Pa-231	A	3.276E+4 Y					
11.12	--	x Po La			Rn-209	Ho-160m2	Cs-134m		
11.41	--	x At La							
11.71	--	x Rn La			Pt-184				
11.85	--	x Hg Lb			Sm-153m				
12.02	--	x Fr La			Au-191m	At-204			
12.23	--	x Tl Lb							
12.33	--	x Ra La			Ba-133m	La-133			
12.4	--	a Pa-231	A	3.276E+4 Y	Sc- 45m	Ca- 45			
12.61	--	x Pb Lb			Eu-152m2				
12.64	--	x Ac La			Pt-193m				
12.7	--	a Ac-227	A	21.773 Y					
12.75	0.304	t Ra-228	B-	5.75 Y					
12.95	--	x Th La			Pu-239				
13.01	--	x Bi Lb			Tl-193m	Ge- 73m			
13.27	--	c Ge- 73m	IT	0.499 S	As- 73				
13.27	--	x Pa La							
13.41	--	x Po Lb							
13.52	1.6	t Ra-228	B-	5.75 Y	Gd-155m				
13.6	--	x U La			Au-191m				
13.83	--	x Hg Lg			Ba-140	Ir-179			
13.83	--	x At Lb							
14.1	--	a Pa-231	A	3.276E+4 Y	Gd-153	Hf-177m1			
14.25	--	x Rn Lb			Dy-157m				
14.29	--	x Tl Lg			Hf-166				
14.4	0.016	a Ra-223	A	11.435 D					
14.41	--	c Fe- 57	NN		Mn- 57	Co- 57			
14.68	--	x Fr Lb							
14.77	--	x Pb Lg							
15.	--	a Fr-223	B-	21.8 M	Cs-130m				
15.12	--	x Ra Lb							
15.15	3.	t Ra-228	B-	5.75 Y					
15.2	--	a Ac-227	B-	21.773 Y					
15.25	--	x Bi Lg							
15.5	0.16	t Ra-228	B-	5.75 Y	Yb-161				
15.5	--	a Pa-231	A	3.276E+4 Y					

Energy 15.5 ~ 31.5 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
15.57	--	x Ac Lb							
15.74	--	x Po Lg							
16.04	--	x Th Lb			Re-188m	Nd-152			
16.2	0.72	t Ra-228	B-	5.75 Y	Hg-195m				
16.25	--	x At Lg			Pu-246	Ta-182m1	Ta-182m2	Pt-183m	
16.5	0.306	a Pa-231	A	3.276E+4 Y	Zn-72				
16.51	--	x Pa Lb							
16.77	--	x Rn Lg							
16.98	--	x U Lb			Ti-52				
17.2	0.227	a Th-231	B-	25.52 H	U-231	Np-235			
17.30	--	x Fr Lg			Nd-154				
17.85	--	x Ra Lg			Sn-126	Sb-126m1	Ag-113m		
18.07	< 0.33	a Th-231	B-	25.52 H	U-231	Np-235			
18.2	--	a Pa-231	A	3.276E+4 Y	Ho-161	Eu-152m2	La-136m		
18.4	0.014	t Ac-228	B-	6.15 H					
18.41	--	x Ac Lg			Pd-112				
18.98	--	x Th Lg			Eu-155				
19.	0.374	a Pa-231	A	3.276E+4 Y					
19.1	1.5E-03	a Fr-223	B-	21.8 M	U-231				
19.1	3.7	a Th-231	B-	25.52 H					
19.57	--	x Pa Lg			Lu-171	Au-187m			
19.59	61.	a U-235	A	703.8E+6 Y					
19.6	--	a Pa-231	A	3.276E+4 Y	Pt-195m				
20.02	9.9E-03	u Th-234	B-	24.10 D	Sb-128m				
20.17	--	x U Lg			Os-180	Ir-174m			
20.3	0.012	a Fr-223	B-	21.8 M	Zr-102				
20.3	0.182	a Th-227	A	18.72 D					
20.95	--	a Th-227	A	18.72 D	Xe-142	Gd-155m	Gd-151	Sm-151	Te-117m
22.7	--	a Pa-231	A	3.276E+4 Y	La-136m	Pb-203m2			
23.44	--	c Ge-71m	IT	20.40 MS	La-132m	Kr-75	La-136m	Pr-151	Eu-149
23.6	4.8E-03	a Pa-231	A	3.276E+4 Y	Sm-156	Sn-126	Hf-166	Tb-151m	Dy-151
24.14	4.1E-03	a Fr-223	B-	21.8 M	Tl-198m1	Tl-198m2	Sn-126	Yb-157	Ge-71m
24.5	--	a Ac-227	B-	21.773 Y	W-185m	Pd-116			
24.5	3.1E-03	a Pa-231	A	3.276E+4 Y	In-119	Sb-119	Sn-119m	Hf-172	Ru-103m
25.51	0.117	a Pa-231	A	3.276E+4 Y	Yb-169m				
25.64	14.5	a Th-231	B-	25.52 H	Pd-101	Fm-255	Co-58m	La-127m	
26.4	0.014	t Ra-228	B-	5.75 Y	Xe-120	Pu-243	Sn-119m	Ag-105m	
26.55	0.54	a Th-231	B-	25.52 H	U-231	Np-235	Tb-161	Ho-161	Sm-165
27.	--	a Pa-231	A	3.276E+4 Y	Sb-124m2	Cr-56	Ac-231		
27.27	9.1E-04	a Fr-223	B-	21.8 M	Yb-157	Sb-122m	Hf-166	Hg-185m	Ce-131
27.36	10.29	a Pa-231	A	3.276E+4 Y	Ir-190m1	Tl-201	Pu-237	Am-241	U-237
27.55	0.093	a Th-227	A	18.72 D	Eu-155	Pu-241			
27.7	--	a Pa-231	A	3.276E+4 Y	Ag-119	Er-154	Au-194m1		
27.7	9.1E-04	a Fr-223	B-	21.8 M	Gd-145m				
27.96	0.109	a Pa-231	A	3.276E+4 Y	Ka-227	Eu-154m	Cd-103	Pu-246	Te-129m
29.3	0.035	a Th-231	B-	25.52 H	Ir-194m1	Mo-108	Ta-160m	Ir-195m	Pt-195m
29.49	1.6E-03	a Th-234	B-	24.10 D	Xe-117	Nd-152	Ag-117m	Eu-154m	Ta-169
29.6	=3.3E-04	a Fr-223	B-	21.8 M	Lu-167	Zr-86	Pa-229	Th-233	
29.6	=4.9E-03	a Th-227	A	18.72 D					
29.86	7.5E-04	a Fr-223	B-	21.8 M	Ir-194m1	Er-156	Cf-247		
29.86	0.093	a Th-227	A	18.72 D					
29.96	0.109	a Pa-231	A	3.276E+4 Y	Ba-140	Dy-165m			
30.6	--	t Ra-228	B-	5.75 Y	Ag-108m	Sm-155	Ba-123	Tl-201	Mg-28
31.	0.01	a Pa-231	A	3.276E+4 Y	W-179	Au-196m2	Zr-93	Nb-93m	Mo-93
31.54	7.0E-03	a Pa-231	A	3.276E+4 Y	Yb-165	Os-189m	Es-253	Ir-195m	Ir-195
					Pt-195m	Am-243			
					Ac-231	Hf-164	Ir-174	Cs-130m	Tm-155

Energy 31.5 ~ 45.4 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
31.58	--	a Fr-223	B-	21.8 M					
31.58	0.075	a Th-227	A	18.72 D					
31.6	0.016	a U -235	A	703.8E+6 Y	Hg-192	Fr-225	Fm-251		
31.82	--	x Ba Ka2			Eu-154m	Po-208	Rh-104m	Ce-134	
31.99	=9.6E-05	a Ra-223	A	11.435 D	Pt-199m				
32.19	--	x Ba Ka1			Sn-128	Kr- 83m	Am-241	Tl-201	Au-193m
					Os-179				
32.73	0.073	a Th-231	B-	25.52 H	Cd-107	Rh-100m	Pd-100	Sm-153m	
33.32	0.03	a Th-231	B-	25.52 H	U -237	Pu-237	Am-241		
33.4	= 0.012	a Th-227	A	18.72 D					
33.6	0.101	a Ra-223	A	11.435 D	La-136m	Ce-144	W -176	Au-194m2	Cs-117
34.	--	a Pa-231	A	3.276E+4 Y	Lu-167	Pu-243	Es-251	Fm-255	
34.3	8.2E-03	u Pa-234	B-	6.70 H	Tc- 96m	Pu-235	Lu-166m1	Es-254	
34.7	= 0.037	a U -235	A	703.8E+6 Y	Es-254m	Rh-117	Pd-117m		
34.8	--	u Ra-226	A	1600 Y	Am-246m	Pa-229	Bk-246	Ir-194m1	
34.99	6.2E-05	a Fr-223	B-	21.8 M	Au-194m1	Er-156			
35.83	0.016	a Pa-231	A	3.276E+4 Y	W -174	Sb-125	I -125	Y - 83	Te-125m
					Es-254m	W -173	Eu-154m	Pm-153	
36.4	--	x Ba Kb			Ir-189	Mo-104	Sr- 98	Cd-124	Es-254m
36.8	--	u Bi-214	B-	19.9 M	Pt-178	Br- 80m	Hg-195m	W -168	Te-121m
					Sn-121m	Dy-157m	Ho-164m		
37.9	1.0E-04	a Fr-223	B-	21.8 M	Zr-104	Ta-173	Ir-185	Yb-164	Ho-155
38.19	0.16	a Pa-231	A	3.276E+4 Y	Sm-156	Ta-169	Au-193m	Ho-162m	Tm-159
38.9	0.11	a Th-231	B-	25.52 H	Te-112	Pu-239	Rh-105	Xe-142	Tc- 95m
					Os-190m	Ir-190m2	Gd-162	Ir-194m1	Lu-165
39.73	2.4E-03	a Pa-231	A	3.276E+4 Y	Ho-155	Sr- 79	Ho-159m	Hg-193m	I -129
					Cs-129	Pd-103	Eu-152m2	Ru-103	Rh-103m
39.86	1.06	t Bi-212	A	60.55 M					
39.97	0.013	a Pa-231	A	3.276E+4 Y	I -130m				
40.2	0.024	a Th-227	A	18.72 D	Pa-229	Y - 45	Fr-212	Rn-208	Nd-136
					Cu- 58	Au-181	Mo- 99	Fm-255	Eu-155
41.4	0.03	a U -235	A	703.8E+6 Y	Sb-118m	Zn- 62	Yb-164	Nb- 94m	Ce-144
					Ca- 47	Zr- 84	Ag-115m	Hf-184	
41.55	0.016	a Th-231	B-	25.52 H	Nd-135	Bk-248m	Fm-252	Tb-153	
41.82	0.012	u Pa-234m	B-	1.17 M	Es-253	Pu-243	Os-191	Ir-191m1	Lu-172m
41.82	2.5E-04	u Pa-234	B-	6.70 H					
41.96	0.06	a U -235	A	703.8E+6 Y	Zn- 72	Ac-231	Cm-245	Pt-188	Np-241
					Cf-246	Cf-247	Tm-160m	Yb-160	
42.11	--	t Pb-212	B-	10.64 H	Rb-100m	Pd-100	Am-242		
42.16	0.039	a Th-227	A	18.72 D					
42.22	0.052	a Th-231	B-	25.52 H	Pu-243	Sr- 83			
42.46	9.0E-03	t Ac-228	B-	6.15 H	Yb-178	Pa-229			
42.48	6.0E-03	a Pa-231	A	3.276E+4 Y	Hg-181	Es-254	Sn-126		
42.86	0.058	a Th-231	B-	25.52 H	Mo- 90	Pu-237	Am-241	Bk-250	Fm-254
					Cm-244	Mo-102	Cf-250	Am-245	Am-240
43.05	7.0E-03	a Pa-231	A	3.276E+4 Y	Am-244m	Am-244	Es-253	Ac-224	Pm-253
					Am-243	Ir-194m1			
43.5	1.3E-03	u Pa-234m	B-	1.17 M	Bk-248m	Cf-252	Pu-237	Am-241	Pu-238
43.5	2.0E-04	u Pa-234	B-	6.70 H	U -239	Am-243	La-125		
43.8	0.264	a Th-227	A	18.72 D	Pt-200	Cm-249	Sm-139m	Dy-168	Ho-161
					Pu-246	Ge- 66	Hf-184		
44.08	7.0E-04	a Th-231	B-	25.52 H	Fr-225	Fm-251	Yb-157	Cm-242	
44.1	7.3E-03	a Th-227	A	18.72 D	U -240				
44.15	0.065	a Pa-231	A	3.276E+4 Y	Pu-241				
44.4	1.6E-02	a Th-227	A	18.72 D	I -134m	Nd-152	Tm-177	Lu-170m	Am-242
					Np-236m	Yb-162	Cm-243	Lu-174m	
45.34	0.034	a Th-231	B-	25.52 H	Zr- 84	Pu-242	Es-254m	Ba-125	Fr-220
					Tb-143	Ir-179	Np-236	Pu-240	Np-236m
					Tb-155	Au-194m1	Ho-155	Hf-163	
45.45	4.3E-05	u Pa-234	B-	6.70 H	Br- 76m	Kr- 76	Er-158	Tm-161	Sn-128

Energy 46.3 ~ 59.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
46.35	0.223	a Pa-231	A	3.276E+4 Y	Pd-118 Br-82m Cd-101	Lu-181 Nd-154 Sm-153m	W-166 Se-72 Cs-147	Cs-122m1 Mo-104 Hf-164	Te-114 Pu-239
46.45	--	a Th-227	A	18.72 D	Ta-183	W-183m	Re-183		
46.54	4.25	u Pb-210	B-	22.3 Y	Zn-72	Os-191	Ir-191m1	Rb-78m	Tm-165
47.91	--	t Pb-212	B-	10.64 H	Ho-155 Es-256m	Ru-92	Pu-236	Hf-170	Hf-184
48.3	9.3E-03	a Th-227	A	18.72 D	La-145	Se-86			
48.5	0.047	a Th-227	A	18.72 D	Lu-170m				
48.56	--	t Pb-212	B-	10.64 H	Cs-141	Am-242m1	Br-71	Am-239	Br-80m
49.55	0.064	u U-238	A	4.468E+9 Y	Zn-74 Cm-243 Ta-171	U-240 Tb-151m Ir-173	Pu-235 Dy-151 Ir-173m	U-236 Se-68 Tb-156m1	Am-242m1 Se-70
49.89	0.038	a Fr-223	B-	21.8 M	Te-132	Pd-118	Au-199	W-174	Pr-147
49.89	0.558	a Th-227	A	18.72 D	Mo-104	Re-186m	Au-181	Fm-253	
50.13	0.497	a Fr-223	B-	21.8 M	Es-254m	Rn-208	Tb-165		
50.13	7.88	a Th-227	A	18.72 D					
50.84	--	a Th-227	A	18.72 D	Au-198m	Ac-231	W-176	Eu-159	Hf-182m
50.9	1.5E-03	a Pa-231	A	3.276E+4 Y	Eu-159	U-237			
51.22	0.02	a U-235	A	703.8E+6 Y	Ho-160m2	Cs-130m	Au-187	W-172	Fm-251
52.73	0.085	a Pa-231	A	3.276E+4 Y	Dy-157m Rh-96m Sr-98 Sn-134	Pu-239 W-171 Sn-106 La-132m	Pa-230 Zn-74 Ta-183	Es-253 I-117 W-183m	Er-156 Re-183
52.91	--	t Pb-212	B-	10.64 H	Lu-181	Er-157			
53.2	0.123	u U-234	A	2.455E+5 Y	Pm-155	Pt-197m	Ba-133	Th-225	
53.23	1.2	u Pb-214	B-	26.8 M	Ru-103	Pd-103	Hg-195m		
53.44	--	c Ge-73m	IT	0.499 S	Ce-144	W-171	As-73	Xe-118	Ge-73m
54.1	<2.0E-03	a U-235	A	703.8E+6 Y	Cm-245 Ba-148	Cs-124m	Ga-65	Mo-106	Ru-110
54.2	--	a Th-227	A	18.72 D	Bi-204m2				
54.25	<0.03	a U-235	A	703.8E+6 Y	Gd-153	La-148			
54.6	0.077	a Pa-231	A	3.276E+4 Y	Dy-166	Tm-165			
54.61	--	x Hf Ka2			Tb-157	Eu-157	Na-29	Pd-94	Te-114
54.96	<1.5E-05	u Pa-234	B-	6.70 H	Cf-249	Pt-188	Xe-125		
55.03	9.7E-04	a Ac-227	A	21.773 Y	Mo-104	Ba-125	Pt-178	Fm-251	Es-253
55.45	4.3E-05	u Pa-234	B-	6.70 H	Re-184m	Sm-135	Am-243	Os-182	Zr-83
55.79	--	x Hf Ka1			Am-241 Zr-99	U-242 Pd-100			
56.	9.3E-03	a Th-227	A	18.72 D	Sm-153	Ba-148	Ba-127m	La-127m	Ra-221
56.55	9.9E-05	a Fr-223	B-	21.8 M	Gd-161	Pu-241	Ru-92	In-121	Ga-74m
56.55	0.097	a Th-227	A	18.72 D	Pa-236	Zn-74	La-136m	Ho-159	
56.72	--	t Pb-212	B-	10.64 H	Ho-164m	Ir-192m1			
56.76	6.1E-03	a Pa-231	A	3.276E+4 Y	Pu-241				
56.84	--	u Pb-214	B-	26.8 M	Au-195m	Cm-245	Pu-239		
56.96	0.019	t Ac-228	B-	6.15 H					
57.19	0.030	a Pa-231	A	3.276E+4 Y	Tm-167	Th-223	Br-76m	Tb-161	Am-239
57.75	6.6E-03	u Th-234	B-	24.10 D	Ce-143 Hf-180m	Pr-151	Xe-127	Te-127	Te-127m
57.77	0.47	t Ac-228	B-	6.15 H	Er-151m				
58.2	1.4E-05	u Pa-234	B-	6.70 H	U-232	Dy-165m	Ho-162m	Am-241	Fm-255
58.57	0.48	a Th-231	B-	25.52 H	Sm-153m Ba-123	Gd-159	Dy-159	Lu-163	Cs-124m
59.19	5.1E-05	u Pa-234	B-	6.70 H	Ce-133	Mo-108	Ce-127	Fm-255	Np-235
59.6	8.7E-05	a Fr-223	B-	21.8 M	Fe-60 Tb-152m Lu-174m Rn-227	Co-60m Re-186m Hf-182m	Xe-117 Ho-168m Tm-159	Ce-144 Bi-196m2	Pr-144m Ho-161
					Pb-190	Pa-227	Tm-161	U-237	Pu-237

Energy 59.6 ~ 71.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
59.6	9.7E-03	a Th-227	A	18.72 D	Am-241	Er-172	Ga-74m	Ag-111m	Nd-156
					Pd-111	Rn-208	Ho-160m1	Er-160	Xe-118
60.5	6.5E-03	a Pa-231	A	3.276E+4 Y	Pt-200	Am-245	Es-255	Fm-255	Md-255
60.5	--	a U-235	A	703.8E+6 Y	Au-200m	In-121m	Sn-130m	In-121	Ir-195m
61	--	u Bi-214	B-	19.9 M	Hg-183	Cd-98	Hf-172		
61.44	--	a Fr-223	B-	21.8 M	Dy-157	Dy-157m	Fr-220	Zr-104	Ho-157
61.44	0.084	a Th-227	A	18.72 D	Sm-145	W-176	Pm-148m	Ar-45	Zn-60
					Sb-122m	Au-195m	Hg-195	Np-239	Ba-148
					Sm-155	Fm-257	Xe-122	Cs-123m	Nd-133m
					Ir-177				
62	--	a Th-227	A	18.72 D	W-174	Ge-75m	Ge-65	Rn-206	Hf-163
62.45	2.5E-04	a Fr-223	B-	21.8 M	Cr-49	Pd-103			
62.45	0.188	a Th-227	A	18.72 D					
62.5	--	u Bi-214	A	19.9 M	Ce-145				
62.7	--	u Pb-214	B-	26.8 M	Tm-173				
62.7	2.5E-03	u Pa-234	B-	6.70 H					
62.7	1.2E-03	u Pa-234m	B-	1.17 M					
62.86	0.021	u Th-234	B-	24.10 D	Ir-194m1	Cd-124	Kr-74	Yb-167	Cd-126
					Kr-73	Os-172	Pt-186	Ra-230	Es-254
					Yb-169				
63.2	0.055	a Ra-223	A	11.435 D	I-119	Sn-130m	Ba-125	Yb-169	Po-204
63.29	4.84	u Th-234	B-	24.10 D	Co-65				
63.65	0.05	a Pa-231	A	3.276E+4 Y	Tm-155m	Po-208	Rn-224	W-188	Re-188m
63.81	0.263	t Th-232	A	14.05E+9 Y					
63.86	0.023	a Th-231	B-	25.52 H	Ba-123	Eu-157	Ag-105	Cs-123m	Bi-208m
64.31	0.036	a Th-227	A	18.72 D	Mo-105	Fr-227	Sn-126		
64.37	0.04	a U-235	A	703.8E+6 Y	Es-252	Zr-102	Pm-154m	Ho-169	Ir-187
64.94	--	x Hf Kb2			Pa-229	Pr-131m	U-237	Cs-124m	Br-73
					Tb-152m	Re-181			
65.12	5.4E-04	a Fr-223	B-	21.8 M	Ge-66				
65.42	0.077	a Pb-211	B-	36.1 M	Ir-181	Au-187	Hg-185m	Ir-187	Os-179
					Dy-155	Te-121	Sn-119m	Mo-107	Mo-108
66.2	6.1E-03	a Th-227	A	18.72 D	W-185m	Ba-145	Cf-249	Ge-75	Se-75
					U-229	Ba-127	Ho-145		
66.4	7.3E-03	a Th-227	A	18.72 D	Se-69	U-240	Rb-77	Cd-104	Pu-246
					Lu-171	Tm-171			
67.25	5.8E-05	u Pa-234	B-	6.70 H	Cs-136	Tm-162m	Am-242m1	Er-157	Pu-243
					Se-73m	Se-73	Pm-145	Ho-158m1	Os-183m
67.67	0.377	u Th-230	A	7.538E+4 Y	Ag-119	Cu-61	Co-61	Nd-155	
					La-125	Pr-184	Ac-226	Pa-227	U-242
					La-129m				
67.81	--	u Th-230	A	7.538E+4 Y	Ta-182	Re-182m	Mo-108	Eu-159	Pa-229
					Am-239	Re-182	Ti-44	Sr-102	Dy-165m
					Nd-154	Hf-172	At-206	Ru-109	Ir-189m2
					Er-172				
68.5	5.7E-03	a Th-231	B-	25.52 H	Eu-154m	Th-223	Cd-153	Hf-169	Cs-121m
68.72	0.053	a Th-227	A	18.72 D	Rn-211	Lu-183			
68.89	--	x Hg Ka2			Ga-73	Mo-104	Tc-109		
69.16	--	x Hf Kb1			Yb-165	Ba-144	Au-194m2		
69.21	6.5E-03	a Ac-227	A	21.773 Y	Xe-141	Tc-109			
69.46	2.8E-05	u Pa-234	B-	6.70 H	Tm-163				
69.8	9.7E-03	a Th-227	A	18.72 D	Yb-157	Re-189	Ir-189		
					Sm-153	Gd-153	Mo-104	Ta-173	Ta-185
					Es-254	Sn-129m	Pd-119	Hf-172	Sn-130
70.5	7.0E-03	a Pa-231	A	3.276E+4 Y	Es-254	Pd-111	Pd-111m	W-177	Es-252
70.82	--	x Hg Ka1			Pt-184	Pr-154			
70.83	--	x Ti Ka2							
71.1	--	u Bi-214	B-	19.9 M	Hf-163	Lu-171m	Es-254m	Os-185	Hg-183
71.9	1.9E-03	a Pa-231	A	3.276E+4 Y	Pd-117m	Ca-50	O-22	Pu-241	Lu-177
					Mo-107	Er-174	Fr-212	La-136m	Er-158

Energy 72.7 ~ 83.7 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
72.7	= 0.11	a U -235	A	703.8E+6 Y	Po-199m Nd-154 Se- 68	Ra-230 Lu-171 Xe-120	Ba-148 Pm-145 Pr-152	U -230 Xe-122 Au-181	Ac-226 Pr-145 Rn-210
72.72	3.7E-03	a Pa-231	A	3.276E+4 Y					
72.75	0.251	a Th-231	B-	25.52 H					
72.81	--	x Pb Ka2			Ba-127	Pr-131			
72.87	--	x Tl Ka1			Xe-142				
72.9	0.027	a Th-227	A	18.72 D	Hf-169	I -133m	Cf-251	Os-193	Hf-183
73.62	0.019	a Th-227	A	18.72 D	Am-242m1	Tb-164	No-164	Ru-108	
73.72	= 0.01	a U -235	A	703.8E+6 Y					
73.92	0.017	u Th-234	B-	24.10 D	Mg- 22				
73.92	0.013	u Pa-234m	IT	1.17 M					
74.15	0.024	a Pa-231	A	3.276E+4 Y	Yb-158				
74.4	4.0E-04	t Th-228	A	1.9116 Y	Ba-147 Ho-161	Ir-187	Os-191m	Ac-224	Tb-161
74.82	--	x Bi Ka2			U -239	Am-243	Pd-100	In-109	
74.97	--	x Pb Ka1			Rh-100m	Pa-227			
75.	5.9E-05	u Pa-234	B-	6.70 H	Tb-149m	Fm-257			
75.02	0.06	a U -235	A	703.8E+6 Y	Ir-187				
75.15	0.022	a Th-227	A	18.72 D	Sn-128	Eu-160	Fr-225	Pa-229	Th-223
					Ir-177	Sm-153	Gd-153	Sm-159	Ru- 94
					Pu-246	Cs-147	Pm-148m	W -172	Hg-186
					Pm-156	Lu-171	Zn- 76		
76.86	--	x Po Ka2			Sb-122m	Pm-147	Eu-147	Re-177	Pt-200
					Tm-174	Lu-174	Lu-174m	Mo-105	Sm-143m2
					Pd-117	Sm-157	Ce-133m		
77.11	--	x Bi Ka1			Nb- 88	Sn-113m	Ho-172	Pt-197m	Pu-241
					Sm-135	Pt-199			
77.34	0.026	t Ac-228	B-	6.15 H	Eu-152m2	Sn-129m	Pt-197	Au-197m	Hg-197
77.34	0.073	a Pa-231	A	3.276E+4 Y	Hg-197m	Gd-161	Tb-161	Ho-161	Fr-225
77.8	0.13	a Th-231	B-	25.52 H	Ba-142	Ba-125	Yb-159	Au-185	Hg-186
					Hg-189gm	Yb-161	Ti- 44		
78.95	--	x At Ka2			Ru-111	Eu-159	Pb-190	Lu-173	Sm-155
					Ho-170m	Tm-170	Lu-172	Tm-172	Hf-166
					Ho-171				
79.29	--	x Po Ka1			Ag-108m	Y - 81	Cm-245	Ho-167	Nd-154
					Dy-159	Au-181	Te-134	Eu-158	
79.72	0.126	a Fr-223	B-	21.8 M	Gd-159	Tb-158	Ba-133	Xe-133	Re-177
79.72	1.87	a Th-227	A	18.72 D					
79.84	9.9E-05	u Pa-234	B-	6.70 H	Mo- 88	Tm-168	Ho-168	Cs-138m	
80.11	--	x Hg Kb1			Pa-227	Xe-121	Xe-140	Yb-165	Ce-144
					Fm-257	Ir-193m	Ag-101	Ba-130m	Cs-130m
81.	0.045	a Pb-211	B-	36.1 M	Ho-166	Tm-166	Ho-166m	Tb-162	Ho-162m
					Dy-153	Es-254	Fm-255	Mo-101	Xe-133
					Ac-226	U -230			
81.07	--	x Rn Ka2			Rh-113	Te-131m			
81.23	0.89	a Th-231	B-	25.52 H	Cs-122m1	Np-235			
81.52	--	x At Ka1			Fm-255	Ta-173	Ta-175	Os-176	Ag-119
82.	=1.2E-03	a Ac-227	A	21.773 Y	Te-121m	Zr- 99	Xe-141	Ba-144	Ag-116m
					Pm-154m	Pm-154			
82.09	0.4	a Th-231	B-	25.52 H	Zn- 76	Yb-176m	Lu-176m	U -231	Tm-176
82.42	--	x Tl Kb1			Es-250	Sn-131gm	Yb-166	Ru-112	Os-194
					Ce-135m	Pt-191	Os-191	Ir-191m1	
82.47	--	x Hg Kb2			Dy-166	Tc-105	U -240	Pr-135	Hg-188
83.	4.2E-04	u Tl-210	B-	1.30 M	Tb-153	Cs-130m	Cr- 56	Tc- 94	Nd-153
					Ac-224	Dy-157	Pt-187		
83.23	--	x Fr Ka2							
83.3	0.079	u Th-234	B-	24.10 D	Re-184m	Cs-123	Pr-151	Pm-153	Sm-153
					Cr- 57	Mo-103	Er-157	Cd-104	Ho-167
83.79	--	x Rn Ka1			Ac-223	Nd-154			

Energy 83.8 ~ 94.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
83.8	0.058	a Pb-211	B-	36.1	M	Te-114	Se- 73m	Pd-100	Pu-243	Bk-247
84.21	6.6	a Th-231	B-	25.52	H	In-109	Fr-212	W -176	U -231	Np-235
84.37	1.22	t Th-228	A	1.9116	Y	Lu-170	Ir-194m1	Re-177	Fr-224	Tm-161
						Ir-189m2				Ac-224
84.77	—	x Pb Kb1				Cu- 68m	Nd-156	Pt-178	Au-183	Au-196m1
						Re-182m	Re-182	Sn-130m	Re-183	Os-177
84.87	—	x Tl Kb2				Tm-159	Rh-113	Pb-197m	Bi-197	Tc- 92
85.43	—	x Ra Ka2				Cs-147	Gd-141m	Tb-141	Nb-105	W -188
						Ru-110	Ba-125	Pt-177	Sn-132	
85.8	5.8E-03	a Th-231	B-	25.52	H	Ge- 64	Cs-121			
86.11	—	x Fr Ka1				Eu-155	Rb- 81m	Ir-179	Cs-136	Mo-108
						Ba-148	Th-233	Eu-155	Gd-155m	Tb-155
87.02	0.019	u Th-234	B-	24.10	D	Pr-147	Am-242m1	Am-243	As- 69	Tb-160
						Sn-126	Mo-104	Pm-137	Dy-157m	
87.17	—	x Bi Kb1				Co- 63	Nd-155	Ce-137m		
87.3	—	x Pb Kb2				Re-186m	Te-136	Xe-119	Au-181	Lu-169
						Hg-183				
87.68	—	x Ac Ka2				Cr- 47	Ir-183	Lu-165	Sn-126	Sm-156
						Ru-114	Dy-165m	Tm-168	Lu-168m	Pr-131m
88.2	0.017	a Pb-211	B-	36.1	M	Ir-177				
						Ce-133	Tb-161	Th-223	Th-233	Ag-109m
						Pd-109	Ru-113	Tm-155	Tm-155m	Ru-110
						Sb-113	Te-127m			
88.35	13.25	Lu-176	B-	3.78E10	Y	Ta-176	Lu-176m	Kr- 75	Tb-156m2	
88.47	—	x Ra Ka1				Au-189	U -229	Sr-100	Te-123m	Zn- 72
						Lu-178m	Hf-178m2	Hf-178m1	Ta-178m1	Eu-156
89.62	—	x Po Kb1				In-130	In-130m2	Pd-115m	Hf-175	Sm-153
						Tc- 99	Cs-124m	Ne- 25	Cm-245	Tc- 99m
89.78	—	x Bi Kb2				Kr- 74	Ir-172	Cd-117	Rh- 99	Sb-120m
						W -172	Eu-152m2			
89.95	0.94	a Th-231	B-	25.52	H	Ar- 32	In-120m2	Ce-147	Au-181	
89.96	—	x Th Ka2								
90.	—	a Th-227	A	18.72	D	Bi-198m1	Fr-227	Nd-134	Te-114	Ir-177
						Pt-178				
90.89	—	x Ac Ka1				Xe-122	Cr- 49	Lu-172	Ga- 79	Rb- 99
						Ce-148	Mo-104	Pd-116	Xe-119	Ta-174
						Sn-128m	Cu- 67	Ga- 67	Ru-108	Ho-164
						Tm-164				
92.	—	u Th-234	B-	24.10	D	Pm-153	Hg-184	Pt-178	Yb-153	Ir-173
						Pt-177	Co- 55	Ba-145		
92.11	—	x At Kb1				Ra-230				
92.28	—	x Pa Ka2				Rb-101	Ta-171	Np-235		
92.32	—	x Po Kb2								
92.38	2.81	u Th-234	B-	24.10	D	Re-188m	La-123	Rn-227	Cf-249	
92.8	2.77	u Th-234	B-	24.10	D	Ba-123	Pt-184	Ac-223	Rb-101	Ce-147
93.02	0.045	a Th-231	B-	25.52	H	Mo-103	Cs-147	W -172	Bi-204m2	U -228
						Ge- 81	Ce- 81m	Ra-221	Ag-107m	Cd-107
						Lu-178m	Lu-178			
93.35	—	x Th Ka1				Hf-178m1	Hf-178m2	Ta-178m1	Mo-102	Pt-179
						Ga- 67	Lu-180	Cs-129	Hf-180m	Ta-180
						Rb- 91				
93.93	5.4E-04	a Fr-223	B-	21.8	M	Te-116	Ir-181	Kr- 74	Cm-245	Sr-102
93.93	1.35	a Th-227	A	18.72	D					
94.	0.4	a U -235	A	703.8E+6	Y	Ho-164m	W -189	Au-181	Er-161	
94.3	0.012	a Pb-211	B-	36.1	M	Lu-163	Er-173	Ho-149m	Pt-189	
94.65	—	x Rn Kb1				Ba-123	W -185m	Cs-123m	Th-233	Dy-165
94.65	—	x U Ka2								
94.9	—	x At Kb2				Nb-105	W -176	Re-177		
94.9	0.011	a Th-227	A	18.72	D					

Energy 95. ~ 105.2 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
95.	0.018	a Pb-211	B-	36.1 M	Mo-103	Pa-228	Ha-258	Ir-189	Ta-172
95.7	0.37	a U -235	A	703.8E+6 Y	As- 79	Xe-121	La-136m	Eu-159	Se- 79m
95.86	--	x Pa Ka1			Sr-100				
96.	--	a Pa-231	A	3.276E+4 Y	Dy-165m	N - 19	Pd-113	Xe-119	Yb-176m
					Cf-246	Fm-257			
96.09	0.086	a U -235	A	703.8E+6 Y					
96.1	0.066	a Th-227	A	18.72 D	Tc-109	Fm-252	Es-254m	Eu-141m	Gd-141m
96.84	0.095	a Pa-231	A	3.276E+4 Y	Tc- 97m	Pt-191	In-130m1	Cs-124m	Ba-145
					Se- 75	Ag-111	Tl-194m		
97.	8.3E-04	u Th-210	B-	1.30 M					
97.17	3.8E-04	u Pa-234	B-	6.70 H	Zr- 83	Rh-117	Pd-117m	Th-223	Rh-104m
97.25	--	x Fr Kb1			Ce-133m				
97.3	0.012	a Pb-211	B-	36.1 M	Cs-123	Cd-102	Ir-185		
97.53	--	x Rn Kb2			Sm-153	Gd-153	Ir-179	Fr-212	
97.55	0.023	a Th-231	B-	25.52 H	W -166	Ra-232	Nb- 99	Nb- 99m	Ce-152
					Hf-182m	Hf-182m	Hf-182	Se- 69	
98.43	--	x U Ka1			I -132m	Ho-161	Ag-101m	Cd-101	Pm-135m
					Ba-148	Am-243	Ce-146	Hf-170	Ac-223
					Pu-239	Ir-195	Ir-195m		
99.28	0.12	a Th-231	B-	25.52 H	Cm-244	Au-195	Ho-158gm	Lu-181	Pt-195m
					Am-240	Tb-158	Pu-237	Am-241	Ce-148
					Ta-183	W -183m	Re-183	Fm-254	Bk-250
					Am-246	Np-235	Re-186m	Am-244	
99.51	1.26	t Ac-228	B-	6.15 H					
99.6	--	a Th-227	A	18.72 D	Lu-183	Dy-153			
99.85	5.1E-03	u Pa-234	B-	6.70 H	Sb-116m	Pt-179	Pa-238		
99.85	5.0E-04	u Pa-234m	B-	1.17 M					
99.89	--	x Ra Kb1			Rn-221				
100.	9.1E-03	a Ac-227	A	21.773 Y	Ce-144	Xe-119	Er-163	Ir-195m	Pm-151
					Re-182	Fr-227			
100.21	--	x Fr Kb2			Ta-182	Re-182m	Sm-158	W -176	Ir-179
100.27	0.075	a Th-227	A	18.72 D	Sb-111	Er-151			
100.41	0.093	t Ac-228	B-	6.15 H	Er-174	Ge- 79	Nd-136	Ho-159	
100.84	0.03	a Pa-231	A	3.276E+4 Y	Hf-180m	Xe-141	Lu-173	Cd-121m	Ir-185
					Dy-149	Ta-170			
100.89	2.0E-04	u Pa-234	B-	6.70 H	Ce-146	Eu-154m	Zr-104	Ra-230	Nd-154
					Y - 81	Rh-115	Dy-147m	Au-187m	Pd-116
					Hg-193m	Kr- 72	Pt-178	Sr- 76	Au-200m
102.27	0.41	a Th-231	B-	25.52 H	W -179m	Ba-128	Fr-227	Hg-192	Np-238
					Zr-102	Nb-105	Tm-162	Th-162m	Re-171
					At-200m1	At-200m2	Te-131m	Ir-183	Np-235
102.5	--	a Th-227	A	18.72 D	Gd-161	Es-252	Lu-166	Lu-166m2	Lu-166m1
102.59	--	x Ac Kb1			W -183m	Ir-181			
102.6	< 0.014	a Pa-231	A	3.276E+4 Y	Nb-103				
102.95	--	x Ra Kb2			Br- 76m	Tc-107			
					Zn- 72	Cd-126	Np-236	In-124m	Pu-237
					Te-116	Ce-134	Sm-156	Se- 81m	Ho-161
					Xe-114	Bk-245			
103.35	4.2E-03	u Th-234	B-	24.10 D	Sm-153	Gd-153	Kr- 76	Rb- 78m	Ir-196m
					Sb-132	Hg-187gm	Pa-238	Th-225	Pu-242
103.71	--	u Th-234	B-	24.10 D	Re-180	Ho-170	Ta-180	Pt-200	Pu-241
					Ho-172	Lu-165			
103.77	3.8E-04	u Pa-234	B-	6.70 H	In-122m2	In-122m1	Te-121m	Ba-144	Ho-155
104.2	0.019	a Ra-223	A	11.435 D	Es-254m	Rn-227	At-209	Te-112	Np-236m
					Pu-240	Ta-175			
104.4	--	u Bi-214	B-	19.9 M	Sn-108	Sa-155	Th-163	Es-254m	As- 67
					Ye-116	Tm-177	Yb-177m	Sm-135	Ra-213m
					Nb- 91m	Re-184m	La-129m		
105.2	--	a Th-227	A	18.72 D	Pm-151	Sr- 79	Zr- 83	Nd-133m	Nd-133
					Ba-147	Ce-148	Ra-232		

Energy 105.3 ~ 118.1 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
105.33	--	x Ac Kb2			Eu-155	Tb-155	Lu-177m	Hf-177m1	Nd-153
105.74	--	x Th Kb1			Au-200m	Te-129m			
105.81	7.1E-03	a Th-231	B-	25.52 H	Cd-119m	Zn-77	Yb-157	Lu-181	
106.	--	a Pa-231	A	3.276E+4 Y	Pr-151	W-188	Br-77m	Kr-77	Tm-161
					Xe-141	Re-188m	At-210	Fr-220	Tb-161
					Cm-243	Yb-167	Mo-108	Dy-149	Pt-179
106.61	0.017	a Th-231	B-	25.52 H	Tc-107	Pt-187	Gd-151	Tb-152m	
106.68	5.8E-05	u Pa-234	B-	6.70 H					
106.78	0.023	a Ra-223	A	11.435 D	Pd-98				
106.79	1.3E-03	a Ac-227	A	21.773 Y					
106.85	< 0.03	a Th-231	B-	25.52 H	Rb-90m	Ir-182	Pa-227	Os-193	
107.22	0.015	u Pb-214	B-	26.8 M	Ag-96	Fr-225	Cd-98	Ho-160m2	Lu-184
107.75	8.4E-03	a Th-227	A	18.72 D	Cs-138m	Ir-181	Eu-143	Ta-185	W-185m
108.	0.011	u Th-234	B-	24.10 D	Pm-154m	Ta-183	W-183m	Re-183	Tc-105
108.14	--	x Th Kb2			La-131	Tb-151	Ac-224	Dy-165m	Pm-157
108.58	--	x Pa Kb1			Nd-137m	Rn-221	Rn-224	Ba-131m	Pr-149
					Yb-180	Ho-153	Kr-91	Ru-97	Ho-153m
109.16	1.54	a U-235	A	703.8E+6 Y	Nd-136	Re-176	Pu-236	Pu-243	Te-125m
109.6	6.1E-03	a Th-227	A	18.72 D	Pb-200	Ge-79	Ge-79m	Am-242m	Cs-147
109.9	--	c F-19	NN		Tb-153	Er-169	Yb-169	La-123	Hg-186
110.	6.0E-05	u Th-230	A	7.538E+4 Y	Ne-19	Re-181			
					Pt-187	Pa-227	Ir-192	Ra-213m	Ra-213
110.65	7.9E-05	a Fr-223	B-	21.8 M	Sm-134	Au-193	Tb-158m	Fr-225	
110.65	--	a Th-227	A	18.72 D	Tm-157	Ge-80	Pd-115	La-129	Dy-149m
110.86	0.058	a Ra-223	A	11.435 D	Th-236				
111.00	--	x U Kb1			Eu-145	Tl-194m	Fr-222	Au-200m	Th-226
					Re-184	Re-184m			
111.49	--	x Pa Kb2			Cu-68m	Xe-125m	Er-149m	Tm-149	Ba-144
					Lu-168	Es-256m	Rn-221	Rb-101	Sm-139m
112.6	8.5E-03	a Th-227	A	18.72 D	Ir-194m2	Te-132	Lu-174m	In-126m	Sm-139m
					Pd-98	Cs-125	Pt-184m		
					Cr-59	Zn-72	Br-75	Hg-186	Ru-110
					Ir-194m1	Cr-48	Lu-168	Re-174	Cs-145
					Cs-138m	Au-193	Tm-161	Xe-140	Nd-135
112.81	0.277	u Th-234	B-	24.10 D	U-236	Ta-177	Lu-177m	Lu-177	Hf-177m1
113.16	0.655	a Th-227	A	18.72 D	Tb-144m	Nd-155	Yb-159	Gd-141m	Tb-141
					Yb-167				
113.5	0.01	u U-238	A	4.468E+9 Y	Rb-109	Rn-224	Ag-115m	W-172	Ba-140
					Th-223	Re-182	Ir-189m2	Yb-175	Hf-175
114.45	--	x U Kb2			Pt-189	Nd-139m	Nd-139	Tm-159	
					Pu-241	Mo-93m	U-229	Hf-172	Au-193
					Hf-182m	Nd-149	Hf-182	Y-81	Os-183m
					Sm-159	Os-183			
114.5	9.0E-03	a Ra-223	A	11.435 D	Rh-101	Re-183m			
114.56	9.8E-03	t Ac-228	B-	6.15 H	Pd-116	Ir-177	Gd-146	Ba-127	Ce-152
115.18	0.592	t Pb-212	B-	10.64 H	C-18	W-172	Ba-144	Ag-121	W-177
					Sb-134m	Yb-156	Yb-157	Au-183	Au-198m
115.45	0.07	a U-235	A	703.8E+6 Y	Y-81	Gd-146			
115.63	1.0E-03	a Th-231	B-	25.52 H	Pa-229	Sb-115	W-177	Nd-134	Lu-177m
116.82	0.021	a Th-231	B-	25.52 H	Os-182	Cd-102	Eu-141m	Ru-110	Ba-123
					Pu-239	Te-132	Nd-138	Ru-109	Ag-123
					Yb-167	Er-171	Xe-117	Rh-113	Nd-151
117.2	0.167	a Th-227	A	18.72 D	Pa-229	Eu-152m1			
117.5	0.012	a Th-227	A	18.72 D	Ac-229	Pm-156	Nd-154	Gd-143m	Am-243
118.16	0.094	u Pb-214	B-	26.8 M	La-147	Pa-230			
					Os-174	Os-181	Yb-165	Os-181m	Er-169
					La-145	Pm-133	Xe-140	Mo-108	Ho-160m2
					Y-100	Er-173	Hg-199m	Xe-141	Yb-162
					Mo-89m	Ba-140	Sm-134	Au-181	Pa-229

Energy 120.3 ~ 134.4 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
120.35	= 0.026	a U -235	A	703.8E+6 Y	Sr- 98 Tm-159 Xe-118 Tl-196m C - 16	Zn- 78 Tb-147 Re-179 Hf-170 Nd-147	Ac-223 Y - 81 Zr-103 Au-200m Hf-177m2	Dy-165m Pm-153 Ba-123 Fe- 61 In-128m	Kr- 75 Ir-184 Fr-210 In-124m Sr- 99
120.9	0.034	u U -234	A	2.455E+5 Y	Lu-165 As- 67 Ho-159 Ba-146	Au-181 Sm-140 Se- 75 Eu-147	Ir-189m2 Pa-229 Ge- 75m Sm-157	La-123 W -175	
121.53	2.1E-03	a Ac-227	A	21.773 Y	Pm-147	Eu-147	Er-157	Zn- 71m Zn- 71	
122.06	--	c Fe- 57	NN		Lu-177m Pm-152m1	Y - 99 Pm-152	Eu-152m1 Eu-152		
122.32	1.19	a Ra-223	A	11.435 D	Hf-171 Sr- 96 W -172	W -185m Sn-106 U -229	Mn- 57 Ta-186 Re-186	Co- 57 Mo- 90 As- 67	Hf-164 Er-173 Yb-177
123.5	--	t Pb-212	B-	10.64 H	Br- 71 Hf-172 Ir-172 Lu-179	Hg-195m Rh-111 Yb-163 Sm-136	Lu-179 Eu-154 Lu-164 Ba-123	Tb-154m2 Re-172 Ir-181	Tb-154m1 Re-172m
123.52	9.7E-03	a Th-227	A	18.72 D	Hf-169	Ag-123	Hf-173	Cd-104	Er-155
124.1	--	t Bi-212	A	60.55 M	Ba-131	Ta-168	Er-171	Y - 81	Fr-212
124.58	4.8E-03	a Pa-231	A	3.276E+4 Y	Kr- 72	Am-239	Ti- 52	Fr-220	Xe-127m
124.8	=2.4E-03	a Th-227	A	18.72 D	Cs-127	Pb-202m			
124.8	2.8E-07	u Th-230	A	7.538E+4 Y					
124.91	0.056	a Th-231	B-	25.52 H	Pd- 96	Tm-162m	Os-175	Hg-180	Pa-227
125.46	1.3E-03	u Pa-234	B-	6.70 H	W -174 Rb- 99 Pd-118 Tm-160	Lu-181 Yb-155 Pa-229 Hf-172	Pu-237 Os-177 In-123m Ta-175	W -185 Yb-162 Tc- 95 Cr- 55	Os-185 Br- 73 Tm-160m Cr- 58
					Pd-100 Hf-164 Ge- 64 Ac-224 Pm-135m	Nd-138 Rh- 94 Ru-114 Br- 83 Er-151m	Lu-174m U -240 Rb- 83 Tm-161	Os-196	Zr-103
					Fr-230 Hg-182 Tb-148m	Ba-129 Pu-239 Pt-195m	Ba-129m Pm-153 Kr- 77	Pa-228 Pt-191 Ir-195m	Ba-128 Os-191 Ir-195
130.	--	t Bi-212	B-	60.55 M	Rh-105m Au-195	Hg-190 Ru-105	Pt-195m Sr- 85	Ir-195m Sr- 85	Ir-195 In-130
					Kr- 85 Hf-164 W -173	Sr- 85m W -189 Au-197m	Pd-119 Pt-197m Hg-197m	Bk-251 Pa-228 Pr-150	Nd-154 Kr- 79m
130.59	0.119	a Rn-219	A	3.96 S	Nd-133 W -171	Er-174 Re-182	Ce-134 Os-182	Yb-169 Yb-163	Pa-227
131.2	5.5E-03	a Ra-223	A	11.435 D	Mo- 88	Fr-222	Th-226		
131.3	0.029	u Pa-234	B-	6.70 H	Pt-181	Ac-224	Re-171		
131.61	0.131	t Th-228	A	1.9116 Y	In-105 Tb-141 Ce-134	Ag-115m Th-236 Ho-159	Cs-130m Fr-224 Yb-167	W -185m Rh-117 In-132	Zr- 84 Pd-117m Eu-139
132.9	--	u Th-234	B-	24.10 D	Au-182 Cm-241 Ba-140 Rn-227 Np-241	Yb-160 Lu-165 Sn-104 Te-112 Dy-167	Kr- 75 Nb- 90 Cm-245 Yb-154	Fr-220 Nd-138 Hf-181 Au-200m	U -229 Xe-121 Hf-163 Re-171
= 134.	--	a Ac-227	A	21.773 Y	Er-156 W -179	Ce-144 Hg-197m	Ce-146 Tl-197	Ba-148 Cd-119	Ho-172
134.03	0.024	a Th-231	B-	25.52 H	W -187				
134.48	6.9E-03	a Fr-223	B-	21.8 M	Pr-133	Bi-195gm	Ag-103m	Cd-103	
134.48	0.028	a Th-227	A	18.72 D					

Energy 134.6 ~ 147.4 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
134.61 135.32	1.8E-04 4.3E-06	u Pa-234 u Pa-234m	B- B-	6.70 1.17	H M	Tc- 90m Hf-173 Pt-185gm Ag-117 Pt-193m	Ru- 92 Zr- 87m Au-201 Hg-190 Sb-116m	Nb- 87m Ir-197gm Ac-229	Hg-188 Am-242m1 Tl-201	Sr- 79 Kr- 94 Te-136
135.54 135.66 136.1	0.018 0.078 0.027	t Ac-228 a Th-231 a Ra-223	B- B- A	6.15 25.52 11.435	H H D	Zr- 86 Hg-192 Mo-102 Hf-181 Ho-155	Ba-129 Pt-200 Cm-245 W-181 Ir-172	Se- 70 Se- 75 Tc-103	La-132m Pd- 99 Kr- 79	Lu-161m Pt-182 Zr-102
136.47	---	c Fe- 57	NN			Ho-155 Ir-172	Ir-192	Co- 57	Mn- 57	
136.55 136.75	= 0.012 4.2E-03	a U -235 a Th-231	A B-	703.8E+6 25.52	Y H	W -174 Ru-111 Hf-181	Pd-114 Cm-249	Tb-141	Fm-257	Lu-177
137.23 137.23 137.45 137.91	4.7E-05 4.3E-05 6.0E-03 0.024	u Pa-234m u Pa-234 u Pb-214 t Ac-228	B- B- B- B-	1.17 6.70 26.8 6.15	M H M H	Ba-123 Ir-186 Rh-113 Au-196m2 Tc-109 In-118m2 Pr-149	Hf-171 Au-194m2 Dy-159 Nb- 99m In-130 Sm-155 Nb-103	Po-204 Au-200m Rh-101 Nb- 99 In-130m2 Fr-212 Cs-134m	Ir-186m Hg-190 Yb-175 Ho-156 Os-174 In-116m1 Cs-134m	Re-186 Ho-172 Cs-138 Bi-196m2
139.68	--	c Ge- 75m	IT	47.7	S	Nd-151 Yb-177 Pd-100 Sm-140 Yb-161	Os-193 Ru-110 Cd-100 At-210 Kr- 74	Hg-192 Tm-164m Tb-147 Fr-220	Es-252 Hf-173 Bi-208m Th-223	Hf-184 Ge- 75m Fr-225 Ir-189m2
140.15 140.15 140.54	1.3E-03 8.1E-04 7.1E-04	u Pa-234m u Pa-234 a Th-231	B- B- B-	1.17 6.70 25.52	M H H	Yb-160 Yb-179 Es-250 Pa-229 Zr-104	Pt-188 Pt-195m Rh-102m Fr-228 Ba-125	Cs-147 Pb-190 Ba-146 Rn-223 Ta-175	Mo- 99 Ac-224	Tc- 99m
140.76 140.88 140.91	0.22 0.021 4.9E-04	a U -235 t Th-232 u Pa-234	A A B-	703.8E+6 14.05E+9 6.70	Y Y H	W -188 Am-243 Ag-113m Sc- 46m Re-186 Cd-124 Yb-167	Am-243 Tc-107 Pb-190 Zn- 71m Zn- 74 Rb- 79 Dy-168	Cs-147 Ba-146 Rn-223 Ta-175	Mo- 99 Ac-224	Tc- 99m
141.02 141.3 141.49	0.05 4.0E-03 0.121	t Ac-228 u Pb-214 a Th-227	B- B- A	6.15 26.8 18.72	H M D	Rb- 97 Nb- 90 Xe-125m Er-148	Tl-201 Pt-189 Sm-155	Br- 75 Ce-146 Rn-227	Yb-152	Zn- 74 Xe-119
142. 142.4	1.3E-06 5.0E-03	t Th-228 a U -235	A A	1.9116 703.8E+6	Y Y	W -188 Ag-113m Sc- 46m Re-186 Cd-124 Yb-167	Am-243 Tc-107 Pb-190 Zn- 71m Zn- 74 Rb- 79 Dy-168	Cs-147 Ba-146 Rn-223 Ta-175	Mo- 99 Ac-224	Tc- 99m
143.1	---	a Ra-223	A	11.435	D	Re-186 Cd-124 Yb-167	Zn- 74 Rb- 79 Dy-168	Rn-209 Se- 71	Hf-182m	
143.76 143.78 143.87 144.1 144.23 144.39	10.96 5.1E-04 0.049 2.3E-05 3.22 0.012	a U -235 u Pa-234 u Th-230 a Fr-223 a Ra-223 a Pa-231	A B- A B- A A	703.8E+6 6.70 7.538E+4 21.8 11.435 3.276E+4	Y H Y M D Y	W -174 Dy-157 W -170 Rb- 98 Sr- 79	Am-243 Tm-161 Ra-222 Rb- 98m Yb-161	Cs-147 Pb-190 Ba-146 Rn-223 Ta-175	Mo- 99 Ac-224	Tc- 99m
144.94	---	t Bi-212	A	60.55	M	U -229 Sr- 77 Gd-141m Os-183 W -168	Zn- 72 Os-181m Tb-141 U -240 Tc-107	Ba-146 Yb-175 Sr- 76 Ce-141 Pd-118	Ce-149 Sn-130m Te-127 Nd-141 Po-199m	Te-125m Xe-127
145.06 145.85 145.94	5.8E-03 0.158 0.032	a Th-231 t Ac-228 a Th-231	B- B- B-	25.52 6.15 25.52	H H H	Gd-141m Os-183 W -168 As- 69 Rh- 94m Eu-159	Tb-141 U -240 Tc-107 Pt-182 Hf-179m2 Ac-229	Ba-146 Yb-175 Sr- 76 Ce-141 Pd-118 Pm-146 Pa-229	Ce-149 Sn-130m Te-127 Nd-141 Po-199m Ti- 44 Cm-239	Te-125m Xe-127
147. 147.48	-- 3.1E-03	a U -235 a Ac-227	A A	703.8E+6 21.773	Y Y	Kr- 77 Th-225 Re-189 Yb-165 Po-200 Sr- 81 Dy-157m	Y - 96 Y - 96m Lu-177m Pd-117 Pb-200 Mo-105 Pt-177	Y - 96m Tm-161 Kr- 72 Tc-111	Ta-182m2 Hf-171	
						Re-189 Yb-165 Po-200 Sr- 81 Dy-157m	Lu-177m Pd-117 Pb-200 Mo-105 Pt-177	Ta-185 Yb-158 Ir-177 Sn-104	Te-114 Ir-173m Hg-181 Mo-102	Se- 71 Ir-173 Au-196m2 Ag-103

Energy 149.8 ~ 166.4 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
149.88	1.2E-04	u Pa-234	B-	6.70 H	Cs-130m	Fr-225	Ra-221	Nd-136	W -175
					Xe-123	Sm-158	Te-131m	Te-131	Gd-149
					Ir-189m2	Sn-130	Pa-228		
150.16	3.0E-05	a Fr-223	B-	21.8 M	Rb- 77	Nb-105	Pd-228		
150.16	0.013	a Th-227	A	18.72 D	Rn-221	Pa-232	Sr-102	Cd-104	Ce-135m
150.93	0.076	a U -235	A	703.8E+6 Y	Tc-111	Nd-156	Er-157	Pu-233	Ru-108
					Lu-159				
					Dy-167	Zr-103	Sb-132m	Yb-177	Lu-163
					In-111	Cd-111m	Pm-254	Kr- 73	Kr- 85
					Kr- 85m	Sr- 85m	Pb-190	Th-225	Es-252
					Cu- 68m	Pd-100	Pd-118	Tm-155m	Nd-154
152.71	9.6E-03	u Pa-234	B-	6.70 H	Y -102m	Rh-113	Er-174		
					Th-223	Tm-155	U -228	Tl-197	Ir-177
					Zn- 77	Ta-182	Re-182	Re-182m	Y - 79
					Tc-112	Sn-128	Np-240	Es-251	Pu-238
					Cr- 49	Ga- 65	Ho-157	Ho-158m2	Kr- 75
153.98	0.722	t Ac-228	B-	6.15 H	Lu-177m	Hf-177m1	Hf-164	Au-180	
					Tm-161	Lu-181	Pb-203m2	Ta-169	Ir-185
					Sr- 81	Te-119m	La-123	Gd-151	Ho-172
					Hg-183	Xe-138	Am-244	Rn-221	Cs-121
154.21	5.62	a Ra-223	A	11.435 D	Rn-209	At-205	Ac-226	U -230	Sb-111
					Gd-146	Hg-190	Pt-184	Rb- 79	Au-182
158.56	--	c Sn-117	NN		Ir-188	Ir-192m2	Y - 81		
					W -190	Tc-105	Os-174	U -227	Cd-115m
					U -230	Xe-135	Ir-185	Hg-199m	Bi-196m2
					At-200m1	Np-236	Tl-199	Ni- 56	In-131m2
158.63	0.685	a Ra-223	A	11.435 D	La-148	Sn-117m	Sb-117		
					In-117	In-117m	Sr- 99	Ta-166	Ce-134
159.28	--	c Cu- 63	NG		Tm-149	Pu-242	Zr-103		
159.48	1.0E-03	u Pa-234	B-	6.70 H	I -123	Te-123m	Hg-184	Np-242	Se- 88
159.7	--	c Ge- 77m	IT	52.9 S	Sc- 47	Au-181	Nb-100	Tc-105	
					Tb-152m	Ge- 77m	Cs-121	Ba-128	V - 47
					Pm-140	Ir-174m	Rh-113	Cs-117	Os-172
					Pu-241				
160.26	5.8E-03	a Ac-227	A	21.773 Y	Cf-252	Sr- 77	Yb-158	Pu-240	Sn-123m
					Sn-123	Np-236	Ta-173	U -242	Mo-105
					W -183m	Xe-117	Xe-133	Ba-133	Pm-157
					Zr- 86	Hf-179m1	Ir-185	Rb- 79	Hf-183
					Ra-213m	Zn- 77	Tm-159	Mn- 50m	Cs-124m
					Ce-147				
162.1	=8.5E-03	a Th-227	A	18.72 D	Sm-134	Au-183	Re-184m	Tb-155	Hf-175
					Y - 97m1	Fr-206	Yb-163	Fr-220	Xe-114
					Os-170	Kr- 77	As- 77	Pr-131	Se- 77m
					W -190	Ir-172m	Sr- 77	Rn-227	Y - 97m2
					Hf-163	Ba-145	Pr-149	Ce-134	Ta-183
					In-116m2	Pr-154	Pt-184m	Ta-175	
163.1	0.155	a Th-231	B-	25.52 H	Kr- 72	Ho-158m2	Ba-140	Os-185	Tm-159
					Os-181m	Au-184	Lu-163	Nd-134	
163.33	5.08	a U -235	A	703.8E+6 Y	Am-242m1	Tb-155	Sr-101	Yb-162	In-122m2
					Ag- 99m	Cd- 99	Sm-137		
164.2	--	t Pb-212	B-	10.64 H	Bk-251	Zr-103	Cs-136	Ba-136m	Xe-131m
					Pm-157	Nd-131	I -118m	La-145	Pr-152
					W -185m	Yb-164	Yb-157	Rh-115	Xe-142
164.94	8.2E-05	u Pa-234	B-	6.70 H	Ac-229	U -237	Nd-135	Hf-170	Ac-224
165.	3.9E-03	a Th-231	B-	25.52 H	Hg-197m	Tb-149	Tb-149m	Pu-236	Cm-241
					Nd-154	Gd-161			
165.5	5.5E-03	a Ra-223	A	11.435 D	Ho-170	Hg-190	Bk-245		
165.61	1.2E-04	u Pa-234	B-	6.70 H	Zr-103	Po-202	Sm-156	Ce-139	Ba-139
					Er-159	Kr- 88	Ho-159m	Pt-200	
166.41	0.104	t Th-228	A	1.9116 Y	W -173	Ru-110	Ho-149m	Yb-159	Ta-171

Energy 166.5 ~ 182.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide					
166.5	2.4E-07	u Pa-234m	B-	1.17 M	Ho-158m2 Au-191 At-210 Kr- 94	Au-189m Hg-189gm Ge- 67	Ac-224 Pr-151 Rb- 97	W -175 Cu- 58	Lu-162 Os-181	
168.29	0.014	a Th-227	A	18.72 D	Ba-147 Rn-211	Tl-201 La-129	Au-201 Lu-183	Pb-192 Bi-202	Pm-151 Sn-108	
168.65	0.013	t Ac-228	B-	6.15 H	Sr- 93 Pd- 95m	Y - 93m Cd-127	Pd-117m La-123	Fe- 52 Sm-137	Rn-211 Te-133m	
169.66	1.2E-03	a Th-231	B-	25.52 H	Th-233 Ce-131	Tb-144m Cs-124m	U -240 Ba-124	Ce-137m Re-188m	B - 13 Hf-179m2	
170. 170.07 170.85	=3.6E-03 0.032 8.1E-04	a Th-227 u Pb-214 u Pa-234	A B- B-	18.72 26.8 6.70	D M H	Fr-225 Os-175 Mo- 88	Pa-228 Tb-153 Au-181	Mg- 27 Au-194m2 Sn-123m	Si- 27 Tc- 93	
						Os-183m Nd-151 Ag-111m				
171.9	1.3E-03	a Ac-227	A	21.773 Y	Lu-173 Ta-182m2 Lu-177m	Er-149m Br- 71 Tm-161	Er-149 Pm-154m Te-127	Tm-155m Pt-179 Xe-127	Hf-182m Bi- 201 Pd-111m	
173.	< 0.04	a Th-231	B-	25.52 H	Ta-173 Xe-127m	Th-226 Ce-149	Zn- 76 W -166	Hf-182 Es-256m		
					Ir-195m Eu-160	Ba-144 Gd-141	Sm-153	Gd-153	Re-182	
173.3 173.37 173.37 173.96	0.01 1.5E-03 0.015 0.035	a U -235 a Fr-223 a Th-227 t Ac-228	A B- A B-	703.8E+6 21.8 18.72 6.15	Y M D H	In-131m2 Hf-182m W -185m Zr- 86	Pb-198 Rn-208 Yb-160 W -168	Au-193	Xe-132m Cr- 58	
						Tb-141 Hf-162 Tl-192gm				
174.15 174.55	0.018 2.6E-04	a Th-231 u Pa-234	B- B-	25.52 6.70	H H	Ra-221 Pd- 98	Sm-141m La-123	Zn- 75 Yb-160	Lu-165 Lu-177m	K - 45 Hf-177m1
174.95 174.95	-- --	c Ge- 70 c Ge- 71m	NG IT	20.40 MS		Gd-151 Eu-140m Cm-245	Gd-140 Ge- 71m As- 71	W -173 Xe-139 Nd-151	Yb-155 Xe-139 Np-241	Au-196m2 Si- 36 Po-203
						Tc-111 Sc- 48	I -132m Cs-145			
175.8 175.8	0.019 0.019	a Ra-223 a Th-227	A A	11.435 18.72	D D	Hf-167 Ta-171 Pm-133	Re-183m Xe-122 Ga- 70	Np-240 Xe-121 Ag-101m	Ho-161 Mo-103 Cd-101	Rh- 99 Xe-120 Yb-167
176.68	0.052	t Pb-212	B-	10.64 H	Cs-119 Cs-136	Ac-223 Cl-251	Sb-125 Lu-174m	Dy-151 Lu-174	Tm-174 Os-172	
177.1	4.1E-03	a Ra-223	A	11.435 D	Tc-107 Pm-151	Os-173 Th-225	Fr-220 I -131	Th-224 Yb-169	Cs-129 Yb-167	
177.4	0.047	a Ra-223	A	11.435 D	Es-254m Es-251 Nb- 97	Y - 79 Fe- 61 Pd-116	Nd-137m Ho-159 Ho-172	Pm-137 Ir-187 W -189	Ta-185 Sm-158 Rh-109	
179.54	0.151	a Ra-223	A	11.435 D	Xe-120 Rb- 77 Sm-159	Xe-123 Lu-167 Ru-114	Pa-238 Rb- 75 Lu-173	Se- 81 Cd-142 Cs-121m	Dy-148 Cd-100 Cs-121	
179.8 180.2	7.1E-05 3.2E-03	u Pa-234 t Bi-212	B- B-	6.70 60.55	H M	Re-182 Er-157	Fm-257 Pd-100	Au-183 Rh-115	Lu-168 Cd-124	Rh-101m Pu-246
						Hf-165 Au-198m Nd-154	Tb-155 Sm-137 Ba-127	Hg-195 Cm-249 Pu-233	Tb-151 Nd-155	Cu- 76gm Pm-133
181.5	--	u Pb-214	B-	26.8 M	Te-134 Mo- 99	Te-116 Au-200m	Hf-184 Au-187	Os-175 W -174	Cs-146 Re-173	
						Lu-172 W -168	Ho-170 Dy-142	Zn- 78 Tb-158	Sm-135 Bi-204m2	Am-239 U -242
182.1 182.2 182.61	-- 5.2E-06 0.34	a U -235 t Th-228 a U -235	A A A	703.8E+6 1.9116 703.8E+6	Y Y Y	Ge- 66 Dy-157 Ar- 44	Lu-167 Te-131m Rb- 79	Ce-132 Sb-130 Pm-153	Sb-130m Fr-225	

Energy 183.5 ~ 197.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
183.5	0.033	a Th-231	B-	25.52	H	Ni- 69	La-146m	Rb- 82m	Pt-177	Nd-139
184.54	0.07	t Ac-228	B-	6.15	H	Hf-168	Bi-206			
						Tb-165	Tc-101	Rh-101m	Rh-101	Ir-177
						W -171	Ho-168	Tm-168	Au-181	Ho-166
						Tm-166	Ag-117m	Re-175	Dy-155	Cu- 67
184.65	3.0E-03	a Fr-223	B-	21.8	M	Ir-181				
184.65	0.038	a Th-227	A	18.72	D					
184.7	1.7E-03	u Pa-234m	B-	1.17	M	Eu-154				
184.8	0.013	u Th-234	B-	24.10	D	Pm-154	Pm-154m	Ta-182m2	Tb-162	Pd- 95m
						Ho-162	Hf-182m	Hg-181	Pb-188	Er-155
						Ho-155				
185.72	57.2	a U -235	A	703.8E+6	Y	Tb-162	Eu-140m	Br- 91	Ac-226	Ru-113
186.01	--	c Cu- 65	NG			Ac-231	Cs-147	Sm-134	Pt-199	
186.05	8.8E-03	u Th-230	A	7.538E+4	Y	Re-189	Er-156	Pt-182	Au-187	Ge- 79m
186.15	2.8E-03	u Pa-234	B-	6.70	H	Fr-226				
186.21	3.59	u Ra-226	A	1600	Y	Au-193				
						W -177	Pt-187	Ho-159	Kr- 94	La-147
						Hg-192	W -177	Bi-203		
187.1	--	u Ra-226	A	1600	Y	Re-190	Re-190m	Ir-189m1	Ir-190	Os-190m
						Ir-190m2	Pt-189	Tc-109	Pt-187	Xe-122
						Ba-128	Ho-158m2	Os-173	U -228	Ce-134
						No-255	Tb-149	Ir-187	Lu-159	Pt-188
						In-125m	Xe-141	Au-193	W -185m	In-103
188.76	3.2E-03	a Th-231	B-	25.52	H	Sm-137	Cm-239	Re-184m	Pm-157	Ho-157
						Cs-117	Sr- 81	Au-196m2	Yb-161	Xe-125
						Re-189	Lu-167	Pm-139m	Sm-139m	Pd-109m
						Cs-124m	Fe- 59	Ba-124	Ru-111	Pr-151
						Re-179	Mo-106	Ra-230	Rh- 97m	Rh- 97
						Sm-158	Zn- 77	Ba-145	Bi-203m	Po-203
						Rh-113	Gd-141	U -240		
191.1	--	u Bi-214	A	19.9	M	Sm-139m	Eu-139	Yb-176m	Hg-185gm	Hg-188
						Ir-174m	Tm-161	Fr-222	In-114m1	Sm-157
						Th-226	Ba-141	In-114m2	Au-187	Kr- 81m
						Mo-108	Sm-158	Re-173	Ge- 65	Fr-225
						Pu-233	Xe-142	Bi-192gm	Rh-111	Gd-140
191.35	0.123	t Ac-228	B-	6.15	H	Ac-223	Hg-197	Eu-145	Re-182	Pt-197
						Au-186	Xe-116	Hg-186	Es-249	Pt-199
						Pb-196	Mo-101	Tb-151	Pt-184	Rn-227
						Pm-133	Tm-158			
193.	-9.6E-03	a Ra-223	A	11.435	D	Se- 68	Nb-104gm	Zn- 74	Fe- 59	Rn-208
						Nb-105	Sn-130	Dy-168	Fr-230	Hf-179m2
						La-124gm	Sm-137	Ho-151	Ga- 63	Hg-185gm
						W -174	Pt-179	Lu-170	Ce-134	
193.4	7.1E-04	u Pa-234m	B-	1.17	M	Np-240	Ho-157	Sb-128m	Ir-174	Fr-225
193.73	7.9E-04	u Pa-234	B-	6.70	H	Er-155	Pm-141	Hg-185gm	Yb-159	Ir-177
						Ru-107	Au-191	Nd-138		
194.94	0.63	a U -235	A	703.8E+6	Y	Tc-109	Ce-148	Ir-183	Ge- 77m	Rn-227
						Bk-245	Sr-100	Pt-188	Zn- 74	Rh-111
						Er-158	Rn-206	Cs-143	Lu-177m	
196.2	0.069	u Pb-214	B-	26.8	M	Os-177	Mo-101	Ce-143	Cs-121m	Cs-121
						Ba-147	S - 38	In-105	Kr- 88	Hg-191
						Hf-162	Sm-157			
196.8	1.2E-04	u Pa-234	B-	6.70	H	Dy-144	Tm-159	Xe-129m	Sm-141m	Nd-147
						Cs-127	Tl-190m	Re-177	W -173	
197.1	--	c F - 19	NN			Zr-100	Cs-119	Ba-146	Ho-160	Tb-160
						Ne- 19	Eu-139	Ge- 81m	Ge- 81	In-120m2
						Pm-147	Eu-147	T -136m	Ir-189	
197.61	0.013	a Th-227	A	18.72	D	Pt-185gm	Bi-198m1			
197.91	2.7E-05	u Pa-234m	B-	1.17	M	Rn-221	Fr-206	Sm-157	Mo-105	Ta-186
						Rh-101	Am-245	Bk-245	Ho-168	Tm-168

Energy 198.8 ~ 215.2 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
198.89	4.9E-03	a Pa-231	A	3.276E+4 Y	Gd-141m	Tb-141	Ce-147	Ge- 75	Ho-171
198.9	0.042	a U -235	A	703.8E+6 Y	Se- 75	Pu-237	Pm-135	Tl-198m2	Lu-168m
199.4	2.7E-03	a Ra-223	A	11.435 D	Cs-147	Ho-153m	Tm-159	Cs-145	Ag-119
199.41	0.315	t Ac-228	B-	6.15 H	Tb-156	Cu- 73	Zn- 76	Er-173	Re-168
199.95	1.2E-04	u Pa-234	B-	6.70 H	Au-195	Nd-138			
199.95	5.7E-04	u Pa-234m	B-	1.17 M	Fr-225	Pt-200	Pa-228	Xe-135	
200.5	7.5E-05	a Fr-223	B-	21.8 M	Au-195m	Hg-195m	As- 77	Pm-133	Tb-145
200.5	—	a Th-227	A	18.72 D	Te-131m	Pd-115			
200.97	1.4E-03	u Pa-234	B-	6.70 H	Os-196	Ho-155	Pu-238	Nb- 87	Nb- 87m
201.6	0.03	a Th-227	A	18.72 D	Zr- 87m	Te-134			
201.82	85.54	Lu-176	B-	3.78E10 Y	Os-192m	Ir-192	Er-161	Pt-187	Ir-195m
202.11	1.08	a U -235	A	703.8E+6 Y	In-103	Au-197m	Hg-197m	Ta-176	At-206
202.5	6.1E-03	a Th-227	A	18.72 D	Pt-197m	W -174	Lu-176m	Rn-224	
					Ba-129m	Zr-104	Ho-155	Y - 90m	Se- 68
203.12	1.0E-03	u Pa-234m	B-	1.17 M	Se- 70	Ra-230			
203.12	2.0E-03	u Pa-234	B-	6.70 H	Xe-127	Te-127	Kr- 74	Ag-120m	Mo- 90
204.03	0.112	t Ac-228	B-	6.15 H	Pt-179	Fr-210	Hg-187gm	Lu-172	In-109
					Lu-165	Zr-103	Hg-205	Xe-142	Lu-178
					Pb-194	Re-183m	Rb- 95	Ru- 91	Sm-156
					Nd-135	Au-198m	Lu-177m	Hf-177m1	Nb- 95
					Tc- 95m	Tc- 95			
204.27	0.194	a Th-227	A	18.72 D	Fr-227	Ho-158m2	Mo-103	Ag-117m	U -229
205.03	0.013	a Fr-223	B-	21.8 M	Bi-203m	Gd-143	Cs-117	In-107	Am-246
205.03	0.146	a Th-227	A	18.72 D					
205.1	5.2E-06	u Th-230	A	7.538E+4 Y	Yb-155	Tm-153			
205.31	5.01	a U -235	A	703.8E+6 Y	Ni- 69	Pt-186	At-208		
205.68	0.011	u Pb-214	B-	26.8 M	Hg-187gm	Am-244	Tc- 91m	Cs-117	Lu-183
					Os-192m	Ir-192			
205.93	0.02	t Th-228	A	1.9116 Y	Cm-241	Ho-159m	Lu-181	Er-159	Fr-224
206.11	0.206	a Th-227	A	18.72 D	Fr-222	Cs-130m	Th-226	Ru-109	Rn-223
					Ho-158m2	Ta-174	Po-199	Pr-131	Mn- 61
					Au-181	Au-185	Ac-223	Os-196	Hg-195m
209.25	3.89	t Ac-228	B-	6.15 H	Ir-189m2	Lu-177m	Lu-177	Hf-177m1	Ta-177
					Kr- 79	La-131	In-118m1	Re-183	Cu- 67
209.9	1.3E-03	u Pa-234m	B-	1.17 M	Te-129	U -227	Pa-228	Er-161	Ho-151
					Np-239	Cm-243	Rn-224	Re-177	Am-239
210.65	1.3E-04	a Fr-223	B-	21.8 M	Ta-163	Pt-182	Cm-242		
210.65	1.09	a Th-227	A	18.72 D	Ir-174m	Pt-186	Tb-153	Tc-103	Hg-185gm
					Ce-146	Te-134	Zr-104	Pb-190	Er-171
211.4	0.064	t Tl-208	B-	3.053 M	Gd-159	Dy-159	Hg-181	Rn-202	
					Ge- 77	Ta-164	Tb-164	U -229	Os-172
					Er-161	Hg-185gm	Ir-195m	Ir-195	Nd-149
					Au-195	Ba-143	S - 40	Ba-124	Cs-124m
					Ru-111	Ru-113	Es-254m	Xe-140	Pb-202m
212.65	0.061	a Th-227	A	18.72 D	Tm-159	Po-205			
					Tb-153	Te-121m	I -121	Pu-240	Hg-185gm
212.7	0.018	a Th-227	A	18.72 D	Pr-131	Pt-185gm			
					Ag-115	Tm-161	Ce-135m	Sr- 96	Zr-104
					Pm-132	Pb-192	Lu-167	Cd-102	Ta-178
					Ag-119	Rn-206	Lu-178m	Rb- 93	Hf-178m2
214.3	2.5E-05	a Fr-223	B-	21.8 M	Ta-178m1	Pr-135			
					Kr- 73	Dy-153	Ru- 92	W -179m	Y - 98
					Gd-163	Hf-177m2	Ta-172	Au-183	Ra-219
					Ba-129	Lu-179	Hf-179m1	Lu-177m	Hf-177m1
214.85	0.029	t Ac-228	B-	6.15 H	Ra-213m	Ra-213	Po-203	Au-198m	Zr- 86
215.28	0.027	a U -235	A	703.8E+6 Y	Ta-186	Pb-192	Ba-148	Lu-179	
					Tb-164	Te-127	Tm-166	Lu-180	Rh-109
					Bi-197m	Nd-138	Re-184m	Ta-184	La-147
					Hf-180m	Ba-128	Ge- 77m	Ge- 77	La-147

Energy 215.9 ~ 233.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
215.98	0.254	t Th-228	A	1.9116 Y	Tl-189m Tb-160 Y - 85 Pd-116	Rb- 84m Au-189 Tl-191m	Ru- 97 Fr-224	Ac-224 Rb- 99	Yb-160 Ac-223
216.47	0.022	u Pb-214	B-	26.8 M	Os-170	Ge- 79m Tl-206m	Ga- 81	Re-184m	
217.94	0.04	a Th-231	B-	25.52 H	Lu-178m Nd-134 Rh-113 W -172	Ta-178m1 Ce-132 Hf-179m2 Lu-165	Hf-178m2 Kr- 74 Kr- 79 Re-182	Re-189 U -229 Bk-244 U -231	Ir-189 Os-182 Ho-159 Sr-102
					Mo-103	Ba-126	Pa-238	Ho-158gm	Tb-158
					Zn- 73 Mo-105	Lu-177m	Au-183		
					Ir-181	Au-200m	Xe-139	Os-179	Dy-153
219.	1.3E-04	a Fr-223	B-	21.8 M	Tc- 95m	Ce-147	Tm-165	Br- 74	Sm-134
219.	0.014	a Ra-223	A	11.435 D	Ho-155	Sr- 79	Br- 74m	Ra-221	Rb- 93
219.	0.102	a Th-227	A	18.72 D	Re-189 Rh-113 Tm-159	Ir-189 Au-193m	Kr- 94 Hg-193m		
220.	2.3E-04	u Pa-234	B-	6.70 H	K - 43	Ru-109	Nd-155	Ag- 99	Ir-179
220.6	0.036	a Ra-223	A	11.435 D	Hg-187gm	Ba-129	Lu-163	La-135	Kr- 89
221.	3.0E-03	u Bi-214	B-	19.9 M	Fr-211	U -230			
221.15	8.2E-05	u Pa-234	B-	6.70 H	Er-155	Ta-170	Ac-231		
221.38	0.12	a U -235	A	703.8E+6 Y	Xe-117	W -172	Fr-222		
221.5	0.03	a Rn-219	A	3.96 S	Br- 82	W -179m	Cs-117	Cs-147	Re-182
221.83	1.2E-04	u Pa-234	B-	6.70 H	Na- 31	Pu-233	Au-189	Pd-114	W -189
222.9	6.2E-05	a Fr-223	B-	21.8 M	Re-182	Ta-182	Ir-185		
					Tl-197m	W -179m	Pb-197m	Gd-142	Hg-185gm
					Pt-177	Hg-181	Xe-133	Ba-133	Mo-108
223.85	0.054	t Ac-228	B-	6.15 H	Pt-189				
					Tc-112	Sm-139m	Eu-139	Lu-168	Np-232
224.1	8.9E-03	a Th-231	B-	25.52 H	Ir-185	Re-190	Mo-102	Gd-141m	U -230
					Lu-182	V - 55	Sn-106	Sm-158	Pd-118
					W -166	Ir-174	Hg-191	Zn- 78	
225.5	=3.6E-03	a Th-227	A	18.72 D	Pm-133	Tl-201m	Pb-194	Cs-119	Fr-225
					Xe-139	Sm-140	Tc-105	In-106	Au-189
226.5	6.8E-03	u Pa-234	B-	6.70 H	Tl-195	Tb-154m2	Ru-109		
					Dy-159	Os-175	U -229	Am-247	Gd-159
					Re-182	Tl-198m1	Np-239	Am-239	Xe-116
227.25	9.2E-03	u Pa-234	B-	6.70 H	Pr-152	Re-184m	Tm-155		
					Dy-155	Yb-177m	Cf-251	W -188	Pt-200
228.5	1.8E-05	t Th-228	A	1.9116 Y	Tm-162m	Tm-162	Ru-113	Hg-186	Fr-212
					Ir-172m	Np-239			
					Tl-194m	Sm-139	Lu-166	Lu-166m2	Lu-166m1
					Np-239	Am-239	Cm-243	Ti- 53	Os-172
228.78	8.0E-03	a U -235	A	703.8E+6 Y	Lu-177m	Hf-177m1	Pu-237	Lu-168	Ir-183
230.	<4.0E-03	u Bi-214	B-	19.9 M	Zn- 75	Cs-143	Ag-115m	Ag-115	Sm-134
					Er-155	Rh- 95	Gd-147	Ta-182	Re-182
					Ho-172	Ba-128	Th-236	Hf-175	Pt-185gm
230.	1.7E-03	a Pa-231	A	3.276E+4 Y	La-124gm	Sm-158	Ta-169	Ac-226	W -179m
230.3	---	a Th-227	A	18.72 D	Rn-209	Sr- 76	Ho-153m	Pt-181	U -230
231.42	0.025	t Ac-228	B-	6.15 H	Ce-131m	Ge- 79m	Ge- 79	Pm-154m	
					Fr-204m2	I -121	Rh-111	Yb-157	Cm-247
					Re-183m	Cd-115	Ce-143	Ba-146	Ir-181
232.21	2.8E-04	u Pa-234	B-	6.70 H	Y - 85m	Xe-119			
					Sr- 85m	Pd-114	Ce-145	Pm-154m	Cs-143
233.36	0.11	t Tl-208	B-	3.053 M	As- 69	Pu-246			
					Tc- 99m	Nb-105	Xe-134m	Xe-133m	Rn-210
233.5	0.029	a U -235	A	703.8E+6 Y	W -174	Hg-187gm			
233.6	8.0E-04	u Pa-234m	B-	1.17 M	Ir-189	Ba-126	Pm-137	Lu-173	Cm-251

Energy 233.6 ~ 249.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
233.6	--	u Pa-234	B-	6.70 H	Br-71 Er-155	Nd-137m Os-185	Tc-101	Rh-101m	Kr-74
234.81	0.041	a Fr-223	B-	21.8 M	I-134m	Np-233	Pb-197m	Bi-197	Kr-90
234.81	0.4	a Th-227	A	18.72 D	Yb-163	Zr-83	Cs-121m	Te-114	Er-155
235.	8.4E-06	u Th-230	A	7.538E+4 Y	Th-224				
235.11	1.8E-04	u Pa-234	B-	6.70 H	Ac-226	U-230	Tb-152m	Pu-233	
235.9	8.0E-05	u Pa-234m	B-	1.17 M	Pb-200	Zr-95	Nb-95m	Sr-80	La-147
235.9	--	u Pa-234	B-	6.70 H					
235.97	12.13	a Th-227	A	18.72 D					
236.	-9.6E-03	a Ra-223	A	11.435 D	U-231				
236.	0.087	u Pa-234m	B-	1.17 M					
236.01	9.2E-03	a Th-231	B-	25.52 H	Sn-108 Rn-211	Yb-155 Hf-179m2	Hg-184 Sm-135	W-171 Hg-189gm	Ir-182 Tc-112
237.8	< 0.09	a Th-231	B-	25.52 H	Fe-51 Mn-61	Au-187 Ho-167	Er-171 Os-181m	Dy-146m Po-199m	Ho-146
238.4	< 0.015	u Pb-214	B-	26.8 M	Nd-137 Rh-101m	Rh-101m	Tc-101	La-132m	Nb-97
238.63	43.3	t Pb-212	B-	10.64 H	Hg-189gm	W-179m	Os-181	Y-85	Sr-85m
					Br-77 Lu-167	As-77	Yb-159	At-209	Tl-192gm
240.2	8.2E-05	u Pa-234	B-	6.70 H	Pt-195m	Tm-163	Cs-121	Cs-121m	Pb-203m2
					Lu-163 Pm-151	Tm-176 Po-201	Os-172 Re-176	Ir-183 Bi-202	Pb-196 Ho-155
					Nd-149				
240.27	2.8E-04	a Th-231	B-	25.52 H	Hg-187gm	Pb-202m	Lu-181	Tm-164m	Mo-108
240.87	0.075	a U-235	A	703.8E+6 Y	Tc-110	Tl-196m	Hg-191	Am-245	Cf-249
240.99	4.1	t Ra-224	A	3.66 D	Te-131m	Cs-145	Ba-126	Au-191m	Pm-257
					Dy-146	Pb-202m	Si-35	Kr-73	Os-182
241.7	-1.6E-03	a Ac-227	A	21.773 Y	Tm-163	Nb-96	Hg-191m	Cs-147	Er-155
					Sr-92	Kr-75	Y-98m	Ac-223	Ba-146
242.	7.43	u Pb-214	B-	26.8 M	Ru-103	Pd-103	Zr-104	Pr-133	U-229
242.2	9.0E-03	a Pa-231	A	3.276E+4 Y	Fr-222	Th-226	Tl-195	Kr-90	Tc-108
242.5	8.4E-04	a Th-231	B-	25.52 H	Lu-184	Se-87	Np-233	Xe-138	In-108
					Cs-134	Os-181			
243.08	0.048	a Pa-231	A	3.276E+4 Y	Zr-86	Tm-165	Cd-103	Tm-159	Au-185
					Pt-179	Pt-181	Gd-151		
243.5	5.0E-04	u Pa-234m	B-	1.17 M	Te-137	Zn-62	Xe-125	Lu-160gm	Pt-189
					Tc-92	Ta-185	Re-174	Pt-200	
244.	0.039	a Pb-211	B-	36.1 M	Sr-102	In-122m2	La-123	Ag-103	Sm-156
					Se-70	Hg-185gm	Dy-153	Ta-183	Mg-30
					V-47	Te-114			
245.2	9.6E-03	a Ra-223	A	11.435 D	Pm-152	Pm-152m1	Eu-152	Ru-112	Ce-131
					Re-189	Ir-189	Ru-109	Bi-200	
245.37	1.2E-03	u Pa-234	B-	6.70 H	Bi-200m1	At-210			
245.4	--	c Cd-111	NN		Ag-111m	Ag-111	Cd-111m	In-111	Nd-135
245.6	7.8E-03	a Pa-231	A	3.276E+4 Y	Pm-133	Ge-66	Sm-155	Sr-79	Cs-147
246.04	0.011	a Pa-231	A	3.276E+4 Y	Cs-119m	Po-199	Th-225	U-228	Ta-183
246.19	2.9E-04	a Fr-223	B-	21.8 M	Pt-199				
246.19	9.7E-03	a Th-227	A	18.72 D					
246.84	0.053	a U-235	A	703.8E+6 Y	Tb-145	Sn-132	Nb-105	Es-250	Zn-62
					Pr-148m	Tm-155m	U-227		
247.2	--	u Bi-214	B-	19.9 M	Tc-110	Tm-148	Tl-206m	Tl-199	Tl-195
					Au-187	Re-182			
247.79	5.9E-07	u Pa-234	B-	6.70 H	Pd-117	Te-123m	Pd-115	Cd-125m	Zr-103
247.79	2.4E-04	u Pa-234m	B-	1.17 M	Ir-189m2	Bi-198m1	Pt-187	Xe-116	Tm-159
					U-229	Eu-154	Tb-154m2	Tb-154m1	I-123
					Os-175	Rb-84m	Lu-183	Hg-189gm	Bi-198m2
249.22	4.0E-03	u Pa-234	B-	6.70 H	Er-158	Am-237	Ge-82	Ni-69	Rh-109
					Ba-147	Pm-135			
249.4	0.038	a Ra-223	A	11.435 D	Pr-151	Ba-131			
249.6	-7.3E-03	a Th-227	A	18.72 D	Se-88	Tb-153	Po-207	Lu-177m	Lu-177

Energy 249.6 ~ 266.4 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
249.6	7.8E-04	a Th-231	B-	25.52 H	Hf-177m1	Mo-105	Br- 77	Xe-135	As- 77
250.35	2.8E-04	a Fr-223	B-	21.8 M	Ag-113m				
250.35	0.425	a Th-227	A	18.72 D	Nd-133	Dy-167	Nd-152	Tm-167	Rn-211
250.45	6.5E-04	a Th-231	B-	25.52 H	Hg-185gm	Cl- 39			
251.1	0.041	a Ra-223	A	11.435 D	Ru-111	Zr-104	Te-129	Xe-142	Pb-192
251.5	< 0.04	a U -235	A	703.8E+6 Y	Tb-163	Ce-146	Rn-208	Au-185	Ba-146
251.8	0.067	a Ra-223	A	11.435 D	Cm-244	Pr-150			
252.6	0.095	a Th-227	A	18.72 D	Au-187	Au-183	Ce-132	Pr-131	Yb-175
252.61	0.249	t Tl-208	B-	3.053 M	In-120	Hg-186	Rb-101	Ir-195m	
252.8	3.0E-03	u Bi-214	B-	19.9 M	Dy-165m	Tb-151	Kr- 76	Te-105	Hf-164
					Ac-229	In-127m	Er-159	Sb-127	Hg-191
					Kr- 93	Yb-158	Hg-191m		
					Xe-121	Tm-159			
					Am-245	Cf-249	Re-184	Re-184m	Ta-184
					Ho-159	Au-191m	Tc- 95m	Nd-155	Pb-196
					Ba-124				
253.73	0.011	u Th-230	A	7.538E+4 Y	Zr-100	Rh-115	Dy-147m	Dy-149	Kr- 93
					Nb- 99m	Ac-226	In-118m2	Sb-118m	Se- 73m
253.8	8.5E-04	u Th-230	A	7.538E+4 Y	Fr-226				
					La-129	Re-172m	Re-172	Sr-102	Au-191
254.68	8.7E-05	a Fr-223	B-	21.8 M	Zr- 97	Ir-185	Rn-221		
254.68	0.728	a Th-227	A	18.72 D	Dy-153	Ce-137m	Rb- 77	Au-185	Cm-243
					Sm-159	Eu-149	Pd-113	Zr- 83	Hf-177m2
255.16	--	u Bi-214	B-	19.9 M	Ir-183				
255.23	0.052	a Ra-223	A	11.435 D	Cf-251	Sn-113	Eu-136gm	Pt-185gm	Pr-139
255.6	5.5E-03	a Ra-223	A	11.435 D	Nd-153	Ba-142	Tl-194m		
255.77	0.112	a Pa-231	A	3.276E+4 Y	Pu-246	Au-193	Nd-151		
256.25	3.1E-04	a Fr-223	B-	21.8 M	Au-200m	Pt-186			
256.25	6.91	a Th-227	A	18.72 D	Fr-210	Er-151	Re-182	At-206	Pd-119
257.2	8.2E-05	u Pa-234	B-	6.70 H					
257.52	0.03	t Ac-228	B-	6.15 H	Rn-224	Ca- 50	Sc- 50m	Dy-152	Re-183m
					In-128m	Pb-200	Mo- 90		
258.26	0.073	u Pa-234m	B-	1.17 M	Cs-119	Tm-148	I -119	Ba-126	Au-180
					Tb-145	Os-196			
258.44	2.4E-03	a Pa-231	A	3.276E+4 Y	Pm-140m	Au-193m	Hg-193m	W -189	Ho-170
258.87	0.524	u Pb-214	B-	26.8 M	Tb-141	Pr-149	Ra-227		
					Ir-189m1	La-146m	Xe-138	Pu-237	La-146
					Np-233	In-126m			
					Hg-185gm	Rh- 97m	Ag-113	Gd-143	Hg-184
					Tb-164	Sr- 83m	Se- 88	Ru- 92	Rh-111
260.19	0.188	a Pa-231	A	3.276E+4 Y	Ba-144	Cs-119	Tl-198m2	Pb-198	
260.48	--	c Pb-204	NG		La-135	Tl-198m1	Tb-162	Cd-126	Se- 81m
260.5	6.9E-03	a Ra-223	A	11.435 D	In-105				
					Zn- 62				
262.27	5.0E-03	u Ra-226	A	1600 Y	Br- 71	Po-209	Rn-224	Cd-115	Tl-198m2
					Fe- 49	Sb-109	Po-205	Ag-101	Yb-169
					Ta-168	Tl-182	Ac-224	Te-133m	Pu-237
					Nd-155	Au-195m	Hg-195	Hg-195m	Ac-229
					Cf-251	Nb- 88m	Lu-164	Tb-155	Rh-100m
					Hg-188	Mo- 87			
262.91	6.2E-05	a Fr-223	B-	21.8 M	Br- 91	Po-209	Ru-105	Pm-135m	Os-181m
262.91	0.093	a Th-227	A	18.72 D	Mo- 93m	Cs-117	Se- 70	Ru-113	Sm-157
263.58	0.04	t Ac-228	B-	6.15 H	Os-182	Cm-244	Np-240m	Cs-143	Zn- 79
					Zr-104	Cd-113m	Nb- 99m	Np-231	Ag-123
					Tm-160	Au-196m2	Re-182	Ta-182	Tm-160m
265.	--	u Bi-210	A	5.013 D	Ag-116m	Ge- 77	Ag- 99	Ce-146	Ge- 75
					Rn-221	Au-182	Tm-167	Rn-205	Se- 68
					Bk-247	Np-242	Pd- 97	Dy-157	Ge- 80
266.45	6.0E-03	a U -235	A	703.8E+6 Y	Ce-135	Bi-210m	Pm-157	Tl-206m	
					Rn-224	Bk-245	Yb-180	Pa-230	Cf-251

Energy 267.1 ~ 282.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
267.1	--	a Th-227	A	18.72 D	Ho-158m2	Zr- 85	Pm-133	Tm-167	Ho-156
267.12	2.8E-04	u Pa-234	B-	6.70 H	Ir-178	Cf-249			
267.62	1.2E-03	a Th-231	B-	25.52 H	Te-135	Cs-129	Kr- 93	Ag-103	Y - 93
268.	5.6E-03	a Th-227	A	18.72 D	Cd-115	Tc-111			
268.8	0.02	u Bi-214	B-	19.9 M	Sm-139m	Eu-139	Pm-156		
269.46	13.7	a Ra-223	A	11.435 D	U -237	Nd-149	Gd-146		
270.25	3.46	t Ac-228	B-	6.15 H	Po-207m	In-120m2	Ba-135m	Au-193	Mo-108
270.7	2.7E-05	a Fr-223	B-	21.8 M	Au-191	Ru-107	Pb-200		
270.7	0.036	a Th-227	A	18.72 D	Mo- 89m	Sm-156	Y - 98	Pm-137	Pt-191
271.23	4.4E-05	a Bi-215	B-	7.6 M	Pt-197	Lu-177m	Ce-147	Hf-179m2	Ir-197gm
271.23	10.8	a Rn-219	A	3.96 S	Mo-106	Mo-105	Hf-171		
272.28	1.7E-03	u Pa-234	B-	6.70 H	Ac-223	Ni- 56	Pb-192	Ce-148	Ba-146
272.93	6.2E-05	a Fr-223	B-	21.8 M	Pa-238	Au-193			
272.93	0.473	a Th-227	A	18.72 D	Pm-133	Pm-135m	Cf-251	Po-204	Am-246m
273.14	0.06	a Pa-231	A	3.276E+4 Y	W -166	Hg-185gm	Nd-149	Ge- 75	Kr- 76
273.8	0.15	u Bi-214	B-	19.9 M	U -232	Pa-228	W -175	Cs-124m	Ba-124
274.1	3.0E-05	a Th-231	B-	25.52 H	Pb-194	Te-119m	Ho-153m	Pd-113	As- 77
274.8	0.474	u Pb-214	B-	26.8 M	Pd-118	Eu-152m1	Tb-152	Cs-117	Sc- 44m
275.04	3.1E-04	u Pa-234m	B-	1.17 M	Lu-165	Rb-101	Tm-159	Ir-183	Np-240
275.04	1.5E-04	u Pa-234	B-	6.70 H	Hg-187gm	Kr- 76	Ce-131	Au-191	
275.13	0.042	a U -235	A	703.8E+6 Y	Nb- 88	Fm-253	Pm-133	Gd-143m	I -134m
275.43	7.0E-03	a U -235	A	703.8E+6 Y	Ho-157	Sm-143	Ba-124	Pt-184m	Po-201m
277.32	0.069	a Pa-231	A	3.276E+4 Y	Gd-149	Rb- 89	Tc-105		
277.36	2.27	t Tl-208	B-	3.053 M	Cs-143	Sn-108	Se- 88	Tm-174	Lu-174m
277.72	--	t Tl-208	B-	3.053 M	Ge- 66	Au-184	Bi-200m1		
278.24	--	c Cu- 63	NG		Am-237	Cd-117	Zn- 60	Ba-128	
278.3	6.6E-05	u Pa-234	B-	6.70 H	Ir-182	Cs-136	Sm-139	Ce-148	Eu-142m
278.95	0.191	t Ac-228	B-	6.15 H	Xe-118	Nd-156	Tl-198m1	Hg-191m	La-147
279.5	0.27	a U -235	A	703.8E+6 Y	Os-182	Te-117m	I -117	Lu-166	
279.72	0.061	a Th-227	A	18.72 D	Tl-196m	Dy-153	Sr- 91	Hg-192	
280.6	--	u Bi-214	B-	19.9 M					
280.95	0.06	u Bi-214	B-	19.9 M	Tm-163	Br- 73	Pm-151		
281.	--	a Th-227	A	18.72 D	Zn- 76	Nd-147	Rh-111	Ho-162m	Re-189
281.29	0.158	a Th-227	A	18.72 D	Se- 81m	Se- 81	Ba-133m	Kr- 81	Kr- 77
281.42	6.0E-03	a U -235	A	703.8E+6 Y	Rh-109	Lu-166	Re-182		
282.	--	u Bi-214	B-	19.9 M	Ba-133	Ir-180	Rh- 99m	C - 16	Ba-141
282.	0.072	t Ac-228	B-	6.15 H	Pm-149	Eu-149	Tb-152m	Ge- 78	Hf-177m2
282.92	5.0E-03	a U -235	A	703.8E+6 Y	Ra-227	Fr-171	Tb-164		
					Rh-107	Np-239	Am-239	Cm-243	Au-191
					Rh-115	U -229	Cm-247		
					Nd-155	Pd-116	Ag-111m	Te-129	Nd-152
					Cs-129				
					La-133	Zn- 79	Lu-167	Pt-197m	Au-197m
					U -229	Ce-132	Tl-195	Ho-171	Hg-203
					Rn-221	Sr- 96	Ce- 75m	Ba-146	Se- 75
					Ce- 75	Dy-165	Tm-152	Pm-154m	Ho-157
					Y - 97m1	Sm-134	Pa-228	Rh-105	Cs-121m
					Dy-146	Am-237	Pt-188	Gd-142	Au-191
					Ag-105	Ag-105m	Os-193	Ho-166m	Np-233
					Cs-147	Yb-157			
					Pt-186	Re-175			
					Fr-211	Kr- 85m	Sr- 85m	In-122m2	I -123
					Ba-126	Te-129	Eu-149	Zn- 78	
					Cs-148	Re-182	Zn- 76	Re-183m	As- 77
					W -179m				
					Lu-177m	Hf-177m1	Np-232	Md-255	Pm-135m
					Pt-187	Ac-231	Br- 71		
					Ir-183	Yb-175	Fr-206	V - 53	Tl-198m1

Energy 283.6 ~ 300.0 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
283.69 284.4	1.7 0.024	a Pa-231 a Th-227	A A	3.276E+4 Y 18.72 D	Ho-162m Ir-192 La-147 Tl-199 Gd-142	Cu-61 Tb-152m Gd-161 La-128 In-131m2	Sn-110 Ra-227 Pb-205m Ba-146	Tm-148 Pd-118 Ac-223 Ce-145	Bi-196m2 Tb-144m I-131 Hg-190
285.5	0.047	a Th-227	A	18.72 D	Ga-73 Pr-152 Lu-166m1 Np-239 Sm-135	Os-173 Ra-230 Cm-243 Pm-149	Ir-173m La-131 Au-196m2 Pm-137	Ir-173 Lu-173 Am-239 Gd-151	Am-247 Pr-131 Ac-223 Nd-137m
286.12 286.12 286.55	6.2E-05 1.52 0.01	a Fr-223 a Th-227 a Pa-231	B- A A	21.8 M 18.72 D 3.276E+4 Y	Ba-145 Po-206 Y-93 As-69 Au-185	Br-75 Tc-112 Tb-151 Cm-247	Re-182 Xe-142 Er-148	Sm-136 Cs-127 Np-243	Tl-184 Rn-208 Gd-163
288.18	0.158	a Ra-223	A	11.435 D	Ar-46 Rh-107 Nd-134 Pb-204m Ce-148	Au-183 Xe-122 Ta-175 Pt-181 Dy-146m	Pm-148m I-135 W-179m Cr-58 Ho-146	Kr-94 Er-151m Tm-159 Rb-98 Xe-139	Hg-185gm Pb-200 Rb-98m Pd-111
288.2 289.5 289.5 289.56	0.337 3.1E-03 — 7.0E-03	t Bi-212 a Fr-223 a Th-227 a U-235	A B- A A	60.55 M 21.8 M 18.72 D 703.8E+6 Y	Ce-147 Dy-159 Ru-95 Sm-156 Pm-133	Pb-200 Gd-159 Dy-149m Cf-251 Ho-172	Re-179 Ir-195m Dy-166 W-188 La-133	Se-81 Pb-198 Sb-127 Ba-143	La-133 Ge-81m Sb-127 Ba-143
291.2	—	a U-235	A	703.8E+6 Y	Tc-107 Se-69 Pr-131 Ho-147 Pa-221 Pm-133	Os-172 Po-208 Zr-85m Br-75 Pa-238	Ba-144 Xe-142 Ir-189m2 Cd-119 Ce-143	Ce-148 Cs-147 Tb-161 Yb-176m Se-88	Ta-183 Hg-185gm Bi-197 Gd-141
291.65 292.41 292.7 293.15	0.038 0.066 6.2E-03 4.6E-05	a U-235 a Th-227 t Ra-224 a Fr-223	A A A B-	703.8E+6 Y 18.72 D 3.66 D 21.8 M	Te-107 Se-69 Pr-131 Ho-147 Pa-221 Pm-133	Os-172 Po-208 Zr-85m Br-75 Pa-238	Ba-144 Xe-142 Ir-189m2 Cd-119 Ce-143	Ce-148 Cs-147 Tb-161 Yb-176m Se-88	Ta-183 Hg-185gm Bi-197 Gd-141
293.6 293.6 293.79 293.8	8.0E-04 0.073 4.8E-03 0.066	a Bi-215 a Rn-219 u Pa-234 a Ra-223	B- A B- A	7.6 M 3.96 S 6.70 H 11.435 D	Au-191 Ge-78 Pm-134 Tb-164 Ru-103 Ag-110 Hf-171 Ce-135m	Ir-194 Ce-149 Nd-152 Xe-117 Pd-103 Mo-108 Ho-153	Au-194 Pm-132 W-171 Ir-190 Rh-101 Am-245 Au-190	Se-70 Cf-247 Ce-134	
295.22	19.3	u Pb-214	B-	26.8 M	Ge-78 Pm-134 Tb-164 Ru-103 Ag-110 Hf-171 Ce-135m	Ce-149 Nd-152 Xe-117 Pd-103 Mo-108 Ho-153	Pm-132 W-171 Ir-190 Rh-101 Am-245 Au-190	Cf-247 Ce-134	
295.91	2.3E-04	u Pa-234	B-	6.70 H	Ge-78 Pm-134 Tb-164 Ru-103 Ag-110 Hf-171 Ce-135m	Ce-149 Nd-152 Xe-117 Pd-103 Mo-108 Ho-153	Pm-132 W-171 Ir-190 Rh-101 Am-245 Au-190	Cf-247 Ce-134	
296. 296.51 296.51	0.017 6.6E-06 0.449	u Tl-210 a Fr-223 a Th-227	B- B- A	1.30 M 21.8 M 18.72 D	Er-158 Ir-173m Pd-101 Kr-74 Hf-173	Ir-192m1 Pr-135 Re-179 Y-97 Sb-134m	Ir-192 Tm-165 Rh-115 Ir-186 Th-224	Au-192 Te-112 Xe-139 Er-151m	Nb-102m Pm-157 Gd-140 Re-186
297.81	—	u Bi-214	B-	19.9 M	Dy-157 Hg-189gm Xe-137 Ag-117m Te-114	Br-77 Pr-152 Ba-146 C-16 Hg-187gm	Sb-126 Er-163 Es-249 Ag-113m Tb-160	Ga-73 Fe-61	Tm-165
298. 298.1 298.58	5.2E-05 2.1E-05 —	u Po-214 u Pa-234 c Cd-113	A B- NN	164.3 US 6.70 H	Hg-189gm Xe-137 Ag-117m Te-114	Pr-152 Ba-146 C-16 Hg-187gm	Er-163 Es-249 Ag-113m Tb-160	Fe-61	
298.76 299.1	< 0.02 6.4E-04	u Pb-214 u Pa-234m	B- B-	26.8 M 1.17 M	Au-186 Pu-237 Ho-163m Sm-136 Ir-197gm	Gd-149 Pt-181 Sr-100 Tm-153 Tm-163	Pm-133 Eu-139 Sm-158	Np-233 Pb-187m U-240	In-132 Kr-79 Xe-116
300. 300. 300.07 300.09	3.1E-04 2.63 2.47 3.28	a Fr-223 a Th-227 a Pa-231 t Pb-212	B- A A B-	21.8 M 18.72 D 3.276E+4 Y 10.64 H	Ir-197gm Sm-134 Ce-135 Ra-227 Ir-189m1 Xe-121	Tm-163 W-171 Pt-179 Os-177 Ir-189m2 Ir-194	Sm-158 Pt-179 Cu-67 Ga-67 Pt-189	U-240 Xe-116	

Energy 301.7 ~ 319.2 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
301.7	=5.0E-03	a U -235	A	703.8E+6 Y	Ru- 95	Ag-124	Mo-107	Tl-196m	Pr-148
302.65	2.87	a Pa-231	A	3.276E+4 Y	Pm-144	Au-190	Os-174	Rn-206	Pd-116
					Pb-196	Gd-162	La-133	Os-192m	Ba-133
					Pr-138m	Rh-107	Pm-136m	Xe-133	Ce-132
					Lu-163	Np-240m	Cm-244	Pr-133	
304.2	< 0.042	u Bi-214	B-	19.9 M	Ba-145	Sb-130	I -117	Es-250	
304.52	1.3E-04	a Fr-223	B-	21.8 M	Er-157	Ru-111	Pd-115	Re-183m	Se- 75
304.52	1.21	a Th-227	A	18.72 D	Ba-141	Zr- 83	Sn-131gm		
304.9	5.9E-07	u Hg-206	B-	8.15 M	U -242	Bi-210m			
304.9	--	u Bi-210	A	5.013 D					
305.26	0.031	u Pb-214	B-	26.8 M	Pt-187	Ba-140	Kr- 85m	Zn- 62	
306.88	94.	Lu-176	B-	3.78E10 Y	Hg-183	Cs-147	Tl-190m	Rh-115	Pr-131
					Ac-223	Gd-159	Re-170	Th-225	Zn- 77
					Rh-105	Pm-135m	Ag-105m	Rn-227	Cs-143
					Ir-195m	Hg-192	Ge- 83	Kr- 74	Hf-173
					Sm-139	Rn-208	Cu- 73	Hf-166	Tc-101
					Pr-140	Ac-231	Sn-129m	Cs-123	Os-192m
					Er-151m	Cs-146	Gd-151	Ta-186	Bk-249
308.4	1.9E-04	a Fr-223	B-	21.8 M	Yb-169	Tl-197	Cd-105	Pb-197m	Tc- 95
308.4	0.013	a Th-227	A	18.72 D	Xe-119	Os-175	Os-196	Pu-245	Cr- 48
308.6	3.3E-05	u Pa-234	B-	6.70 H	Ir-192	Au-192			
308.78	3.9E-04	a Th-231	B-	25.52 H	Xe-114	Xe-142	Tl-197		
					Th-236	Np-241	Re-179	Ir-181	Pt-179
					Pr-134m	Ho-145	Au-185	Ba-142	Tb-143
310.	1.5E-03	a Pa-231	A	3.276E+4 Y	Pb-187m	Ho-159	Sr-100	Kr- 76	Nb-105
310.2	1.2E-04	u Pa-234	B-	6.70 H	Pa-228	U -227			
310.52	2.1E-07	u Pa-234	B-	6.70 H	Kr- 72	Pa-237	Dy-167		
310.52	8.7E-05	u Pa-234m	B-	1.17 M	Pb-205m	Xe-121	Co- 65	Au-185	
310.69	=4.0E-03	a U -235	A	703.8E+6 Y	Xe-116	Ge- 80	Er-158	Fe- 64	
311.	2.9E-03	a Th-231	B-	25.52 H	Ta-174	Rh-101m	At-205	Hf-173	Sn-130m
					Pd-109	Hf-177m2	Fr-212	Po-206	In-114m2
					Rh- 94	Ta-166	Cm-251	Pt-187	
312.69	2.4E-04	a Fr-223	B-	21.8 M	Kr- 77	Zn- 80	Te-133	Np-233	Cs-147
312.69	0.473	a Th-227	A	18.72 D	Pt-183m	Rh-107	Ag-117	K - 42	Sc- 42
312.92	0.102	a Pa-231	A	3.276E+4 Y	Ho-145	Ta-183	Au-183	Hg-185gm	
313.5	1.6E-04	u Pa-234	B-	6.70 H	Pb-195m	Ta-183	Pu-237	Gd-140	
313.59	0.031	a Pb-211	B-	36.1 M	Rb- 75	In-121m	Sm-136	Hf-164	Lu-163
314.32	0.078	u Pb-214	B-	26.8 M	Sb-128m	Cs-119	Cs-119m	Rn-210	Sb-128
314.78	2.5E-05	a Fr-223	B-	21.8 M	Tc- 96	Sn-117m	Se- 68		
314.78	0.437	a Th-227	A	18.72 D	Ag-121	Pr-147	Er-161	Ir-192	Pa-230
314.9	--	u Bi-214	B-	19.9 M	V - 55				
					Gd-161	Tm-164m	Ho-145	Tb-144m	Tm-155m
					In-117m	In-129m	Er-148	Hg-185gm	Os-196
316.7	1.6E-04	u Pa-234	B-	6.70 H	Pr-133	Kr- 76			
316.7	1.8E-04	u Pa-234m	B-	1.17 M	Ra-219	Hf-183	Np-239	In-126m	Hf-179m2
					Sr- 80	Po-202	Es-254	Ag-113m	Au-196m2
					W -170	Ag-113	I -134m	Ba-146	Pr-149
					Pt-183m	Ru-105	Rn-208	Tc- 96	Lu-180
317.1	=1.0E-03	a U -235	A	703.8E+6 Y	Ir-192	Au-192	Pm-133	Ce-146	Yb-152
317.87	8.0E-05	a Th-231	B-	25.52 H	Rh-114m	Ce-131m	Lu-163	Ac-229	Pt-199
					Sm-157				
					Tl-189m	Pt-189	Pd-103	Sr- 79	Ru-103
					Bi-198ml				
318.1	3.4E-03	a Pa-231	A	3.276E+4 Y	Re-184m	Ta-184	I -131	Pr-151	Cs-129
318.46	6.1E-03	a Th-227	A	18.72 D	Zn- 69	La-129	Ta-182m2	Au-195m	Ge- 69
					Ta-172				
319.2	6.9E-03	a Fr-223	B-	21.8 M	Rh-105	Hf-175	Ir-181	Au-190	Cs-147
319.2	0.032	a Th-227	A	18.72 D	Lu-177m	Ag-105m	Ag-105	Cs-147	Nd-156

Energy 320.1 ~ 338.3 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
320.15	1.1E-04	a Th-231	B-	25.52 H	I -121	Ir-195m	Zr- 84	Yb-160	Ra-221
320.4	8.2E-05	u Pa-234	B-	6.70 H	Cr- 51				
					Ho-152m	Xe-119	Ho-158gm	Se- 73m	I -119
					Lu-162	Pu-237	Re-183m	Kr- 94	Cs-121m
					Hg-189gm	Np-233	Am-237		
321.65	0.226	t Ac-228	B-	6.15 H	Sb-125	Au-189m	In-104	In-128m	Cf-249
					Y - 97m2	Sm-158	Ho-167	Lu-177	Th-225
					Dy-144	Cs-127	Os-193	Rh-107	Rh- 99m
323.83	0.028	u Pb-214	B-	26.8 M	Mo-105	Pu-243	Tc- 99m	Ce-149	Rh- 99
323.87	3.93	a Ra-223	A	11.435 D	Hg-187gm	Mo- 90	Tm-155m	Dy-153	Tm-167
					Kr- 93	Pd-117	Ir-194m2	Sr- 79	Cd-121
324.9	<6.5E-03	a Rn-219	A	3.96 S	Pr-131				
					Sm-141	Tb-146m1	Ru- 97	Cs-138m	Sm-158
					Au-180	Rn-206	Pm-135m	Lu-168	Dy-146
					Ce-148				
324.94	=4.9E-03	a Th-227	A	18.72 D	Os-174	Pb-191m	Rh-101	Ba-145	Hg-185gm
325.8	=4.0E-04	a U -235	A	703.8E+6 Y	Rn-208	Cd-126			
					Ho-155	Rh-109	Ag- 96	Hf-178m1	Hf-178m2
					In-108	Lu-178m	Ga- 73	Nd-138	I -131
					Cs-147				
326.04	0.033	t Ac-228	B-	6.15 H					
326.11	= 0.024	a Th-227	A	18.72 D	Pd-119	Ag-115	Dy-157	Sn-106	Ho-154
					Au-196	Tl-191m	Nd-149	Mo-106	
327.13	0.038	a Pa-231	A	3.276E+4 Y	Y -102m	Y -102	Hf-177m2	As- 71	Sm-158
					Tl-188m1	Ru-112	Sb-114	Bk-249	
327.44	0.12	t Ac-228	B-	6.15 H	Np-232	Pu-245	Eu-149	Yb-160	Pa-228
					Hf-177m1	At-204	Cs-147		
328.	2.95	t Ac-228	B-	6.15 H	U -232				
328.03	0.125	t Bi-212	A	60.55 M					
328.12	1.4E-03	a Tl-207	B-	4.77 M	Po-200	Bi-207	Sc- 42m		
328.12	9.0E-06	a Po-211	A	0.516 S					
328.4	0.206	a Ra-223	A	11.435 D	Ca- 38	Ba-126	Gd-151	Rn-224	Cd-115
					Ca- 50	Ir-194	Ir-194m2	Au-194	Rh-116m
					Rb- 95	Y - 96	Er-155	La-140	Ra-222
					Lu-181	Pt-183m	Au-185		
329.85	3.7E-04	a Fr-223	B-	21.8 M	Bi-195gm	Tc- 92	Sb-134m	Bi-210m	Ir-192
329.85	2.66	a Th-227	A	18.72 D	I -118m	Rn-207	Gd-145m	Ce-132	U -242
330.06	1.4	a Pa-231	A	3.276E+4 Y	Ra-227	Xe-123	Hg-185gm		
330.4	=1.2E-04	u Pa-234	B-	6.70 H	Yb-159	Pt-200	Eu-139	Tm-176	
331.4	1.2E-04	u Pa-234	B-	6.70 H	Sb-130	Pr-133	Hg-181	Rb- 99	Pm-251
					Cs-122m2	Tl-201m	Y -100	Pb-201	Sc- 51
					Hg-191	Pb-187	Ag-105	In-131m1	Hg-191m
					Lu-178m	Pr-134m			
332.37	0.4	t Ac-228	B-	6.15 H	Sn-125m	Mg- 21	Au-185	Sn-125	Hf-180m
					U -237	Cs-146	Sb-113	Rh-101m	Rh-114m
					Au-200m				
333.31	0.08	u Bi-214	B-	19.9 M	Ir-196	Fr-228	Pr-149	Au-196	Ag-113
					Cf-249	Re-186	Ac-223	Bk-244	
333.99	0.1	a Ra-223	A	11.435 D	Tl-189	Au-198m	Ba-129	Eu-150m	Pm-150
					Eu-150	Te-136	Se- 87	V - 55	Ho-145
334.38	1.4E-04	a Fr-223	B-	21.8 M	Pr-134m	Te-133m	Te-131m	Te-133m	Np-239
334.38	1.03	a Th-227	A	18.72 D	Zn- 60	Lu-181	Rh-101		
334.78	< 0.034	u Bi-214	B-	19.9 M	Ho-154m	Ho-154	Hg-187gm	Xe-142	Fe- 59
					Pr-131	Cs-125	Tl-189m	Fr-208	Tm-158
					Nb- 98m	Pm-134m	Pt-185gm	Pb-202m	Pt-181
337.7	8.6E-03	a Rn-219	A	3.96 S	Hg-185gm	Rh-101m	Cs-118gm	Rn-209	Ru-113
					Bi-196m2	Tm-162m	Lu-179	Ag-117m	Ag-117
338.1	1.1E-03	u Pa-234m	B-	1.17 M	Ge- 75	Eu-138	Ge- 66	Gd-161	Dy-146
338.28	2.79	a Ra-223	A	11.435 D					
338.32	11.27	t Ac-228	B-	6.15 H	Pa-228	Po-206	Tb-163	Er-151m	Au-183

Energy 339.8 ~ 357.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
339.8	9.6E-04	a Fr-223	B-	21.8 M	Ir-194m2				
339.8	--	a Th-227	A	18.72 D	Re-182	Yb-180	Cu- 59	Ag-113	Hf-182m
					Co- 57	W -174	Sm-140	Ho-145	Er-163
					Yb-157				
340.2	6.4E-05	u Pa-234	B-	6.70 H	Co- 65	Pm-151	Th-236	Mo-108	Ir-189m2
340.2	7.0E-05	u Pa-234m	B-	1.17 M	Pm-152m1				
340.74	0.181	a Pa-231	A	3.276E+4 Y	Rh-115	Rh-116m	Rh-116	Tb-143	Sn-132
					Tb-155	Cs-147	Rh- 99m		
340.96	0.369	t Ac-228	B-	6.15 H	Cu- 76gm	Nd-133m	Te-137	Ho-157	Pb-191m
					Sm-140	Gd-162	Er-158	Nd-138	Lu-181
342.5	1.9E-04	a Fr-223	B-	21.8 M	Hf-166	Yb-157	Pm-135	Ag-111m	Ag-111
342.5	0.388	a Th-227	A	18.72 D	Kr- 92	Sn-104	Ir-183	Ag- 99m	
342.9	0.219	a Ra-223	A	11.435 D	Pd-115	Cd- 99			
342.91	0.035	a Pb-211	B-	36.1 M	Cd-119	Tb-150m			
343.5	=3.0E-03	a U -235	A	703.8E+6 Y	Hf-175	As- 82m	Tm-176	Pb-187	Dy-166
					Tc-103	Tb-141			
343.8	5.4E-05	u Pa-234	B-	6.70 H	Ba-141	Am-240	Er-149	Er-149m	Rh-101
344.3	1.2E-08	u Hg-206	B-	8.15 M	Hf-182m	Bi-210m	Tb-152m	Eu-152	Tb-152
					Cd-117	Ag-105	Rn-207	Tm-156	I -136
					Pm-151	Hf-184	Au-182	Zn- 65	Pa-228
345.9	0.038	a U -235	A	703.8E+6 Y	Se- 85	Nd-153	Pm-133	Po-207	Rb- 91
					Rb- 76	Hf-181	Cm-247	Mn- 52	Er-150
346.45	9.7E-03	a Th-227	A	18.72 D	I -123	Tc-103	Ce-133	Zn- 74	Bi-202
					La-129	Ho-167	Tm-167	Pt-197m	Ho-154m
346.8	= 0.178	a Ra-223	A	11.435 D	Gd-149	Eu-138	Tb-154m2	Hg-186	I -136m
					Te-114	Co- 60	Tm-165	Cd- 98	Hf-171
					Tb-147	In-109	Hg-185gm		
348.5	6.1E-03	a Th-227	A	18.72 D	Er-157	Tb-163	Ir-183	Dy-159	Au-189
					Gd-159	Lu-168	Pt-181	Tm-159	Bi-200
					Yb-178	Np-231	Nb-105	Sb-130m	Ta-175
					Rh-112	Rh-112m	La-129		
348.92	0.12	u Bi-214	B-	19.9 M	Hg-185gm	Re-174	Hg-186	Cd-121	Es-250
					Pd-118				
350.43	0.112	a Th-227	A	18.72 D	Fm-251	Sm-135	Eu-149	Rn-208	Xe-122
					Cs-147	Re-172	Re-172m	Bk-245	Rb- 79
					Rn-206	Na- 21	F - 21		
351.06	12.91	a Bi-211	A	2.14 M	Lu-173	Os-178	Bi-197	Te-112	Ce-145
					Hg-207	Re-182	Gd-141m	Pt-191	Nb- 99m
					Tb-163				
351.51	7.3E-03	a Pa-231	A	3.276E+4 Y	Tl-182	Ce-146			
351.8	7.0E-05	a Th-231	B-	25.52 H	I -118	Yb-179	Au-187		
351.9	0.07	u Bi-214	B-	19.9 M	Cs-148	Re-178			
351.9	6.6E-04	u Pa-234	B-	6.70 H					
351.93	37.59	u Pb-214	B-	26.8 M	Rb- 95	Er-156			
352.36	--	c Fe- 56	NG		Dy-167	W -168	Ho-152m	Tb-149	Ag- 98
					Mn- 57	Co- 57	Ce-148	Pr-145	
352.61	2.9E-06	a Fr-223	B-	21.8 M	Sr- 92	Se- 68	Xe-142	Ce- 75	Tl-199m
352.61	0.012	a Th-227	A	18.72 D	Rh- 99	Hf-175	Pb-199	Ag-121	
354.46	0.1	a Pa-231	A	3.276E+4 Y	La-147	Gd-151	Pr-137	Au-191	Yb-157
					Cs-124	Sr- 85	Zn- 78	Tb-163	Tc-107
					In-120m2	Dy-146	Rn-205	W -174	Xe-122
356.	8.3E-04	u Tl-210	B-	1.30 M	Kr- 76	Rb- 97	In-116m1	Zr- 97	Rb- 76
356.	7.0E-03	u Bi-214	B-	19.9 M	Au-196	Ir-196	La-145	Cs-121	Ir-196m
					Ba-133				
356.03	=5.0E-03	a U -235	A	703.8E+6 Y	Ba-147	Kr- 89	Tb-156	Ir-195m	Pu-243
356.94	0.017	t Ac-228	B-	6.15 H	Se- 83m	Se- 83	Tl-186m1	Lu-165	Rh-110
					Hf-173	Hg-191m			
357.12	0.175	a Pa-231	A	3.276E+4 Y	Ba-130m				
357.5	7.9E-04	u Pa-234m	B-	1.17 M	Rb- 81	La-130	Ac-223	Pd-103	Rh-113
357.9	5.8E-05	u Pa-234	B-	6.70 H	Yb-157	Am-238	Tm-157	Br- 92	Rb- 75

Energy 359.3 ~ 380. (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
359.3	9.0E-03	a Pa-231	A	3.276E+4 Y	Tc-104 Tc-105 Pd-114 Te-137 Th-225	Ce-147 Ho-171 Er-155 Ba-128 Nd-133	Rh-104 Fm-251 Lu-152 Ru-109 Pm-154m	Zn-79 Xe-135 Se-71 Ir-195m	Lu-158 Au-181
360.6	2.8E-05	u Pa-234	B-	6.70 H	Ge-67 W-189 Re-181 Yb-157 Gd-141m	Cs-142 Tc-107 Nd-133m Lu-165 Os-190m	Rh-112m Cd-102 Pt-184m Re-190 Ir-190m2	Zr-83 Te-127 Re-171 Re-190m Pb-201	Pt-191 Tm-150 Gd-161 Ir-190
362.	<2.6E-04	u Tl-206	B-	4.199 M	Rn-208 Ag-121	Dy-165m Rh-114	Yb-155 Rh-114m	Dy-165 La-123	Sm-158 Po-199m
362.06	0.045	a Ra-223	A	11.435 D					
362.07	0.043	a Pb-211	B-	36.1 M	Pm-135	Kr-88			
362.5	4.6E-03	a Th-227	A	18.72 D	Tb-143	Np-241	Pr-133	Au-184	Hf-179m2
362.8	6.8E-04	u Pa-234m	B-	1.17 M	Ir-178 Rb-101 Re-168 Sm-158 Tm-174	Kr-85 Y-96m Lu-174m Tm-175	Sr-85 Cs-132 Cf-247	Yb-164 Dy-159 Cd-115	Sm-135 In-124m Ba-142
363.47	7.8E-03	u Bi-214	B-	19.9 M					
363.84	7.8E-03	a Pa-231	A	3.276E+4 Y	I-131 Br-91 La-131 Cs-147 Pm-139	As-79 Dy-147m In-107 Sr-97 Pb-194	Ba-147 Ir-189m2 Rn-208 Bk-245 Au-200	W-174 Ir-195m Pb-198 Cd-126 Tl-200	Zn-60 Tl-193m W-172 Ho-153 Lu-166
365.	2.8E-05	u Pa-234	B-	6.70 H					
368.8	8.2E-03	a Ra-223	A	11.435 D	Tc-111 Cd-100 Au-187	La-123 Pm-136 Nb-105	Nb-104gm Cs-249 Lu-159	Zn-77 Bi-210m Ag-121	Hg-195m Ac-231
369.35	1.4E-03	a Fr-223	B-	21.8 M					
369.35	6.1E-03	a Th-227	A	18.72 D					
369.5	0.021	a Ra-223	A	11.435 D	Eu-141	Eu-141m	Hf-169	Po-207	Yb-153
369.5	4.0E-03	u Pa-234	B-	6.70 H	Fr-227	I-136m	Pm-136m	Gd-147	Ta-168
370.85	--	a Th-227	A	18.72 D	Eu-157	Ag-119	Tm-157		
370.9	<0.011	a Rn-219	A	3.96 S	Np-231 Re-190	U-237 Ir-190	Hg-191m	Pb-192	Rn-206
371.68	0.48	a Ra-223	A	11.435 D	Nb-90	Cd-123	Lu-163	Dy-166	Ag-121
372.	1.9E-03	u Pa-234	B-	6.70 H	Cs-129 Bi-196m2	Os-174 Xe-125	Xe-125 Te-110	Ho-149m	
372.57	6.7E-03	t Ac-228	B-	6.15 H	Ag-119 Tl-191m	Sn-111 Te-112	Mo-108 K-43	Tm-150 Se-43	Ac-223 Zr-84
373.3	0.049	a Ra-223	A	11.435 D	Lu-165	Yb-160	Cu-61	Xe-135	Pr-151
374.79	1.3E-03	a Th-227	A	18.72 D	Ra-232 Rh-110 As-69 Te-115 Pb-204m	Gd-163 Ag-110 Hg-199m Os-192m Ag-111m	Pm-136m Ag-123 Tl-186m2 Ir-192 Bi-204	Re-173 At-200gm Ce-147 Ag-111	Pm-136 Ru-107 Br-73
374.93	4.9E-03	a Pa-231	A	3.276E+4 Y	Tm-159 Pu-239	Xe-127 Es-249	Ba-128 Ir-181	Te-127	Yb-180
375.59	4.6E-03	u Bi-214	B-	19.9 M	Cs-127	Sr-76	Pb-197	Ta-163	Tl-191m
376.	0.012	a Ra-223	A	11.435 D	Tm-160m	Fm-251	Mo-104		
376.3	--	a Th-227	A	18.72 D	Cf-247	Cd-127	Hg-187gm	Np-231	Pb-190
377.99	0.025	t Ac-228	B-	6.15 H	I-140 Ta-164 Br-75 Zn-75 Hf-177m1	Pd-111 La-145 Es-252 Fe-53 W-174	Pu-245 Sm-136 Cs-147 Yb-155	Tc-109 W-174 Hf-166 Ir-197gm	Pd-111m Mn-52m Ir-172m
379.1	6.6E-05	u Pa-234	B-	6.70 H	Tc-100 Tm-155m	Lu-169 Os-183	Sr-80 Ga-73	Ba-145 Tb-141	Gd-140
379.3	0.05	a Pa-231	A	3.276E+4 Y	Os-182	Re-183m	Pd-118	Es-249	
380.	3.2E-05	a Rn-219	A	3.96 S	Te-114	Tb-151m	Rn-208	Xe-142	La-146m
					Ce-149	Sm-134	Tb-143	Tb-151	Sb-125

Energy 382. ~ 399.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
382.	6.2E-04	u Tl-210	B-	1.30 M	Bi-195gm Es-253 Pt-188 Pd-95m Ru-111	Y-87m Sr-83 Sr-83 Tm-176 Pb-198	Bk-245 Hg-180 Y-94 Au-180 Am-240	I-116 I-136m Tc-112 Ge-66	Sn-123m Pu-243 Pm-133
382.4	7.0E-06	a Fr-223	B-	21.8 M	I-121	Sb-132	Sb-132m	Se-86	Hg-193m
382.4	-6.1E-03	a Th-227	A	18.72 D					
382.8	0.014	a Ra-223	A	11.435 D	Tl-199m	Bi-192gm	Eu-141	Sn-113	Rh-98m
383.52	0.046	a Th-227	A	18.72 D	Fm-251	Gd-146	Er-172	Pa-230	Tl-195m
					Es-250	Co-65	Xe-133	Ba-133	Tl-192gm
384.63	6.7E-03	t Ac-228	B-	6.15 H	Te-131				
					Ge-64	Re-184m	Ta-184	Rn-209	Mo-107
384.7	3.7E-03	a Pa-231	A	3.276E+4 Y	Sn-109	Eu-141	Pt-185gm	Dy-146	
385.4	6.6E-05	u Pa-234	B-	6.70 H	Pr-151	Au-185	Bk-245		
					Au-201	Mo-93m	Co-55	Tm-157	Yb-180
386.77	0.31	u Bi-214	B-	19.9 M	Y-80	Pb-197m	Pb-197	Tb-152m	Sr-98
					Dy-151	Ho-167	Hf-182m	Zn-71m	Tb-163
					Rn-209	Hg-195m	Cu-70m	Sn-106	Sr-81
					Rn-206	Pd-99	Rn-209	Ag-117m	Er-158
387.	4.9E-04	a Pa-231	A	3.276E+4 Y	Au-191	Cd-103	Pb-191m	Es-253	Br-71
387.82	0.038	a U-235	A	703.8E+6 Y	Zr-99	Os-193	Os-174	Pr-131	Ho-145
					Pb-197m	Hg-195m			
387.94	1.1E-06	u Pa-234	B-	6.70 H	Pa-232				
387.94	1.4E-03	u Pa-234m	B-	1.17 M					
388.	0.015	a Ra-223	A	11.435 D	As-81	Au-202	Cf-249	Ba-144	Rh-112m
388.88	0.37	u Bi-214	B-	19.9 M	Tb-142				
					Sr-87m	Y-87	Tb-149	Tc-103	Ag-108
389.12	0.01	t Ac-228	B-	6.15 H	Cs-126	Sb-111	Ag-115m	Kr-79	
					Tb-141	Es-253	Gd-141m	Yb-176m	Fr-208
					Yb-160	Dy-153	Ho-148m1	Na-25	Al-25
390.3	0.04	a U-235	A	703.8E+6 Y	Tb-163	Au-185	Zn-71m	Pb-202m	Zn-71
390.4	6.9E-03	a Ra-223	A	11.435 D	Yb-159	Au-191	Nd-136		
					Ir-184	Tl-198m1	Au-187	Rn-208	Yb-164
391.6	7.8E-03	a Pa-231	A	3.276E+4 Y	Yb-178	Ir-194m2	Pr-138m		
					Mn-61	Mo-108	Lu-163	Pd-111m	Er-157
					In-130m1	Fr-227	Y-83	In-113m	Sn-113
392.4	9.7E-03	a Th-227	A	18.72 D	Te-113	Tc-93m	Kr-73	Pt-199m	
					Ag-113m	Ba-129m	Si-35	Ho-162	Hg-184
393.5	0.011	a Ra-223	A	11.435 D	Ba-146	Ce-131	Ir-183	Ag-105	Zr-88
					Hg-186	Cs-117	Ta-175	Pr-152	Pt-179
					Ru-105	Rb-77	Au-196	Pb-187	Se-73m
					Cs-116	Ir-196m	Cu-67	Ga-67	Ru-91
394.05	0.015	u Bi-214	B-	19.9 M	Ho-150m	Ir-182	Eu-141m	Eu-141	Tm-175
394.1	1.5E-04	u Pa-234	B-	6.70 H	Zn-62				
					Xe-142	Pm-135m	Pb-195m	Pt-184	Sm-157
395.5	2.2E-03	a Pa-231	A	3.276E+4 Y	Ta-185	Ta-169	Tb-148m		
					S-39	Kr-94	Ac-234	Y-97m2	Ce-131
396.01	0.029	u Bi-214	B-	19.9 M	Tb-151	Tl-194	At-206	Eu-141	Eu-141m
					W-166	Gd-147	Ta-163	Yb-175	Sn-108
					Gd-163	S-39	In-102	Pa-238	Xe-138
					Y-97m2	In-117			
397.7	4.3E-05	u Pa-234	B-	6.70 H	K-43	Mo-87	Pm-132	Dy-150	Lu-168
					Re-190	Re-190m	Ir-190	Al-29	P-29
					La-144	Kr-79	Rb-79	Pb-198	Pa-230
397.94	0.027	t Ac-228	B-	6.15 H	Hf-183	Hf-164	Bi-206		
398.14	8.8E-03	a Pa-231	A	3.276E+4 Y	V-52	As-69	Rh-116	Rh-116m	Ho-152m
					Rh-110m				
399.	-2.4E-03	a Th-227	A	18.72 D	Zn-71	Ho-167	Pm-135m	Hg-185gm	Hg-189gm
					Eu-138	Ir-175	Ag-119	Zn-77	Se-69
399.62	0.029	t Ac-228	B-	6.15 H	Nb-88m	Nb-88	La-147	Es-252	Pd-99

Energy 401.1 ~ 426.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
401.1	0.329	Lu-176	B-	3.78E10 Y	Ag-119 Zr-100 Br- 73 Xe-138	Ac-234 Lu-165 Bi-196	Ge- 75m Se- 75 Lu-168	Mo-107 Mg- 28 Lu-167	Lu-163 Pt-187 Sn-104
401.8	5.8E-05	u Pa-234	B-	6.70 H	Se- 73m	Tc-103	Ba-124	Ho-145	
401.81	8.0E-06	a Bi-215	B-	7.6 M	Re-179				
401.81	6.37	a Rn-219	A	3.96 S					
402.5	9.5E-06	a Fr-223	B-	21.8 M	In-109m2	Pt-179	Cm-247	Pd-117	Kr- 87
402.5	—	a Th-227	A	18.72 D	Kr- 94 Nd-133m	Au-181 Pm-139	Tl-186m1 Nb- 88	Rn-207 Tb-141	Pt-181 Gd-162
404.2	2.2E-03	t Ra-224	A	3.66 D	Tc-103 Tl-199	Er-151m	Sm-141	Pt-189	Tl-194
404.85	3.78	a Pb-211	B-	36.1 M	Pb-191m	K - 43	Sn-128		
= 404.85	—	a At-215	A	0.10 MS	Rh-108	Nd-139	Hg-180	Fm-253	Ge- 83
405.74	0.17	u Bi-214	B-	19.9 M	Tl-186m1 Rh-106m	I -134 Ho-158m2	Cs-147 Pb-201	Fm-251 Th-235	Po-207 Ag-106m
407.81	0.036	a Pa-231	A	3.276E+4 Y	Xe-142 Ho-154m	Kr- 76 Cf-247	Eu-150m Y - 97m1	Pm-150 Ag-119	In-122m2
					Re-190m	Ir-190	Er-172	Sb-116m	Ir-198
409.46	1.92	t Ac-228	B-	6.15 H	Te-133 Lu-180 Se- 84 Se- 88 Au-197m	Hg-193m Ra-227 Tc-112 Bk-245 Hg-197m	Am-237 Xe-135 Sm-137 Cs-138m Eu-157	Bk-245 Te-114 Rn-209 Cs-138 Pr-134	Os-196 Y - 81 Tm-159 Pt-197m Pr-134m
409.8	5.4E-04	u Pa-234	B-	6.70 H	Rh-113 Hf-179m2	At-200gm Zn- 75	Pm-133 Ag-123	Pt-191 Pm-155	Y - 85 La-146
410.29	3.0E-03	a U -235	A	703.8E+6 Y	Os-175 Hf-162	Th-224 Sn-129	Fm-251		
410.3	3.2E-03	a Pa-231	A	3.276E+4 Y	Tb-164	Fr-228	Pm-137	Cl- 39	Eu-157
414.6	3.0E-04	u Ra-226	A	1600 Y	Yb-179 Eu-152 Ba-146 Se- 70 Eu-148	Ho-166m In-130m1 Lu-177m Rn-208 Pm-148m	Co- 54m Ho-150m Pu-239 Pm-133 Sr- 80	Os-177 Au-191 Er-151m Cs-121m	Tb-152 Sr- 79 Ta-184 Pb-192
415.13	1.6E-03	a Th-227	A	18.72 D	Rb- 96 Sb-126	Nd-133 Tb-163	Sb-126m1 Ra-221	Xe-142 Zr- 99	Sr- 76
415.2	0.143	t Pb-212	B-	10.64 H	Kr- 72 Pd-109 Hg-205	Tb-163 Ru-110	Ra-221 Re-179	Pd-111m	Au-186
416.1	5.8E-05	u Pa-234	B-	6.70 H	Ga- 82 Rn-227	Ba-148 Hg-185gm	Yb-164	Cm-251	Si- 33
416.3	0.013	t Ac-228	B-	6.15 H	Zr- 85 Zr- 85m In-116m1	Ge- 77 Dy-146m W -189	Tl-190 Ho-146 At-203	Tl-190m Xe-122 Th-235	In-107 Tm-149 W -177
419.42	0.021	t Ac-228	B-	6.15 H	Es-252 Nd-155 Ge- 77m	Rh-102m Sm-134 Pm-140m	Lu-177m Ge- 75 Nd-133m	Hf-177m1 Po-203 Bi-200	Tl-184 Re-172 Yb-180
422.	—	u Bi-214	B-	19.9 M	Ba-129m Mo-104	Cd-121m Os-177	Y - 83 Ru-111	Hg-191m Lu-166m1	Rh-102m Au-191
422.04	3.0E-03	t Ra-224	A	3.66 D	La-124gm Ce-148 Pb-202m	Rh- 97m Y - 83m Bi-202	Rh- 97 Hg-184 Cm-251	Gd-146 Tb-163 Tb-156	Bi-196m2 Mn- 61 Cd-119m
425.3	5.8E-05	u Pa-234	B-	6.70 H	Tc-110 Ta-177	Er-155 Ce-132	Rb- 99 Ho-162m	Tl-192gm Si- 36	Tc-108 Ti- 45
426.95	7.3E-04	u Pa-234	B-	6.70 H	Fr-210 Am-237 Se- 68 Rh-109 Lu-178m	Bi-199 Tl-197 Se- 70 Hf-178m1	Fm-251 Mo- 91m Ag-117	Np-233 Dy-166 In-109 Ta-178m1	Tl-196 In-125 At-204 Au-187

Energy 427. ~ 452.7 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
427.	6.8E-04	a Pa-231	A	3.276E+4 Y	Nd-133	Tb-151	Tb-154m2	Rn-208	Ru-109
427.09	1.76	a Pb-211	B-	36.1 M	W-177	Ge-64	Pm-133	Ir-187	
427.4	4.9E-08	u Pa-234	B-	6.70 H	Cs-121m	Cs-121	Pt-187		
427.4	2.0E-05	u Pa-234m	B-	1.17 M	Pd-99	Tb-163			
428.	<2.3E-03	u Bi-214	B-	19.9 M	Br-75	Sb-125	Gd-140	Cs-125	Cd-126
					Cd-100	Sm-135	Tl-194m	Tl-194	Po-201
					Rh-106	Cd-123m	Pb-195m	Ag-106	Nd-133
					Es-253				
430.	6.5E-03	a Pb-211	B-	36.1 M	Si-34	Sr-98	Ba-146	Rh-106m	Ag-106m
					Hg-185gm	Md-255	Mo-107	La-145	Re-179
430.5	0.019	a Ra-223	A	11.435 D	Po-200	Ag-121	Ba-144	Sr-92	Ir-189m2
					Ir-197gm	Cm-241	Bk-245	Pd-115	Ga-76
432.1	0.034	a Ra-223	A	11.435 D	Au-181	Ba-143	Er-163		
					La-144	Sm-145	S-40	Re-190	Eu-136gm
					Sm-141m	Cu-76gm	Ti-45	As-79	Y-95
432.33	4.6E-03	a Th-227	A	18.72 D	Fe-63	Dy-151			
433.	=4.0E-03	a U-235	A	703.8E+6 Y	Zn-75	Xe-142	La-140	Eu-152m1	Ce-133
433.1	1.5E-04	u Pa-234	B-	6.70 H	Tm-155m	Ir-195m	Pr-149	Hf-175	
433.7	0.017	t Bi-212	A	60.55 M	Es-253	Tl-197	Ce-137	Cd-105	Rb-98m
					Lu-154	Ce-131	Tb-143	Sb-131	Fr-227
					Eu-141	Eu-141m	Ag-108m	Ag-108	Cs-126
434.4	3.3E-05	a Fr-223	B-	21.8 M	Rh-108m	Dy-153	Cd-117	Rh-108	Ac-223
					Th-236	Po-200	Hg-189gm	Xe-138	Sn-130
435.05	3.1E-03	a Pa-231	A	3.276E+4 Y	Ir-186	Re-171	Te-134	Re-183m	La-145
					Cs-145				
438.01	4.6E-03	a Pa-231	A	3.276E+4 Y	Te-114	Pm-138m	Tm-149	Ba-140	Es-249
					Pr-151	Eu-139	Rh-94m	Rh-94	
438.2	<0.03	a Rn-219	A	3.96 S	Sn-127	Sm-141	Au-201	Cm-251	La-147
					Am-237				
438.7	1.5E-03	a Pa-231	A	3.276E+4 Y	Zn-69m	Xe-140	Hg-187gm		
438.8	=0.04	a Po-215	A	1.781 MS	Cs-117	Pt-184m	Au-193		
439.3	0.081	a Ra-223	A	11.435 D	Ag-101				
439.34	0.012	u Bi-214	B-	19.9 M	Eu-150				
439.6	4.6E-06	a Fr-223	B-	21.8 M	Br-77	Au-202	Tl-202	Rh-110	Ce-145
					Er-163	Ne-23	Mg-23	Mn-59	Rh-110m
440.44	0.121	t Ac-228	B-	6.15 H	I-123	Pr-131	Ta-169	Th-233	Au-189
					Tb-146m1	Au-190	At-202		
444.5	7.5E-06	a Fr-223	B-	21.8 M	Pa-230	Pd-103	Ru-103	Tb-151	Eu-152
					Ta-162	Rn-206	Ba-148	Ta-171	Yb-164
445.03	1.27	a Ra-223	A	11.435 D	Zr-104	Sb-127	Ho-147	Xe-121	Tl-189m
					Mo-90				
445.91	3.0E-05	u Pa-234m	B-	1.17 M	Pm-151	Tc-109	Tc-105	In-118m1	La-146m
					Er-172	Rb-81	Rh-100		
446.6	1.8E-04	u Pa-234	B-	6.70 H	Yb-164	As-79	Ir-196	Br-84m	Cd-121m
					Mo-105	Ir-196m	Ce-137		
448.	1.5E-04	a Th-227	A	18.72 D	La-145	Ho-168	Sm-139	Pt-181	Tm-168
					Cf-247	Re-190m	Np-240		
448.4	=1.0E-03	a U-235	A	703.8E+6 Y	Pa-238	Ir-172m	Y-92	La-129	Pr-151
					Ta-163	Pb-187m			
449.15	0.048	t Ac-228	B-	6.15 H	Lu-163	Ra-230	Nb-92m	Tc-94	Xe-120
449.37	1.9E-04	u Ra-226	A	1600 Y	Ac-229	Hg-187gm	Cu-73	Cs-114	Zn-63
450.93	3.0E-03	u Pa-234m	B-	1.17 M	Rb-75	Ag-100	Tm-159	Th-235	Hg-180
450.93	6.3E-06	u Pa-234	B-	6.70 H	Pb-200	Nb-88m	Ru-92	Sr-85m	Rh-106m
					Pr-148m	Nb-99m	Ag-106m	Kr-85m	Tl-189
					Rh-104	Ce-132			
452.4	4.3E-05	u Pa-234	B-	6.70 H	Kr-76	Nd-135	Ag-98	Ce-147	Te-131
452.47	0.015	t Ac-228	B-	6.15 H	Zn-79	Ba-130m	Po-199		
452.7	2.7E-05	a Fr-223	B-	21.8 M	Er-155				
452.7	=9.7E-05	a Th-227	A	18.72 D					

Energy 452.9 ~ 477.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
452.92	0.031	u Bi-214	B-	19.9	M	Tm-156			
452.98	0.363	t Bi-212	A	60.55	M	Os-192m	Fm-251	Xe-142	La-130
453.58	1.9E-03	u Pa-234m	B-	1.17	M	Tl-206m	Eu-139	Gd-140	Ir-172m
						Pa-232	La-131	Pd-101	Y-99
						Pr-146	Pm-146	Zn-78	Br-78
454.77	0.3	u Bi-214	B-	19.9	M	Lu-178m	Zr-85	Y-83	Pd-111m
						Kr-73			Br-72
454.95	2.5E-05	u U-234	A	2.455E+5	Y	Ac-230	Pa-230	Rb-78m	Rb-78
455.1	-8.0E-03	a U-235	A	703.8E+6	Y	Sb-130	Tl-199	Xe-137	Tb-150m
456.7	7.1E-04	u Pa-234m	B-	1.17	M	Nb-103	Cd-103	Pt-191	Ho-153m
						Ir-197gm			Lu-163
457.17	0.015	t Ac-228	B-	6.15	H	La-129	Os-177	Tl-206m	Pm-137
457.5	-6.1E-05	a Th-227	A	18.72	D	Pu-233	Sn-111	I-140	W-173
						Pr-138m	Ra-230	Ga-78	Eu-136gm
458.68	1.8E-03	u Pa-234	B-	6.70	H	Sm-143	La-129	Yb-161	Rn-210
						Tc-107	Lu-165	Hf-183	Ge-65
						W-172	Th-233	Xe-141	Pm-134
						Ru-112	Cs-119	Cf-247	Te-129
461.	0.053	u Bi-214	B-	19.9	M	Ho-167	Nb-96	Tc-96	Pb-194
						Rh-104	Nd-131	Ru-97	Lu-163
						Te-134	Pr-136	Hg-185gm	Fr-210
461.5	5.4E-05	u Pa-234	B-	6.70	H	Nb-100m	Tm-173	As-85	Xe-119
462.	0.221	u Pb-214	B-	26.8	M	In-110	Cs-147	Hg-187gm	Sr-101
						Bi-200	Bi-200m1		Ba-141
463.	4.4	t Ac-228	B-	6.15	H	Ru-107	Y-84m	Tc-105	Cs-138
						Zn-80	Cs-138m	Pa-228	Ba-130m
						Sb-116	In-116m1	Dy-151	Cm-241
464.2	4.9E-05	u Pa-234	B-	6.70	H	Tb-141	Bi-192gm	Lu-181	
						Rb-84m	Gd-143	Pm-135	Cs-132
						La-132m	Te-134		Rn-205
465.2	4.0E-03	a Ra-223	A	11.435	D	Tb-142	Ir-189m2	Re-179	Ga-79
						Tb-142	Pt-185gm	Ra-220	Pr-133
						Zn-77	Tc-108	Ru-109	Mo-106
466.4	0.029	t Ac-228	B-	6.15	H	Ir-189m2	Ar-32	Ce-147	Re-171
466.5	4.6E-05	a Th-227	A	18.72	D	Rh-116m	Cs-143	Cs-143	Sr-76
468.	3.5E-04	u Pa-234	B-	6.70	H	Cu-60	Hg-195m	Re-192	Ba-141
						Xe-141	Nd-134	Se-87	Sb-130
						Tl-188m1			Ir-192
468.44	2.3E-03	u Pa-234m	B-	1.17	M	Rh-102	Th-235	Ge-75	
469.33	3.1E-05	a Fr-223	B-	21.8	M	Si-35	Tc-102	Te-137	Zr-99
						Y-96			Hf-171
469.76	0.129	u Bi-214	B-	19.9	M	Ra-230	Ir-197gm	Mo-103	Fr-208
470.25	0.013	t Ac-228	B-	6.15	H	Re-182m	Hg-187gm	Te-121	Ni-69
						Er-155	Ge-66	Cs-130m	I-121
471.76	0.033	t Ac-228	B-	6.15	H	Pm-135m	Co-66	Tm-163	Dy-153
						Bk-245	Cm-241	Tb-152m	Rn-208
472.3	5.8E-04	u Pa-234	B-	6.70	H	Ne-24	Na-24m	Pa-232	Ra-222
473.	0.05	t Bi-212	A	60.55	M	C-18	Ag-115	Cs-118gm	Hg-187gm
						Rn-208	Am-237		Mn-59
474.2	5.8E-05	u Pa-234	B-	6.70	H	Kr-73	Ba-124	Ba-147	Bi-196
						Zn-77	Fr-228	Sr-101	Sr-97
474.41	0.11	u Bi-214	B-	19.9	M	Zr-83	Tm-150	In-118m1	Pr-149
474.75	0.022	t Ac-228	B-	6.15	H	Br-71	Eu-157	Pt-199	Lu-163
						Ta-175	Rh-102	Rh-102m	Zn-61
475.4	8.7E-05	a Fr-223	B-	21.8	M	Tc-102m	Pd-97	Nd-153	Ac-223
						Cs-134	Zr-83	Gd-141m	Tb-141
						Nd-139	Dy-144		Tb-163
475.75	2.3E-03	u Pa-234m	B-	1.17	M	C-17	Nd-135	Hg-187gm	Ce-131
						Er-150	Pa-238	Dy-151	Nd-133
477.6	—	c Be-7	EC	53.29	D	Nd-136	Pm-144	Sr-76	Te-112
									Hf-183

Energy 478. ~ 500.4 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
						Lu-158 Sn-106 Be- 7 Re-188 Pt-188	Fm-251 Ce-133 Pr-147 Ir-188 Pu-233	Pm-140 Re-179 Au-191	Ho-154m Nb-104gm	At-206 Mo-108
478.	0.013	a Pb-211	B-	36.1	M					
478.33	0.209	t Ac-228	B-	6.15	H					
478.6	2.0E-04	u Pa-234	B-	6.70	H	Ra-232	Ac-229	W -171	Ra-230	Ar- 43
479.6	5.2E-03	a Pb-211	B-	36.1	M	Rh-104	In-132	Ce-137	Pt-181	Te-114
						Tb-151	La-132m	Y - 90m	W -187	Rn-208
480.	4.2E-04	u Tl-210	B-	1.30	M	Re-168	Hg-180	Sr- 97	Hg-185gm	Gd-161
480.	1.9E-05	a Fr-223	B-	21.8	M					
480.	2.8E-04	a Th-227	A	18.72	D					
480.43	0.32	u Pb-214	B-	26.8	M	Tb-141 Pt-187	Bi-200	Fm-251	Ni- 56	La-135
480.94	0.023	t Ac-228	B-	6.15	H	Nb- 96	Tc- 96m	Sr- 98	Au-181	
481.	4.9E-04	u Pa-234	B-	6.70	H	Cd-102				
481.1	0.026	a Pb-211	B-	36.1	M	Ir-195m	Hf-170	Hf-183		
481.6	0.021	a Ra-223	A	11.435	D	Np-231	Tb-148m	Tc- 90m		
481.92	0.01	a Pb-211	B-	36.1	M	Lu-184				
482.	1.3E-04	a Th-227	A	18.72	D	Ho-170m	Hf-181	Sn-128	Yb-152	Ge- 81
						Pd-113	Ir-194m2	Ag-119	Ru-113	I -136m
						Hf-166	Ga- 68	Nd-134	Lu-163	Mo-107
485.44	1.9E-05	u Pa-234m	B-	1.17	M	I -138 Hg-189gm; At-200gm; Np-231 Rn-206	S - 39 Os-192m Y - 87	Th-235 Ir-192 Ge- 79m	Pr-135 Kr- 92 Na- 33	Cd-115m Cs-119 Sm-136
485.92	0.022	u Bi-214	B-	19.9	M					
485.95	0.018	t Tl-208	B-	3.053	M	Ir-187	Au-184	Re-188		
486.7	<6.0E-03	u Bi-214	B-	19.9	M	Pt-184m	At-203	Ba-131	Pt-187	Ho-147
486.83	2.0E-03	a Pa-231	A	3.276E+4	Y	Rn-208	Y -102	Cs-147		
487.09	0.422	u Pb-214	B-	26.8	M	Ra-227	Dy-168	La-140	Ag-105m	Sr- 99
487.6	0.011	a Ra-223	A	11.435	D	Te-129	Gd-141m	Au-191	At-203	Ag-118
487.95	0.028	u Bi-214	B-	19.9	M	La-128 Re-183m Ir-192	Pm-136m Pm-136 Ru-107	Re-170 Tb-148m Tb-148	At-200gm Ra-219 Sb-111	Ga- 73 Pa-238
490.33	0.011	t Ac-228	B-	6.15	H	Ca- 47 Y - 83 Tc-105	Sb-115 Au-185	Ba-126 Tc-109	Ho-152 Ce-143	Tl-198m1 Pb-202m
491.	5.3E-04	a Pa-231	A	3.276E+4	Y	Re-190m Se- 81m	Sn-127 Sn-127m	As- 81 Te-136	I -126 Zn- 59	Sr- 92 Rn-223
491.82	4.1E-03	a Pb-211	B-	36.1	M	Ta-177	Pu-245	Ir-187	Ir-189m2	Cs-145
492.37	0.024	t Ac-228	B-	6.15	H	Tb-141 Sm-145 Te-131	Tl-199 F - 23 Ba-145	Cd-115m Y - 92 Ta-171	Cd-115 Rh- 94	K - 45 Ho-152m
493.1	3.7E-05	a Fr-223	B-	21.8	M	Hf-169	Mn- 60m	In-130m1	Ga- 74	Rb- 75
493.1	5.1E-04	a Th-227	A	18.72	D	Cs-118gm	Pm-138m	Ir-184	Pm-135	
493.3	<3.6E-03	t Bi-212	A	60.55	M	Pb-187m	Zr-103			
494.2	1.7E-03	a Pb-211	B-	36.1	M	Pt-199	Pb-196	Te-112	Re-168	Tm-174
494.2	0.012	u Bi-214	B-	19.9	M	Ga- 67 Pm-134	W -172 Hf-178m2	Tb-141 Ne- 17	Y - 83m Pr-151	Tb-163
496.9	6.9E-03	u Bi-214	B-	19.9	M	Zn- 73 Ba-131 Ru-103	Hf-163 Gd-149 Pd-103	Tb-150 Pr-133 Ag-108	Tb-150m Ir-197gm Cs-122m2	Yb-159 Sb-132m Cs-122
497.49	5.9E-03	t Ac-228	B-	6.15	H	Tc-102m Kr- 89	Eu-139 Rn-206	Rh-108	Rh-108m	Sb-115
498.	9.9E-05	u Pa-234	B-	6.70	H	Au-200m Ho-145 Lu-163	Ag-119 Sb-124m1 Dy-146m	Sb-113 Se- 84 Ho-146	Zr-100 Ir-183 Th-233	Re-171 Dy-155
500.4	0.012	a Pb-211	B-	36.1	M	Cs-123 Tm-177	Hg-187gm Yb-179	Hg-193m Tb-141	Pd- 96 Rh-113	Po-199m Pu-233

Energy 501.4 ~ 524.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
501.4	8.5E-04	a Pa-231	A	3.276E+4 Y	Ag-121 Tm-159 Ir-187 Ta-171	Hf-180m Re-178 Nd-135 Bi-192gm	Tc-103 Hf-170 Pa-238	Pm-148m	Au-186
501.96	0.018	u Bi-214	B-	19.9 M	Cu- 73	Pb-196	Os-190m	Ir-190m2	Re-190m
502.	3.6E-03	a Pb-211	B-	36.1 M	In-104	Hg-189gm			
502.	4.3E-05	u Pa-234	B-	6.70 H	Nb- 88 Zr- 83	Tc- 91m U -232	I -131	La-146m	Ge- 79
503.5	-9.5E-07	u U -234	A	2.455E+5 Y	Pu-237				
503.82	0.182	t Ac-228	B-	6.15 H	Pu-233	Zr-100	Ho-148m1	Tl-188m1	Bi-192gm
504.12	5.8E-03	a Pb-211	B-	36.1 M	Y - 85 Cd-102 Er-159	Cm-241 Nd-137	Tb-151m La-145	Zr-104 Tl-196m	Ho-154m I -123
506.75	2.1E-03	u Pa-234	B-	6.70 H	Sn-129m Ag-120m Ta-171 Ir-198	In-107 Mo-101 Nb-233	Eu-150 Pm-137 Kr- 91	I -132 Eu-149 Hf-182m	Cs-132 Fe- 62 Ag-111m
507.4	3.3E-05	a Fr-223	B-	21.8 M	Cd-100	Nb- 89	Nb- 89m		
507.4	3.8E-04	a Th-227	A	18.72 D					
507.5	1.6E-03	u Pa-234m	B-	1.17 M	Tb-163	Te-121	Zn- 62	Zr- 97	In-125
508.2	1.5E-05	u U -234	A	2.455E+5 Y	Ni- 65 Tm-150	Am-240 Sm-139	Ta-177	Ac-230	Pa-230
508.96	0.45	t Ac-228	B-	6.15 H	Nd-133 Pd-111	Rn-227 Ir-197gm	Pr-142 Tb-165	Os-192m	
509.2	2.1E-03	u Pa-234m	B-	1.17 M					
509.7	1.2E-03	a Pa-231	A	3.276E+4 Y					
510.	0.076	u Rn-222	A	3.8235 D	Se- 73 I -130	Tb-150m Ce-133	Se- 83	Os-182	Ag-108
510.77	8.13	t Tl-208	B-	3.053 M	Rb- 81 Sr-101	Dy-153	I -133	Ta-186	In-105
511.	0.032	u Pb-214	B-	26.8 M	Tl-194m	Tb-150	Er-155	Ta-169	Po-206
511.	--	annih			Tc-112 Ag-106m Cs-122	Zn- 71m Rh-106 Dy-153	Zn- 71 Ag-106	W -187 K - 45	Rh-106m Sn-104
513.4	=1.8E-03	u Pa-234	B-	6.70 H	Er-155 Ag-116	Hg-189gm Cs-123	Pu-233 Pr-137	Ir-183 Kr- 85	Au-182 Nb-105
515.06	0.049	t Ac-228	B-	6.15 H	Tc-109 Y - 86 Ba-144	La-146m Hf-178m1 Dy-165m	Tm-175 Cm-242	Eu-160 Tb-142	At-200gm Er-149m
516.1	1.0E-03	a Pa-231	A	3.276E+4 Y	Ra-222 Bi-206	Pu-236 Cs-138m	Pa-232 Ra-227	La-132	Er-158
516.4	5.0E-05	a Fr-223	B-	21.8 M	Ba-144	At-204	Ga- 79		
516.4	1.7E-04	a Th-227	A	18.72 D					
516.6	1.3E-05	u Pa-234m	B-	1.17 M	Gd-149	Zn- 77	La-147		
517.2	=4.0E-04	a U -235	A	703.8E+6 Y	Au-201	At-208			
517.63	1.5E-05	a Bi-215	B-	7.6 M	Pr-149	Tb-141	Tm-177	V - 55	Tb-154m1
517.63	0.044	a Rn-219	A	3.96 S	Ce-135 Ir-190	Pr-134	Tm-159	Cm-249	Pa-230
519.6	6.3E-04	u Pa-234	B-	6.70 H	Eu-141m Tb-152m	Np-241	Pm-157	Yb-117	Mo-103
519.9	0.016	u Bi-214	B-	19.9 M	Rh-114m	Co- 55	Rb- 97		
520.15	0.067	t Ac-228	B-	6.15 H	Tl-202 At-205	Au-202 Pr-154	Hf-163 As- 77	Rb- 83 Br- 77	Cr- 58 Ho-152m
521.4	1.2E-03	u Pa-234	B-	6.70 H	Sr- 94 Hg-191	Pm-138m Pb-194	Au-201 Ag-117m	As- 81 Os-196	Ir-196m Tc-106
523.13	0.103	t Ac-228	B-	6.15 H	Ta-171	Tl-189	Tb-151m	Po-206	Pr-148m
524.3	7.0E-05	a Fr-223	B-	21.8 M	Sm-155 Hg-188	Pd-117 Tc-112	I -132 Cd-101	Ac-233 Ba-127	Ga- 80 Cd-127
524.3	1.4E-04	a Th-227	A	18.72 D	Sc- 50 Pt-181	Ho-154m Ag-111	Mn- 58 Cs-116	Pd- 95m Au-180	Tb-145 Pu-233
524.6	0.017	u Bi-214	B-	19.9 M	Nd-133m	Ru- 94	Tm-157		

Energy 526.0 ~ 547.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide
526.02	9.2E-06	u Pa-234m	B-	1.17	M Nb-99m, Hg-187gm, Pd-111m, Hg-195m, La-131, Gd-141, Cs-125, Gd-141m, Lu-166m1, Gd-142, Cd-107, Sb-128, I-128, Xe-135m, Cs-128, Au-201, Ho-151, Ir-197gm, Au-185, Cs-143, At-210, I-139
527.61	0.07	a Ra-223	A	11.435	D Rh-97m, Cd-115, Rh-99, Cs-140, Nb-100, In-118, Rh-99m, Mo-99, I-123, Sn-132, Eu-149, Sb-118, Pa-237, Gd-161, Rb-83, Es-252, Cu-61, Pa-237, Gd-161, Rb-83, Br-83, Ho-166m, I-133, Sr-96, Y-97m1
527.9	6.3E-04	u Pa-234	B-	6.70	H Rh-97m, Cd-115, Rh-99, Cs-140, Nb-100
528.	4.0E-03	u Bi-214	B-	19.9	M In-118, Rh-99m, Mo-99, I-123, Sn-132
529.1	1.5E-04	u Pa-234	B-	6.70	H Es-252, Cu-61, Pa-237, Gd-161, Rb-83, Br-83, Ho-166m, I-133, Sr-96, Y-97m1
533.1	2.9E-05	a Fr-223	B-	21.8	M Sr-94, Po-201, Ga-81, Tc-104, Ca-47, Tb-141, V-53, Eu-140, Nd-147, Cu-69, Sm-137, Sm-153, Tc-101, Tm-167, Sr-99, At-203, Rn-208, Tm-155, Fr-212, I-121, Tc-94, Ca-51, Ho-171, Pb-202m
533.66	0.186	u Pb-214	B-	26.8	M Tb-152m, Ba-145, Os-179, C-17, In-104, Os-178, Pt-181, Tm-155, Sm-153
534.1	1.3E-04	u Pa-234	B-	6.70	H Nb-88m, Pm-137, Pt-181, Ag-124, Tl-184, Po-201m, Gd-149, Tb-156, At-200gm
535.	9.3E-05	a Th-227	A	18.72	D Rh-112m, Eu-136gm, Cs-143, Pu-233, Nd-136, Tc-104, N-18, Hf-163, Zr-102
535.8	6.0E-04	a Pa-231	A	3.276E+4	Y Tb-165, Bi-210m, Y-85m, Nb-100, Nb-100m, Bk-243, I-130m, I-130, Y-99, Cs-130, Hg-191m, Sr-99, Cs-130m
536.77	0.068	u Bi-214	B-	19.9	M In-123, I-139, Rn-206, Re-184m, Ta-184
537.	7.5E-05	a Fr-223	B-	21.8	M In-111m, Tb-145
537.	1.0E-03	a Th-227	A	18.72	D Dy-153, Ba-140
537.2	1.3E-04	u Pa-234	B-	6.70	H Bi-206, Po-201m, Rb-81, Lu-166, Rn-208
537.45	—	c Pb-206	NN	—	—
538.2	6.5E-03	a Rn-219	A	3.96	S Ta-171, Np-236m, Pu-240, Xe-132m, Se-81, Xe-142
538.41	0.02	u Pb-214	B-	26.8	M Rh-116m, Am-244, Nb-103, Sm-141m, I-123, Re-183m, Cd-105, Rh-113, Ag-124, Tb-165, Tl-200m, I-130, Po-208
539.8	8.3E-05	a Fr-223	B-	21.8	M Ir-197gm, Re-184, Rh-114, Os-177, Kr-90, Rh-100, Rh-100m, Ac-233, Ir-184, Pr-136, Hg-189gm, Ac-229, Nb-84, Cs-125, Eu-142m, Po-201m, Xe-141, Tb-154m1, I-116
540.76	0.026	t Ac-228	B-	6.15	H Hf-171, La-132, Ac-226, Nd-149, Hf-170, I-134, Ho-170m, In-106, Nd-138, Ba-144, La-144, Mo-93m, Rh-112, Tm-159, Ga-73, Sn-123m
543.	0.084	u Bi-214	B-	19.9	M Au-181, Ir-197gm, Ge-79m, Eu-145, Au-201, Rh-99m, Sb-116m, Pt-199, Nb-100m, I-114m
543.8	2.1E-04	u Pa-234	B-	6.70	H Te-136, Ho-145, Rh-95m, Sb-127
543.81	0.069	u Pb-214	B-	26.8	M Tc-90m, Sn-135, Sn-130m
543.98	3.6E-03	u Pa-234m	B-	1.17	M Ag-119, Tl-190m, Ba-145, Es-254m, Ba-130m, Eu-138
545.4	4.6E-06	a Fr-223	B-	21.8	M Sb-129, Sb-109, Pt-189, I-118, At-209, Rh-101m, Te-114, As-78, Cs-148, Bi-200, Nd-152, W-172, Ir-189m2, Po-199, Dy-165, Zr-99
546.	—	a Pb-211	B-	36.1	M Rh-110m, Au-187, Dy-151, Ra-213m, Ba-129m
546.47	0.201	t Ac-228	B-	6.15	H Gd-140, Bi-198m1, I-135
546.7	8.7E-04	a Pa-231	A	3.276E+4	Y Pm-154m, I-140, Tc-90m, Np-233, Pd-111, Rn-223, Cs-145
547.6	<4.0E-03	u Bi-214	B-	19.9	M Tm-164m, Tb-147, Pa-238, Yb-153, Pb-202m, Ca-51, Yb-180, Ce-131, Os-178

Energy 548.7 ~ 572.1 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
548.73	0.023	t Ac-228	B-	6.15	H	Kr- 92	Pt-184	Zn- 62	Tb-164	Tc- 91
549.73	0.114	t Rn-220	A	55.6	S	Rb- 81m	Cs-129	Ar- 45	Zr-102	Er-157
						Sn-132	Nb- 97	Cm-249	Hf-173	Fr-228
						W -189	Pm-148m	Pm-148	Eu-148	Ir-189m2
						La-130	Bk-248m			
551.8	5.5E-07	u Th-230	A	7.538E+4	Y	Ho-150m	Y - 94	Te-116	At-209	Sm-158
						W -187	Nb-102m	Er-159	I -118	Os-178
551.9	—	u Bi-214	B-	19.9	M	As- 79	Lu-164			
552.4	4.6E-05	a Fr-223	B-	21.8	M	Pr-136	In-106	Se- 81	Sn-123m	Rb- 83
552.4	2.8E-04	a Th-227	A	18.72	D	Br- 83	Au-201	In-117	Sb-117	Er-151
553.7	7.1E-05	u Pa-234	B-	6.70	H	Fr-208	Eu-148	Ge- 69	Sr- 80	Ho-153m
						Ba-129	Gd-143	Tl-184	Tb-141	Br- 82
						Kr- 90				
555.12	0.046	t Ac-228	B-	6.15	H	Sn-134	Cm-244	Np-240m	Pr-147	Tb-147
						Pa-237	Cs-141	Fr-227	Nb-104gm	Cd-126
						Y - 91m	Ag-104m	Ag-104		
556.5	2.2E-05	a Fr-223	B-	21.8	M	Rh-104m	Rh-104	Cs-118gm	Au-185	Pr-134
556.5	2.1E-04	a Th-227	A	18.72	D	Pr-134m	Rb- 86m	Pd-115	Rh-102	Eu-142m
						Ag-102m	Ag-102	Au-183	Xe-141	
557.24	8.6E-06	u Pa-234m	B-	1.17	M	Zr- 84	Tl-190	Tl-190m	Ru-103	Xe-140
557.3	7.1E-04	u Pa-234m	B-	1.17	M	Sn-128	Os-193	Gd-141m	Lu-173	Tb-154
558.	1.5E-04	u Pa-234	B-	6.70	H	Ce-133m	Cs-146	Rh-114m	Pu-197m	Re-190m
						Ir-190	Ge- 77	Tb-144m	Pd- 94	Re-168
558.46	--	c Cd-113	NG			Rh-111	Tm-159	Eu-149	Tl-195	In-114
558.46	--	c Cd-114	NN			In-114m1	Ag-114	Gd-140	Re-190m	Pu-233
559.2	1.2E-04	u Pa-234	B-	6.70	H	Hg-185gm	Br- 76m	Cd-104	Sm-137	Fr-206
						Br- 76	As- 76	Os-193	Pm-134	Dy-149m
						Au-187	Cs-122m2	Pu-245	Cs-116	Hg-195m
						I -120m	I -120	Rn-208	Cm-249	As- 82m
						Gd-141m	Pb-191m	Zn- 77	Pm-135	
562.5	0.87	t Ac-228	B-	6.15	H	Nb- 92m	Am-238	Cm-242	Y - 92	Nb- 92
						Ar- 43	Cs-141	Nb- 95	Rb- 78	Rb- 83
						Ir-194m2	Bi-198m1	Lu-163	Cm-251	
562.8	5.8E-05	u Pa-234	B-	6.70	H	Ti- 43				
562.93	--	c Ge- 76	NN			Tc-103	Ga- 76	Eu-152m1	Br- 76	Pu-236
						Cs-134	La-134	Ho-145		
563.7	1.0E-05	a Bi-215	B-	7.6	M	Os-192m	Re-189	Tl-191m	Tl-195	V - 53
563.7	<3.2E-03	a Rn-219	A	3.96	S	Ir-189m2	Eu-142m	Sr- 98	I -122	Pm-135
						Sb-122	Sn-111	Cd-117m	I -140	
565.2	1.6E-03	u Pa-234	B-	6.70	H	Pm-132	K - 47	At-200gm	Rn-223	La-133
						Hg-189gm	Au-183	Dy-165	Ho-153m	V - 55
						Pd-101	Te-134	Se- 88	Pb-190	Se- 81
						Zn- 80	Lu-163	Tb-150m		
568.9	5.8E-03	u Pa-234	B-	6.70	H	Ga- 78	La-132m	La-132	Cs-132	Rh-107
						Cd-100	Ag- 99	Pm-149	Te-115	Re-171
						Pt-189	Nb- 96	Tc- 96	Rb- 81	
569.	7.0E-04	a Fr-223	B-	21.8	M	Ce-131m	Ho-154	Tb-150	Ac-229	
569.	5.6E-04	a Th-227	A	18.72	D					
569.5	0.013	u Pa-234	B-	6.70	H	Bi-202	Ru- 97	Re-190m	Re-190	Ir-190
						Os-192m	Ag-122	Pt-186		
569.7	1.6E-03	a Tl-207	B-	4.77	M	Dy-167	Pb-207m	Bi-207	At-202	Yb-161
569.7	--	c Pb-207	NN			Rb- 92	Mn- 57	Ho-154	Po-212m	Co- 57
569.7	1.5E-03	a Po-211	A	0.516	S					
570.5	3.3E-06	u Th-230	A	7.538E+4	Y	Ba-144	Ho-154m	Bi-205	Mn- 59	Cs-143
						Po-208				
570.91	0.182	t Ac-228	B-	6.15	H	Tm-162	Au-196	Lu-166m1	Eu-157	Rn-210
						Ga- 80	Ag- 98	I -139	Xe-142	Pm-157
571.8	5.3E-04	a Pa-231	A	3.276E+4	Y					
572.	8.7E-04	u Pa-234m	B-	1.17	M	Eu-148				
572.14	0.15	t Ac-228	B-	6.15	H	Tb-145	Lu-170	Se- 75	Ce-135	Zn- 60

Energy 572.7 ~ 596.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
572.76	0.074	u Bi-214	B-	19.9	M	Bi-197	Rh-110	Mo- 93m	Hf-170	U -242
573.88	--	c Pb-204	NG			Sm-135	W -168	Te-121	Se- 87	Hg-193m
575.5	4.3E-05	u Pa-234	B-	6.70	H	Y - 82	Sb-126	Zn- 69m	Ge- 69	Hf-178m2
						Ni- 69	Sr- 81			
						Nd-136	Lu-181	U -230	Gd-141m	Pd-111m
						Gd-163	Fr-206	Ir-195m	Gd-140	Y - 99
575.7	1.7E-05	a Fr-223	B-	21.8	M	Eu-136gm	In-114			
575.7	1.2E-04	a Th-227	A	18.72	D					
576	--	t Bi-212	A	60.55	M	Se- 73	Gd-146	Ag-114	Yb-162	Os-177
						Kr- 72	La-124gm	Ir-187	Nd-152	Kr- 89
						Ce-135	Lu-160gm			
578.5	1.2E-04	a Th-227	A	18.72	D	Ce-131m	Nd-133m	As- 84	Se- 73m	Cu- 68
						Ce-147	I -116	Pr-147	Tl-197	Ba-127
						Dy-145m	Ga- 68	Bi-202	Hg-191m	Te-136
579.14	--	u Bi-214	B-	19.9	M	Rb- 95	Br- 77	Ag-105m	Tl-200	Au-200m
						Ru-107	Y -102			
580.13	0.352	u Pb-214	B-	26.8	M	Bi-205	Pd-111m	Pd-111	Pm-139	
580.4	--	a Ra-223	A	11.435	D	Ce-147	Rn-208	Kr- 85m	Nd-137	Sr- 85m
581.19	8.1E-05	u Pa-234m	B-	1.17	M	Gd-159	Pm-137	Er-159	Rh-108	
581.3	2.1E-05	a Fr-223	B-	21.8	M	Pr-154	Pa-232			
581.7	1.2E-05	u U -234	A	2.455E+5	Y					
581.9	--	u Bi-214	B-	19.9	M	Pb-194	Fr-230	In-110	Mg- 22	Fe- 63
						Tc- 95m	I -140	Ir-172m	Pm-144	
583	4.4E-03	a Pa-231	A	3.276E+4	Y	Cd-100	Au-192	Pm-135	Pm-135m	Au-183
583.19	30.36	t Tl-208	B-	3.053	M	Y - 98m	Ba-144			
583.19	--	c Pb-208	NN							
583.41	0.111	t Ac-228	B-	6.15	H	Lu-168	Pa-238			
584.1	2.8E-04	u Pa-234	B-	6.70	H	Ag-113m	Ce-131	Eu-136gm	Th-163	Yb-162
						Eu-150	Es-254m	Ir-186	Nb- 86	Pb-201
						Rh-110m	Pt-185gm	Cd-119m	U -242	La-144
						Al- 25	Hg-195			
586.3	1.2E-04	u Pa-234	B-	6.70	H	Rb- 97	Br- 77	Re-183m	Cd-126	Tb-141
						Tb-164	Tm-156	K - 47	Kr- 89	I -130
						Cs-130	Ga- 80	Os-196	Eu-152	Eu-152m1
						Au-191	Cs-118gm	Yb-153	K - 42	
587.7	0.014	t Tl-208	B-	3.053	M	Br- 92	Cs-127	Ce-143	Tl-198m1	At-204m
						Ge- 65	Zr- 89m	La-135		
588.1	1.0E-05	a Fr-223	B-	21.8	M	Nb- 89	Nb- 89m	Ag-101	Gd-143m	Tl-201m
						Rh-100	At-204	At-207		
589	5.6E-05	a Th-227	A	18.72	D	Ce-129	Ir-192	Cu- 61	Ta-185	Cs-141
						Tl-196m	I -138	As- 67	Sr- 80	Ho-147
						Ir-194	Sn-125m			
590.3	5.8E-05	u Pa-234	B-	6.70	H	Pm-146	Gd-141m	Lu-181	Es-252	Mo-101
						Y - 93m				
590.4	0.017	t Ac-228	B-	6.15	H	Sr-101	Xe-120	Pd-101	Cs-118gm	Tc-100
						Mo-101	Pt-181	Mn- 59	Ag-123	Ho-150
592.3	4.1E-05	a Fr-223	B-	21.8	M	Ho-149m	Eu-154	Rn-223	Ra-219	Os-185
						Au-184	Tl-188m1	Bk-248m	Nd-152	Tl-195
						Er-161	Eu-136gm	Pm-148	In-102	Sb-126
						Tc- 95	Te-127m	Po-201	K - 43	Sc- 43
						Kr- 94	Nd-135	Dy-153		
595.23	0.017	u Bi-214	B-	19.9	M	Os-179	Au-183	Zr- 99	La-131	Rh-111
						Tm-150	Tm-166	I -121	Os-178	Pm-134m
						Cu- 69	Ce-131m	Ta-169	B - 13	Y - 80
595.4	1.5E-04	u Pa-234	B-	6.70	H	I -134	Mo-106	Tc-107		
595.85	--	c Ge- 73	NG			As- 74	Ga- 74			
595.85	--	c Ge- 74	NN							
596	1.4E-05	a Fr-223	B-	21.8	M	La-133	Cs-147	Zn- 71m	Pr-151	Sm-139
596	9.7E-06	a Th-227	A	18.72	D	Sr- 96				
596.9	3.1E-04	u Pa-234	B-	6.70	H	Zn- 62	Cs-123	Au-183	Cm-244	Cd-107

Energy 598.5 ~ 620. (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
598.5	--	u Bi-214	B-	19.9	M	Np-240m	Dy-157	Tl-186m1	Rn-227	Au-190
598.72	0.093	a Ra-223	A	11.435	D	Rh- 98	Eu-141	Pb-190	Ce-131	
						Cu- 76gm	I -121	Tm-166	Rh- 98m	Pd- 96
600.	8.0E-03	u Bi-214	B-	19.9	M	Mo-103	Dy-167	Fr-230		
						Eu-156	Bi-192gm	Zr-102	Gd-141m	Hg-195
						I -132m	Po-205	Yb-161	Zr- 84	Nb- 87
						Hg-189gm	Te-114	Xe-132m	Mn- 52	Sr- 98
						Tb-144m				
600.66	4.9E-04	u Ra-226	A	1600	Y	Rb- 97	Nb-100m	La-128	Ir-194m2	Np-240
						I -118	I -118m	Os-178		
600.7	8.3E-06	a Fr-223	B-	21.8	M	Ga- 72	I -137	I -120m	I -120	Po-199m
						I -139				
602.6	8.6E-04	u Pa-234	B-	6.70	H	Pr-146	La-148	Pb-202m	Te-131	Y - 82
						Cs-140	Zr- 97	Y - 99	Pd-109	Pm-136
						Pm-136m	Sb-124m1	I -124	Sb-124	Rb- 91
604.6	8.2E-05	u Pa-234	B-	6.70	H	Po-208	Hf-182m	Te-115	Sb-127	Te-135
						Ge- 79	Mn- 51	Tc- 95	Pr-149	In-105
						Cs-134	La-134	Tb-151	Ta-164	Cm-242
						Re-190	Re-190m	Ir-190	Ac-229	Cs-141
						Pb-200	Nd-154	Xe-142	Rb- 98m	I -118
607.5	4.6E-05	a Fr-223	B-	21.8	M	Eu-141	Eu-141m	Os-192m		
607.5	1.7E-04	a Th-227	A	18.72	D	Kr- 79	Eu-158	In-112	Zn- 75	Kr- 77
						Hf-177m2	Au-183	Tc- 91m	Ag-112	Tm-155
						Sb-125	Ce-135	Mg- 28	Ga- 79	Au-186
						Tl-186m1	Pt-189	Pb-195m	Yb-162	
608.3	4.3E-03	a Rn-219	A	3.96	S	Bi-204m2	Xe-140	Xe-135	Mo-103	Hf-164
						Tb-163	Tl-184			
608.35	--	c Ge- 74	NN			Ga- 74	As- 74	Tc-105	Ti- 51	Rb- 77
						Eu-140				
609.	7.3E-03	a Pa-231	A	3.276E+4	Y	Br- 75	Rh-113	Ag-105m	La-128	In-103
609.31	46.1	u Bi-214	B-	19.9	M	Nd-155	Rn-218			
609.32	0.056	a Ra-223	A	11.435	D					
609.38	0.043	a Pb-211	B-	36.1	M	Ni- 65	Er-148	In-120m2	I -132m	
610.64	0.023	t Ac-228	B-	6.15	H	Er-172	Pt-184m	Ru-103	Pm-132	Au-181
						Pt-184	Tl-196m	Tl-196	Te-115m	Hg-191m
						Ir-187	Tb-164	Ti- 42	Cs-123	At-200gm
						Pm-148	Eu-148	Cs-116		
612.	6.1E-04	u Pa-234	B-	6.70	H	Pt-186	W -177	As- 68	Zr- 86	Ag- 98
						Ru-103	Yb-179	Ir-192m1	Ir-192	Au-192
613.6	2.9E-05	a Fr-223	B-	21.8	M	Xe-139	Kr- 91	B - 14	Tc-110	Ho-152
						Fr-228	Ag-124	Au-201	I -128	Cs-128
						In-109	Br- 78	As- 78	Pr-135	Au-182
						Ho-152	I -132m	Ir-189m2	Y - 99	Tm-158
						Ge- 77m	I -118m	Er-163	At-206	Gd-142
						Rh-108				
615.73	0.06	u Bi-214	B-	19.9	M	I -120m	Au-181	Sb-122	Pr-148	Cs-116
						Hf-181	Rh- 98m	Ta-186	As- 71	Tl-190
						Tc- 96m				
616.22	0.08	t Ac-228	B-	6.15	H	Rh-106m	Ag-106m	Ag-106	Lu-160gm	Rh-106
						Tc- 95m	Nb- 87	Os-190m	Ir-190m2	Tb-151
617.	0.034	u Bi-214	B-	19.9	M	Y -100	Rb- 80	Tl-184	Yb-162	U -230
617.	8.2E-05	u Pa-234	B-	6.70	H	Y - 96m	In-112	Pb-187m	Cm-242	
617.52	--	c Cd-112	NN			Ag-112	Tb-141	Ac-226	Am-238	K - 43
						Ir-183	Po-200	Rh- 99m	Pr-144m	At-205
						In-125	I -133	Pm-144	Rh- 99	La-133
619.	5.8E-05	u Pa-234	B-	6.70	H	W -187	Cs-114	Xe-142	Fe- 61	Te-127
						Dy-146	Mo-106	Hg-205	Hf-181	Ge- 65
						In-123	Ag-108	Rh-108m	Br- 82m	Br- 82
						C - 17	Tc-110	Ar- 45	Eu-157	Os-192m
620.	--	t Bi-212	A	60.55	M	Yb-162	Gd-142	Sb-126m1	Sr- 91	Ag-111m

Energy 620. ~ 641. (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
620. 620.38	8.0E-07 0.08	u Th-230 t Ac-228	A B-	7.538E+4 Y 6.15 H	Nb- 86 Zn- 71m Rn-208 Mo-103 Pr-135	Ba-131 Nb-104gm Y - 98m Au-187 Lu-163	Rn-205 Zr- 86 La-143	Dy-148 Np-242m	Ag-111 Dy-165 La-133
621.4	5.6E-05	a Th-227	A	18.72 D	Sr- 94 Cm-249 Pm-141 Nb-100 W -173	Nd-139 Rh-106 Ho-145 Rh- 95 Na- 31	Mo- 99 Ag-106 Rb- 79 Pt-187 In-109	I -134 Ir-194 In-104 Tb-162	Al- 31 Ag-111 Pb-204m Pr-149
623.27 623.4	0.011 8.2E-03	t Ac-228 a Ra-223	B- A	6.15 H 11.435 D	Pa-238	Ir-189m2			
623.8 623.8 624.2 624.4 624.6	7.0E-06 1.5E-04 5.6E-04 =8.2E-07 1.4E-04	a Fr-223 a Th-227 u Pa-234 u U -234 u Pa-234m	B- A B- A B-	21.8 M 18.72 D 6.70 H 2.455E+5 Y 1.17 M	Ho-150m Ir-178 Er-159 Tl-190m Rh-114m Es-250m Rb- 77 Ru- 95 Y - 86m Tc-102 Rh-102 Mn- 61 At-205 Kr- 94 Po-207 Pu-245 Re-186 Dy-149m Re-190 Ce-137 Y - 96m Rh- 96 Ag-103	Pt-191 I -123 Pr-144 Cd- 98 Se- 69 Tl-190 W -187 Cd-103 Zn- 77 Cs-139 Ta-163 Rh-102m Te-127m Fr-206 Ho-169 Am-246 Au-181 As- 72 Ga- 72 Kr- 91 I -132 Cs-132 Tc-102m Dy-168 Er-149m W -172 Te-136 Rb- 98m U -239 Pm-134 Au-189 Yb-161 Rn-207 Ho-168 Ge- 77 Tb-148 Y - 97m2 Rn-206			
626.4	=5.0E-03	u Bi-214	B-	19.9 M					
627.23	0.014	t Ac-228	B-	6.15 H					
628.1	3.8E-04	u Pa-234	B-	6.70 H					
629.4 629.4 629.95	0.045 5.6E-04 —	t Ac-228 u Pa-234 c Ge- 72	B- B- NN	6.15 H 6.70 H					
630.79	< 0.018	u Bi-214	B-	19.9 M					
632.	0.03	a Ra-223	A	11.435 D					
632.3 632.3 632.6 633.14	2.9E-05 1.3E-04 5.8E-05 0.055	a Fr-223 a Th-227 u Pa-234 u Bi-214	B- A B- B-	21.8 M 18.72 D 6.70 H 19.9 M					
634.18 634.3 634.72 634.9	0.011 2.1E-04 6.5E-03 1.4E-05	t Ac-228 u Pa-234 u Bi-214 u U -234	B- B- B- A	6.15 H 6.70 H 19.9 M 2.455E+5 Y					
639.67	0.03	u Bi-214	B-	19.9 M					
640.34 641.	0.054 1.8E-05	t Ac-228 a Th-227	B- A	6.15 H 18.72 D					

Energy 643.2 ~ 669.6 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
643.2	4.3E-05	u Pa-234	B-	6.70	H	Zn-80	Sb-131	Pa-236	Np-236m	Pu-240
						Er-174	I-131	Ru-93m	Sn-125m	Yb-179
644.2	4.6E-05	a Th-227	A	18.72	D	Rn-227	Cl-40	Rb-81m	Sb-111	La-128
						Pd-113	Po-202	La-143	Fr-210	Te-119
						Ir-180	Rh-96	Cs-123	Y-96	Lu-163
645.5	5.4E-03	t Ra-224	A	3.66	D	Rb-97	Sn-104	Te-113	Xe-142	La-145
						Nb-98m	Th-235	Au-201	Pu-236	Nb-98
						Au-194	Sn-129	Pr-133	Tl-194	Ru-97
						Ho-160	Pb-187m	Au-181	Pm-133	Sb-124m1
						Sb-124	Y-86			
646.5	1.8E-04	u Pa-234	B-	6.70	H	In-127	Os-185	P-37	Eu-156	Ho-160
						Th-236	Cs-141	Sn-113	I-133m	
647.7	1.6E-03	u Pa-234m	B-	1.17	M	I-139	Ho-152	Pd-109	Gd-141m	Tb-164
						Ho-152m	Tb-152m	V-52	Mn-52	Te-133m
						Br-71	Sb-130m	Rh-114m	Bi-200	Rb-77
648.5	1.8E-05	a Th-227	A	18.72	D	Ba-141	At-207	Tb-150m	Cd-105	
648.84	0.04	t Ac-228	B-	6.15	H	Au-184	Rn-210	Rn-223	Eu-138	Es-254m
649.	1.0E-03	u Pa-234m	B-	1.17	M	Br-83	Rb-83	Pb-198		
649.18	0.06	u Bi-214	B-	19.9	M	Ag-115	Er-159	Ag-105m	Os-177	
649.5	4.9E-08	u Hg-206	B-	8.15	M	Cu-69	Tb-154m1	Tb-154m2	Ge-65	Xe-121
						Se-81				
650.1	0.013	t Tl-208	B-	3.053	M	In-109	Sn-109	Pd-117	Zr-99	Au-181
						In-109m1	Bi-208m	Ag-122	Tl-194m	Tb-150
						Tb-150m	Ta-164			
651.26	--	c Cd-113	NG			Ag-105	Sr-92	Te-127m	Tb-149m	As-68
						K-44				
651.5	<2.0E-03	u Bi-214	B-	19.9	M	Ta-166				
651.51	0.09	t Ac-228	B-	6.15	H	Rh-116m	Tb-149	Sr-97	Sr-91	Sn-132
						Lu-181	Tc-98	Ba-130m	Rh-98	Rh-98m
653.7	7.4E-04	u Pa-234	B-	6.70	H	Cm-249	Sr-91	Mo-91m	Eu-138	Gd-141m
						Cd-126	Pd-99	Ho-150m	Rh-110m	Xe-140
						Fr-230	Eu-145	Dy-149	Yb-179	Zn-79
						Cs-122m2	Rb-75	Sb-128	Te-131	Sb-129
						As-82	Ag-119	Xe-135		
655.2	2.1E-04	u Pa-234	B-	6.70	H	Nb-102m	Nd-149	Au-204	Br-90	
655.3	1.4E-03	u Pa-234m	B-	1.17	M	Sm-139	Am-237	Ir-183	Sm-139	Tb-146m1
						I-139	Cu-61	Ag-119	Pm-152m1	Nb-99m
657.4	6.3E-04	u Pa-234	B-	6.70	H	At-203	Tm-158	Lu-162	Te-115	Br-76
						Xe-142	In-121	Pb-202m	Bi-202	Ag-110
657.76	--	c Cd-110	NN			Pr-145	In-110m	In-110	Ag-110m	Rb-89
						Ru-113	Sb-131	Nb-97	In-104	
658.7	0.015	u Bi-214	B-	19.9	M	Au-181	At-207	Mo-89	Te-127m	Yb-161
659.8	4.3E-04	u Pa-234	B-	6.70	H	Ne-18	Eu-139	Ag-118m	At-205	
660.1	=5.0E-03	t Ac-228	B-	6.15	H	At-208	Cs-143	Rb-95	Ag-98	Ag-119
661.1	0.047	u Bi-214	B-	19.9	M	Xe-117	Ho-148m1	Tl-200	Au-200	Mn-50m
						Cs-137	Ba-137m	Au-181	Re-181	La-141
663.1	2.1E-05	a Fr-223	B-	21.8	M	Cs-143	Pd-98	Hf-171	U-239	Pr-149
663.1	5.6E-05	a Th-227	A	18.72	D	Pr-151	La-132	La-132m	Fr-230	
663.82	0.028	t Ac-228	B-	6.15	H					
663.9	8.6E-04	u Pa-234	B-	6.70	H	Pb-204m	Dy-155	Rb-78m	Sb-109	Ce-143
665.45	1.46	u Bi-214	B-	19.9	M	Eu-159	Dy-146	Ta-170	Ac-232	Te-131m
						As-76	Eu-146	Bi-196	Mg-31	Ar-34
						Ag-100m	Br-80			
666.45	0.062	t Ac-228	B-	6.15	H	Y-100	Os-181m	At-200gm	La-146	Sb-126m1
						Au-181	Tm-163	As-80	Zn-74	Sb-126
						I-126				
666.5	1.9E-03	u Pa-234	B-	6.70	H	Sr-101	Zr-84	Zn-71	Ag-116m	Ge-64
						Er-151	Au-182	Ag-101	Lu-171	Y-97m1
						I-132	I-132m	Cs-132	Rh-112m	Cs-119
669.62	--	c Cu-63	NN			Gd-143m	In-105	I-140	Sb-114	As-70

Energy 669.7 ~ 695.5 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
						I -130 Zn- 63	Y - 97m2	Nd-139	Sn-108	At-205
669.7	1.6E-03	u Pa-234	B-	6.70	H	I -132				
670.	4.2E-04	u Tl-210	B-	1.30	M	Th-233	Sb-112	Nb- 86	Rh-107	Cm-241
670.8	3.7E-04	u Pa-234m	B-	1.17	M	Bi-204	Au-181	Po-200	Lu-165	Nb- 88
671.9	1.2E-05	a Fr-223	B-	21.8	M	Cl- 38m	I -132	Sb-125	Rb- 75	Cd- 99
672.	0.026	t Ac-228	B-	6.15	H	Bi-194	Te-129m	Th-226		
						Tm-166	Ag-113	Tm-162	Tm-162m	Tm-162
						La-124gm	Tm-152	Tm-152m	Rn-209	At-205
673.9	6.4E-04	u Pa-234m	B-	1.17	M	Re-190m	Pd- 99	In-109m2	Tb-164	Dy-146m
						W -172	Na- 31	Kr- 87	Se- 83m	Ho-166
674.16	< 0.109	t Ac-228	B-	6.15	H	In-105m	Yb-153	Rn-211	Au-191	Tl-197
						Cu- 73				
674.75	< 0.109	t Ac-228	B-	6.15	H	Nb- 99m	Po-199m	Tm-166	Ga- 78	
675.1	1.6E-04	u Pa-234	B-	6.70	H	Pr-144	Rn-205	At-207	K - 48	Ca- 52
						At-202	Yb-164	Cd-102	Pr-145	Tl-198
676.64	4.8E-06	a Bi-215	B-	7.6	M	Au-198	Ru-105	C - 17	Ho-169	Au-186
676.64	0.021	a Rn-219	A	3.96	S	Tb-154m1	Eu-159			
676.69	0.013	a Pb-211	B-	36.1	M	S - 40				
677.11	0.062	t Ac-228	B-	6.15	H	Br- 80	Br- 80	Ag-118	Ag-118m	S - 30
677.41	6.0E-03	u Bi-214	B-	19.9	M	I -134	Fr-230	Au-180		
677.6	=1.0E-06	u U -234	A	2.455E+5	Y	Eu-147	Rh- 95	In-110	Pr-134m	Ag-110m
						Ag-101	Br- 92	Th-236	Mn- 60m	In-107m
						Ag- 98	Au-181	Sn-107	Sb-109	Eu-152
						Rh-114m	Xe-120	I -116	Sm-142	Am-246
682.3	7.5E-06	a Fr-223	B-	21.8	M	Pd- 95m	Y - 84m	Sn-128	Pb-203	Ag-113
						Rb- 95	Ru- 93	Sb-130	Br- 83	Rb- 83
						Y - 90m	Ba-126	Eu-159	Y - 83	Eu-142
683.22	0.081	u Bi-214	B-	19.9	M	I -114	I -114m	Ga- 68		
683.4	5.7E-04	u Pa-234m	B-	1.17	M	Cr- 58	Dy-146m	Ho-146	La-148	In-118m1
683.9	2.5E-04	u Pa-234	B-	6.70	H	Tl-190	Tl-190m	Ho-152m	Sb-129	
684.	0.019	t Ac-228	B-	6.15	H	I -122				
685.1	2.3E-04	u Pa-234	B-	6.70	H	I -117	Fr-206	Zn- 79	At-204	Ho-156
						Ag-117m	Sm-141m	Mo- 93m	Os-179	Ir-195m
						Rh- 96m	Rh- 96	As- 67	Pr-151	Zn- 80
687.6	6.9E-03	u Bi-214	B-	19.9	M	Eu-138	Sb-127	W -187	Nd-147	I -130
						Bi-210m	Am-246	Nd-137	Tb-143	Ag- 97
						Tl-206m	At-208	Lu-165	Pa-238	Rh-100m
						At-211	Ag-110m	Rb- 97	Cs-148	Yb-163
						Br- 80	Pa-236	Po-207	Pu-240	Mo-103
688.1	0.067	t Ac-228	B-	6.15	H	Rh-110m	Cs-132	Ir-194m2		
						Mg- 30	Cd-127	Rb- 79	Pu-233	Pr-138
						Hf-163	Pm-152	Tb-164	Ho-153	Ac-234
						Eu-152	Es-254m	Eu-152m1	Au-181	Au-196
						Sm-143m1	Mo- 93m	Ag-123	Dy-151	Pt-186
691.	7.8E-03	u Pa-234m	B-	1.17	M	Lu-171	Bi-196	Bi-196m2	Tc-100	Te-115m
691.43	—	c Ge- 72	NN			Au-203	Zn- 61	Y - 80	Ag-113m	Tl-192gm
692.	3.8E-05	a Th-227	A	18.72	D	As- 72	Ho-156	Ba-130m	Pu-236	
						Tm-166	Mo-103			
692.5	5.6E-03	t Ac-228	B-	6.15	H	Au-204	Se- 69	Dy-148	Mn- 57	Rb- 96
692.6	2.0E-03	u Pa-234	B-	6.70	H	Tl-190m				
693.3	6.0E-03	u Bi-214	B-	19.9	M	Pb-201	Co- 57	Tb-154m1	Tb-154	Eu-154
						Sb-122	Ag-112	I -122	Rb- 78	Rb- 78m
						Xe-119	Au-185	Zn- 73	As- 67	Ac-234
						La-123	Tb-142	Es-254m	Eu-139	Nb-104gm
694.6	7.5E-06	a Fr-223	B-	21.8	M	Pm-144	Ho-151	Es-252	Co- 67	Pd-111m
						Rh-114	Rh-114m	Tb-147	K - 42	La-124gm
						Br- 78	Nb- 99m	Ag-112	Sb-126m1	Po-200
695.5	1.6E-03	u Pa-234m	B-	1.17	M	In-112	Sb-126	I -126	Lu-163	
						Tl-196m	Bi-195gm	Mo-101	Pb-197m	Kr- 94

Energy 697.9 ~ 722.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
697.9	0.051	u Bi-214	B-	19.9 M	Te-129m Rn-210 In-120m2 Sr- 97 Pr-135	Pm-152 Pm-144 Sb-132 Lu-172 Rn-207	Pm-136m Pr-144 Sb-132m Tb-162 Pr-148m	Pb-195 Rb- 82 Sb-130m Pr-148	In-127m Tc-102m In-119 Po-201m
699.	7.9E-04	u Pa-234m	B-	1.17 M	Cu- 76gm Ag-115 Sb-127	Ag-120 Cs-114 Te-112	Ag-120m Br- 82m Ce-137	Tb-144m Br- 82 Ir-180	Y - 85 Rb- 82
699.03	5.8E-03	u Pa-234	B-	6.70 H					
699.08	0.037	t Ac-228	B-	6.15 H	Eu-152m1				
699.82	0.016	u Bi-214	B-	19.9 M	Ag-116m Ho-152 Lu-181 Fe- 53m	In-103 Ho-145 Ce-147	Ag-116 Br- 73	Ho-170m	
700.5	=3.1E-06	t Th-228	A	1.9116 Y					
701.75	0.173	t Ac-228	B-	6.15 H	Rh-100m Pd-109 La-146m	Nd-139m Nb- 94m Re-170	Eu-139 Zn- 79	Se- 87 Eu-146	Ir-189m2 La-146
702.05	7.1E-03	u Pa-234m	B-	1.17 M					
703.11	0.472	u Bi-214	B-	19.9 M	Nb- 94 Y - 86 Tb-151	Tc- 94 Pb-205m Zr- 97	Ce-149 Bi-205 Br- 80	Ga- 67 Sn-104 Sb-120	Eu-146 Eu-152m1 Sr- 94
704.3	7.5E-05	a Th-227	A	18.72 D					
704.64	0.462	a Pb-211	B-	36.1 M	In-120 Y - 84m Ho-171 Tb-154	Na- 33 V - 52 Lu-160gm	Rb- 80 Mn- 52m	Fe- 52	Tl-206m
704.9	0.047	u Bi-214	B-	19.9 M					
705.2	7.8E-03	t Tl-208	B-	3.053 M	Lu-166m1	Ho-166	Tm-166	La-144	Ag-116m
705.9	3.6E-03	u Pa-234	B-	6.70 H	Pb-191m	Ge- 66	Au-187	Ge- 81	Cs-121m
705.9	4.0E-03	u Pa-234m	B-	1.17 M	Sb-134m	Fr-230	Co- 57		
707.2	3.8E-05	a Th-227	A	18.72 D	I -133	Au-185	Ag-110m	I -119	Br- 90
707.41	0.155	t Ac-228	B-	6.15 H	In-110	Zn- 79	Th-226	Fr-222	Pb-195m
708.3	2.1E-05	a Pr-223	B-	21.8 M	Nd-139m	Re-177	Au-180	Ag-113m	Th-235
708.3	<7.0E-04	u Pa-234m	B-	1.17 M	Er-174	Ho-171			
708.3	3.6E-05	u Pa-234	B-	6.70 H					
708.8	0.017	u Bi-214	B-	19.9 M	Ag-116m Pt-187	I -114 Cd-104	I -114m	Ag-113m	S - 30
710.3	--	u Bi-214	B-	19.9 M	Pd-111	Au-181	Rb- 93	Tm-162m	Sr- 93
710.67	0.075	u Bi-214	B-	19.9 M	Se- 87	Ta-176	Bi-194		
711.2	3.6E-03	a Ra-223	A	11.435 D	Fr-230	Ga- 81	Br- 82m	Rb- 82	
711.5	2.5E-04	u Pa-234	B-	6.70 H	Ho-166m	Cs-125	Po-202	Eu-150m	Pb-191m
713.7	2.3E-04	u Pa-234	B-	6.70 H	Sn-106 As- 71	Zn- 80 Tm-153	Ir-186m Ta-163	Pt-187	Te-137
					Tb-144m	Te-134	Pm-135	Eu-136gm	Mo-101
					Au-189	Na- 27	In-120m1	Sb-124	Nb- 98m
					Er-174	Ac-232	Pt-199	Ru-113	
716.5	4.9E-05	u Pa-234	B-	6.70 H	As- 79	As- 74	Dy-165	Zn- 80	In-127
					Tc-101	Es-252	Tm-152m	Gd-145m	Pd- 95m
					Re-168	Sr- 85	Ho-169	Rh-106m	Po-202
					Ag-106m	Os-185			
718.48	0.019	t Ac-228	B-	6.15 H	Sc- 51	Pm-151	Se- 83	C - 10	
718.5	2.8E-05	a Th-227	A	18.72 D					
719.01	2.6E-05	u Pa-234m	B-	1.17 M	Ba-143	Eu-139	At-203	Rb- 99m	At-205
					Ag-102m				
719.86	0.379	u Bi-214	B-	19.9 M	Nb- 97 Te-133 Pt-185gm Hg-205	Tc- 96m Tl-199m Pr-150 Sr- 81	Nb- 96 Pb-199 Tc-106	Ti- 45 Tm-168 In-103	Fr-208 Au-187 Cd-119m
722.04	0.072	t Tl-208	B-	3.053 M	At-207	Pr-148	Pt-189	Zn- 71	Gd-145m
722.1	5.3E-04	a Fr-223	B-	21.8 M	Ce-143				
722.1	3.5E-04	a Th-227	A	18.72 D	Tb-154	Tl-184	Pr-138	Gd-140	Bi-203
722.98	0.035	u Bi-214	B-	19.9 M	Sn-129m	Sb-129m	Pa-237	Nb- 98m	Pr-150

Energy 723.6 ~ 752.8 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
723.6	2.5E-04	a Th-227	A	18.72 D	I-124	Nb-84	Se-71	I-131	Ag-108m
724.15	2.2E-04	a Fr-223	B-	21.8 M	Au-204	Rn-223	Cd-103	Eu-156	Tl-196m
					Eu-154	Pd-96	Re-177	Sr-94	Xe-139
					As-79	Te-115m	Pd-101	Zr-95	Nd-131
					Pd-94	Pb-197m	Y-99	Rb-78m	Ho-154m
726.86	0.62	t Ac-228	B-	6.15 H	Au-181	Ce-145	Pd-98	Tb-152m	Rh-116m
727.33	6.58	t Bi-212	B-	60.55 M	Pm-155	Ir-189m2	Ir-187	Te-114	Ho-153
727.8	1.8E-04	u Pa-234	B-	6.70 H	Eu-148	Pm-148m	K-44		
					Mn-59	Sb-131	Ir-196m		
730.9	1.0E-03	u Pa-234	B-	6.70 H	Th-235	Ho-171	In-107	Ho-160	Pa-230
					Sb-128	I-120m	Tm-160	Ge-67	In-129
					Fr-230	Cs-143			
					Rb-81m	Te-129m	Au-181	Rn-205	Tm-148
					Th-235	Ag-100	Tl-190m	Pt-184	Tb-151
732.5	1.3E-03	u Pa-234m	B-	1.17 M	In-108	Xe-135	Ca-47	Kr-85m	Ir-183
733.39	0.011	u Pa-234	B-	6.70 H	Sr-85m	Sb-130	Ir-178	Au-201	Xe-139
733.8	0.043	u Bi-214	B-	19.9 M	Mo-91m	Tc-108	Tm-155		
734.4	9.7E-05	a Th-227	A	18.72 D	Ba-136m	Fr-210	Os-177	Ir-172m	Pt-181
					At-206	Pa-237			
735.5	8.3E-06	a Fr-223	B-	21.8 M	Bk-246	Ru-93m	Ta-177	Am-246m	As-83
735.5	1.5E-04	a Th-227	A	18.72 D	Ag-101	Kr-77	Fr-230		
					Tl-194m	Hf-183	Re-176	La-144	
					Mg-32	Pr-146	I-123	Lu-179	Ac-232
					Np-242m	Te-114	Nd-151	Dy-149	Bi-204m2
737.72	0.037	t Ac-228	B-	6.15 H	Cd-125m	Cu-68m	Eu-160	Hg-189m	Rh-112
					Eu-138	Y-82	Xe-142	Eu-150	Ta-186
					Ge-81m	Np-231			
738	1.8E-03	u Pa-234	B-	6.70 H	Yb-162	Ar-43	Rh-116	At-203	
738.4	8.3E-06	a Fr-223	B-	21.8 M	Te-136	Nd-139m	Kr-89	Rn-206	I-140
738.4	6.6E-05	a Th-227	A	18.72 D	Tm-160m	Cs-146			
739.95	0.012	u Pa-234m	B-	1.17 M	Ba-141	Ta-186	Rn-227	Tc-105	Re-174
					Ga-73	I-130	Mo-99	Ho-148m1	Rh-102
					Pd-113	Lu-171	Pu-235	Re-170	In-103
					Eu-150m	Ag-104	Lu-164	Pm-138m	Rh-104m
740.73	= 0.04	u Bi-214	B-	19.9 M	Br-90	Te-129m	Ho-149m	Eu-142m	Ho-168
742.2	1.5E-06	t Th-228	A	1.9116 Y	Cs-123	Dy-149	Rh-96	Pm-143	Pr-143
742.37	1.7E-05	a Fr-223	B-	21.8 M	Pb-195m	Zn-63			
742.5	4.0E-04	a U-235	A	703.8E+6 Y	Tc-94	Zn-80			
742.81	0.08	u Pa-234m	B-	1.17 M	Te-134	Po-207			
742.81	3.3E-03	u Pa-234	B-	6.70 H	At-211	Np-234	Ta-166	Tl-191m	Pu-238
					Pr-149	Te-112	Tb-144	Tb-144m	Re-172m
					Y-102m	Eu-158	Sn-130		
743.56	--	c Ge-70	NN		Sb-128m	Sb-128	Zr-97	Nb-97m	Ag-123
					La-145	Rh-116m	Nd-133m	Am-244	Mn-52
745.9	5.1E-04	u Pa-234	B-	6.70 H	As-70	Os-178	Bk-244	Ge-79m	Pu-235
					Dy-157	Tc-98	Pr-137	Rh-98	Pm-154m
					Tl-192m	Eu-138	Rn-209	Ta-177	
746.4	3.0E-04	a Fr-223	B-	21.8 M	Nb-103	Cd-105	Rn-207	Eu-146	Pm-146
746.4	9.7E-05	a Th-227	A	18.72 D					
748.1	1.6E-04	u Pa-234	B-	6.70 H	Ge-81	Sb-115	Sm-136	Pb-187m	Nb-86
					Th-235	Lu-164	Cd-117m	Eu-150	U-239
					Rh-112m	Pr-145			
748.5	2.8E-04	a Th-227	A	18.72 D	Ag-106m	Rh-106m			
748.7	0.015	t Tl-208	B-	3.053 M	Gd-149	Zn-76	Bi-196m2	Pd-115m	Tl-194m
					Re-180				
750.12	1.8E-05	u Pa-234m	B-	1.17 M	Sr-91	Gd-140	Ni-56	Mo-103	Ho-148m1
					I-136m	Ho-170	Tl-199	Cs-122m2	Ag-100
					Re-192	Au-181	Eu-150	P-37	Ta-168
752.84	0.13	u Bi-214	B-	19.9 M	Ge-81	La-140	Ba-124	Nb-86	Ga-65

Energy 754. ~ 780.5 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
754.	1.4E-04	a Fr-223	B-	21.8	M	Mn- 48	Ho-166m	Al- 31	Bi-204m2	Y - 94
754.	9.3E-05	a Th-227	A	18.72	D	Ag-111m	Zn- 74	Tb-148m	Nd-133	Cs-145
755.	1.9E-03	u Pa-234	B-	6.70	H	Pm-134m	Pm-134	I -126	Sb-128m	Ru- 97
						Sb-128	Ce-139m	Sm-143m1		
						Ag-111	Ag-124	Po-201m	Sr- 94	Sm-135
						Tb-164	Al- 29	P - 29	Ge- 79m	Np-232
755.32	1.	t Ac-228	B-	6.15	H	Zn- 76				
						As- 82	Pb-196	Br- 77	Sb-111	Bi-197
						Am-246				
756.9	1.2E-04	a Fr-223	B-	21.8	M	Rh- 94m	Rh- 94	Au-181	Pu-235	Pm-139
756.9	=9.1E-04	a Th-227	A	18.72	D	Nd-141m	Y - 80	Zr- 95	Eu-154	Br- 71
						Ho-172	Tm-166			
758.9	4.0E-04	u Pa-234	B-	6.70	H	Zn- 80	Cs-114	Pb-188	Ho-152m	Cm-244
						Rh-104m	Au-196	Es-252	Os-179	Au-200m
760.3	1.6E-03	u Pa-234m	B-	1.17	M	Ag-122	Rn-227	Mn- 48	La-148	
760.53	4.3E-06	u Pa-234m	B-	1.17	M	La-136				
761.	1.2E-04	u Pa-234	B-	6.70	H	Nb- 88m	Sn-129m	Sb-129	Pr-136	Ho-169
						Sr- 91	Rn-210			
762.2	3.7E-05	a Fr-223	B-	21.8	M	Nd-137	At-204	Tb-164	As- 68	Sn-111
762.2	2.4E-04	a Th-227	A	18.72	D	Pb-199	Rh- 98m	Pm-155	Pd-111m	Rh- 98
						Ce-137m	Xe-120	Po-204	Fr-224	Sr- 83
763.13	0.652	t Tl-208	B-	3.053	M	Eu-144	Fr-211	In-119	Pr-137	Pr-134m
						I -118m	Ag-110m			
764.8	3.1E-04	u Pa-234	B-	6.70	H	Es-250	B - 13	Ho-156	Kr- 94	Eu-145
						Tb-152	Eu-152	Se- 73	Cd-121	Ho-160
765.96	0.078	u Pb-214	B-	26.8	M	Au-186	Ta-170	Tc- 95	Tm-153	Nb- 95
766.3	3.3E-04	a Fr-223	B-	21.8	M					
766.3	2.8E-04	a Th-227	A	18.72	D					
766.38	1.2E-04	u Pa-234	B-	6.70	H	Pu-238				
766.38	0.294	u Pa-234m	B-	1.17	M					
766.51	0.617	a Pb-211	B-	36.1	M	Rh-102m	Er-174	Ca- 47	Se- 81m	Rh-104
						Te-134	Pb-201	Y - 85m	Rn-210	
768.36	4.94	u Bi-214	B-	19.9	M	Ir-186m	Re-186	Ir-186	Ag-104	Rh-104m
						Eu-142	Eu-142m	Eu-138	Re-176	Si- 35
						Sr- 85m	Nb-100			
769.1	3.0E-04	u Pa-234	B-	6.70	H	Ga- 65	Nb-100m	Tm-164	Br- 92	Rb- 95
769.7	0.03	u Bi-214	B-	19.9	M	Nb- 89m	Pm-251	Pd-117	Pt-181	Re-184
770.04	6.3E-03	t Ac-228	B-	6.15	H	Tl-186m1				
770.6	—	c Cu- 65	NN			Te-115m	Pr-138m	Pm-136m	Ni- 65	Zn- 65
						I -136m	Ag-118m	Rh- 97m	Nb-104gm	
772.29	1.49	t Ac-228	B-	6.15	H	Br- 76m	Zr- 87	Ag-124		
772.4	1.2E-04	u Pa-234	B-	6.70	H	Tl-188m1	I -132	I -132m	Xe-132m	Cs-132
773.	1.2E-04	a Th-227	A	18.72	D	Hf-165	W -187	Er-174	Tc- 92	Tb-149m
						I -137	Ir-186m	Ir-186	Ag-100	U -232
						Re-186	Bi-194			
774.1	= 0.06	t Ac-228	B-	6.15	H	Te-131m	Pm-140m	Pm-140	Xe-140	Pb-197m
						In-130m2	Ge- 64	Au-181		
775.3	6.6E-03	a Fr-223	B-	21.8	M	La-143	Br- 72	I -114m	Eu-138	Br- 88
775.3	1.4E-03	a Th-227	A	18.72	D	Dy-149	Ho-151	Au-181	Cd- 98	Os-176
776.56	0.019	t Ac-228	B-	6.15	H	Bi-195gm	Br- 82m	Br- 82	Rb- 82	Rb- 82m
						Bi-196	In-102	Au-184	La-148	Re-174
778.23	0.022	t Ac-228	B-	6.15	H	Sm-141m	Rh- 97	Co- 62m	Rh-112	Pb-195
						Rh-104	Sb-111	Re-178	Mo- 99	Eu-136gm
						Gd-147	Nb- 96	Tc- 96	Tc- 96m	Ho-169
778.6	7.3E-05	u Pa-234	B-	6.70	H	Sr- 83	Te-114	Fr-208	Pm-144	Pm-155
						Tm-166	Tb-152	Eu-152	Ag-119	In-131
780.4	1.4E-03	u Pa-234	B-	6.70	H	Ho-147	Ir-196	Pu-235	Sn-130	Hg-195
						Tb-158	Y - 97m2	Np-242m		
780.5	4.1E-05	a Fr-223	B-	21.8	M	Lu-168m	Lu-171	Er-149m	Nd-154	Pm-152m1
780.5	3.0E-04	a Th-227	A	18.72	D					

Energy 781.3 ~ 808.2 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
781.37	7.8E-03	u Pa-234m	B-	1.17 M	Am-246 Pb-192	Y - 96 Ag-118	Ir-183	Pd-109	Ge- 79m
782.14	0.485	t Ac-228	B-	6.15 H	At-209 Sn-129m	Pr-149 Te-131m	Y - 99 As- 80	Sm-139 Au-181	Zr- 85 Tb-164
783.4	3.8E-05	u Pa-234m	B-	1.17 M	Fr-222	Y - 80	Mn- 50	Rh-114	Th-226
783.4	4.8E-04	u Pa-234	B-	6.70 H	Ce-145 Hf-183	Mn- 50m	Cd- 99	Ce-135	Sb-127
784.2	1.3E-04	a Fr-223	B-	21.8 M	Tb-148	Tb-148m	Ce-133	La-146	
784.2	9.3E-05	a Th-227	A	18.72 D					
785.37	1.1	t Bi-212	B-	60.55 M	Mo-107	Ru- 97	Es-252	Gd-143m	
785.96	1.07	u Pb-214	B-	26.8 M	Ag-104m Tm-166	Ag-104 Tc- 95	Np-242 Au-202	Rh-104	Rh-104m
786.1	0.31	u Bi-214	B-	19.9 M	Nb- 95m				
786.27	1.9E-03	u Pa-234	B-	6.70 H	Tc- 95m	Np-234	Ho-170	Tl-192gm	Pu-238
786.27	0.048	u Pa-234m	B-	1.17 M	Bi-201	As- 72	La-145	Dy-149m	Pd- 99
787.4	3.7E-05	a Fr-223	B-	21.8 M	Xe-135m	Te-133	Pb-202m	Au-182	Cs-135m
787.4	9.3E-05	a Th-227	A	18.72 D	Nb- 98m	Nb- 98	Sb-128m	Os-181	Rh- 95m
788.6	0.015	u Bi-214	B-	19.9 M	Br- 80	Xe-139	In-126m	Ir-180	Ho-169
788.74	33.6	La-138	B-	1.05E+11 Y	Pr-138 Ce- 81	Pr-138m Ce-138m	Gd-149 Au-181	Rh-111 Er-151m	Pd- 96 Dy-149
791.49	0.023	t Ac-228	B-	6.15 H	Es-249 Rb- 83	As- 67 At-209	Ir-182 Po-202	Br- 83 Bi-204	Sm-158
791.94	1.0E-05	u Pa-234m	B-	1.17 M	Po-201	Rh-112	Nb- 98m		
792.6	1.0E-05	a Fr-223	B-	21.8 M	Y - 97m2	Tl-197	Ta-184	Re-184	Re-184m
792.6	6.6E-05	a Th-227	A	18.72 D	Tc-106	Tb-150	Fr-230	Tc-104	In-127
792.8	-0.08	t Ac-228	B-	6.15 H	Pt-189				
792.8	7.1E-05	u Pa-234	B-	6.70 H	Pd- 97	Pt-187	Ge- 81	Y - 84m	Y - 84
794.7	-6.0E-04	a U -235	A	703.8E+6 Y	Nb- 99m	Kr- 75	K - 48	I -122	Sb-122
794.9	1.1E-03	u Pa-234	B-	6.70 H	Sb-130m	Zr- 83			
794.95	4.25	t Ac-228	B-	6.15 H	Te-131m	Zr- 87	Pr-154	Au-185	Ga- 67
796.1	4.1E-03	u Pa-234	B-	6.70 H	Pm-134m	Pm-134	Pa-228	Rn-209	Br- 85
796.8	1.6E-04	a Fr-223	B-	21.8 M	Dy-148				
796.8	7.5E-04	a Th-227	A	18.72 D	Tl-188ml				
799.7	0.021	u Tl-210	B-	1.30 M	Cs-134	Tb-149m	Tm-149	Br- 71	
799.7	0.01	u Po-214	A	164.3 US	Cd-107	Nd-139m	Er-171	Rh-110	Po-200
799.7	—	u Pa-234	B-	6.70 H	Zr- 87	Zn- 79	Sm-159	Te-112	Nd-151
802.3	4.9E-05	u Pa-234	B-	6.70 H	Pd- 94	Pd-111m	Ag-118	Fe- 49	La-143
803.1	5.0E-03	u Tl-206	B-	4.199 M	Hg-183	Ag-122	Sn-131gm	Cs-126	Tm-162
803.1	—	c Pb-206	NN		Tm-162m	Au-186	Bk-246	Eu-147	Lu-162
803.1	1.2E-03	u Po-210	A	138.376 D	Ba-143	Am-246m	Gd-143m	Se- 83	Se- 83m
803.5	8.7E-04	a Fr-223	B-	21.8 M	Nd-154	Hf-182m	Pu-245	Ir-187	Es-252
803.5	9.1E-04	a Th-227	A	18.72 D	Ir-183	Nd-155	Rh- 96	Er-173	
804.1	9.9E-04	u Pa-234	B-	6.70 H	K - 43	V - 46m	Sr- 97	Er-151m	Tm-151m
804.9	1.9E-03	t Po-216	A	0.145 S	Cs-134	Nd-139m	Te-129	Br- 88	Br- 84
805.8	4.3E-03	u Pa-234m	B-	1.17 M	Br- 85	Zn- 79			
805.8	4.0E-03	u Pa-234	B-	6.70 H	Th-226	Ba-130m	Mo- 89	Bi-206	V - 48
806.17	1.22	u Bi-214	B-	19.9 M	Br- 91	Ho-150m	Co- 55	Ho-150	Rb- 81
807.5	4.6E-05	a Th-227	A	18.72 D	Tc-109	Ag-106m	Dy-145m	Eu-141m	
808.2	3.0E-03	u Pa-234m	B-	1.17 M	Rh-106m	Pr-150	Eu-159	Es-252	Rn-227
					Re-181	Ra-219	Rn-208	Eu-143	
					Xe-140	Ag- 99	Pa-238	Ga- 68	Ag-114
					Sn-127				
					Sr- 94	Lu-181	Ru- 95	Cs-127	Tm-165
					Cu- 68	Pr-135	At-208	Rh- 99	Br- 89
					Tb-162	Ho-162	Bi-195gm	Rh- 97	
					Ga- 64	Ca- 47	As- 67	Tb-148m	Lu-182
					Pm-149	Mn- 51	Tm-152	Pu-238	Zn- 77

Energy 808.4 ~ 834.0 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
808.4	5.8E-05	u Pa-234	B-	6.70	H	Tm-152m	Gd-145	Ag-118m	Rh- 96m	In-121
810.	0.509	u Pa-234m	B-	1.17	M	In-107	Ge- 65	Ir-197gm		
810.	3.1E-04	u Pa-234	B-	6.70	H	Ar- 44	P - 36	Sr- 96	Au-180	Nd-139m
						Pm-142	Ho-152m	Tc- 90m	Pd- 99	Cd-100
						Lu-172	Ta-166	Pm-152m1	Es-250	Ho-166m
811.5	2.0E-04	u Pa-234	B-	6.70	H	Nb- 96	Eu-152m1	Ar- 33		
						Mn- 58	Co- 58	Tc- 91	Tm-153	Tm-175
						Eu-156				
812.2	3.1E-04	a Fr-223	B-	21.8	M	Ni- 56	Lu-166m1	I -132	Br- 80	Ho-170m
812.2	2.5E-03	a Th-227	A	18.72	D	As- 69	Nb-104gm	Tc- 96	Kr- 92	I -136m
						Sb-129	Au-189	Rb- 94	Pm-133	Gd-143
813.77	7.0E-03	t Ac-228	B-	6.15	H	In-118	Rb- 96	In-118m1	Sb-118	Es-249
						Sb-128	Np-242m	Rh-110	Tc- 91	
814.2	4.9E-04	u Pa-234	B-	6.70	H	Sb-132	Pr-144	Ho-154m	Pm-144	Te-113
						At-207	Ag-124			
815.	0.038	u Bi-214	B-	19.9	M	Tl-195	Ce-131m	Np-232	Rb- 92	Rb- 96
						As- 82m	F - 23	Ag-110	Ag- 99	Ta-164
816.54	2.2E-05	a Fr-223	B-	21.8	M	La-140	Pm-139	Ho-168	Ir-197gm	Tm-168
						Sb-130m	Bi-203	Pt-187	Sb-132	
816.71	0.03	t Ac-228	B-	6.15	H	Cu- 61	Te-129m	Ag-120	Tb-149	Yb-153
						Fr-210	Ag-121			
818.	1.2E-04	a Th-227	A	18.72	D	Eu-144	Br- 77	Sb-133	Cm-244	Np-240m
						In-110m	Ag-110m			
818.2	1.0E-03	u Pa-234m	B-	1.17	M	Es-252	Ag-110	Lu-182	Cs-136	Ba-136m
						As- 82m	Sb-116			
819.2	3.0E-03	u Pa-234	B-	6.70	H	In-116	In-116m1	Bi-201	Pa-232	U -239
						Pb-194	Np-232	In-122m1	Re-176	Rn-208
						Te-112				
821.18	0.158	u Bi-214	B-	19.9	M	Ru-109	Pb-203m1	Bi-203	Lu-160gm	Kr- 93
						Tc- 95m	Ho-168	Tm-168		
821.2	0.014	t Tl-208	B-	3.053	M	Lu-154	Ni- 67	Eu-160	N - 18	Sb-134m
823.1	1.2E-04	a Fr-223	B-	21.8	M	Sn-125	Tc-100	Rh-100	Te-131m	Po-203
823.1	2.3E-03	a Th-227	A	18.72	D	Mo- 99	Sn-127	Hf-182m	Pm-132	Mn- 60m
824.2	2.0E-03	u Pa-234	B-	6.70	H	Ho-171	Rh- 98m	Rb- 90m	Gd-143m	
824.93	0.05	t Ac-228	B-	6.15	H	Ag-106m	Sn-127	Ce-137m	Rh-106m	
825.1	3.0E-03	u Pa-234	B-	6.70	H	Pb-203m1	Bi-203	Lu-162		
825.6	1.4E-03	u Pa-234m	B-	1.17	M	Re-180	Ag-119			
826.	7.9E-04	a Fr-223	B-	21.8	M					
826.	1.8E-04	a Th-227	A	18.72	D					
826.3	0.11	u Bi-214	B-	19.9	M	Tb-165	Pb-201	Co- 60	Co- 60m	Cu- 60
						Sr- 95	Mo- 93m	In-118	Yb-152	Os-181
						In-125	Sb-118			
828.5	1.8E-04	a Th-227	A	18.72	D	Tb-150m	Nd-139m	Br- 82	Rb- 82m	As- 78
						Ga- 81	Se- 81	Ge- 67	Tl-200	Ce-135
						Bk-250				
829.3	5.8E-04	u Pa-234	B-	6.70	H	Es-250m	Cd-107	Re-190	Pm-138m	Es-250
						Ir-188	Re-188			
830.49	0.54	t Ac-228	B-	6.15	H	Tm-168	Ag-120m	Lu-166m1	Se- 71	Tb-151m
						Pm-149	Ho-166m	I -138	Zn- 76	Pu-233
831.5	6.6E-03	u Pa-234	B-	6.70	H	Ta-168	La-148	In-122m1	Os-181	In-128m
						Rb- 90	Rb- 90m	Bi-195gm		
832.	1.5E-05	t Th-228	A	1.9116	Y	Cd-117	Eu-150m	Pm-150	Kr- 79	
832.01	3.52	a Pb-211	B-	36.1	M					
832.39	0.028	u Bi-214	B-	19.9	M	Lu-166m1	Ag- 99	Ce-147	Rh- 96	Rh- 96m
						Re-179				
833.	1.1E-05	a Bi-215	B-	7.6	M	Pd- 98	In-127m	Cu- 66	Pm-251	Pm-149
833.	1.1E-03	a Rn-219	A	3.96	S	Tm-153	Au-187			
833.9	1.9E-05	a Fr-223	B-	21.8	M	Ga- 66	Bk-246	Nb- 98m	Am-246m	As- 83
834.01	—	c Ge- 72	NN			As- 72	Ga- 72	Ga- 80	As- 83	In-104
						Np-241	Rb- 81	V - 54	Ta-170	Kr- 88

Energy 835.7 ~ 866. (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
835.71	1.61	t Ac-228	B-	6.15	H	Fr-228 Pa-228 As- 81 Se- 83 Na- 25	Nb- 95m Ir-196m Nb-104gm Pr-137 Sb-133	Tc- 95m Zn- 77 Kr- 87 Dy-149 Rb- 94	Pb-195 Pd-111 Rh-100m I -135 Fr-224	Ce-137m Ag-124 Cu- 59 Po-205 Bi-199
837.3 837.3	1.4E-04 3.8E-04	a Fr-223 a Th-227	B- A	21.8 18.72	M D	Rh-110m Pb-203m2 Re-190	Ho-159 Ho-158m2	Br- 74m	Am-246	
839.04	0.587	u Pb-214	B-	26.8	M	Pm-154m Pm-140m	Pm-154	Sb-130m Sb-130	Y - 98m	
839.5	4.9E-05	u Pa-234	B-	6.70	H	Lu-171 Ba-142 Sn-125m	Bk-243 Rh-110 Cl- 33	Rh- 97 Os-183m At-204	Ra-222 Pu-245	Bi-195gm Cl- 39
840.38 840.4	0.91 9.0E-03	t Ac-228 u Bi-214	B- B-	6.15 19.9	H M	Ir-184 Co- 61	Pm-152 Bi-199	Ir-186 Zn- 75	Rn-208 Ho-162m	Eu-152m1 Cs-122
842.2 842.2	7.9E-05 5.6E-04	a Fr-223 a Th-227	B- A	21.8 18.72	M D	Lu-160gm Ge- 82 Si- 27 Y - 92 Tb-164	Os-172 Mo- 89 Te-133 At-208	Te-119 Sb-116m La-144	Ru-111 Sb-128m Te-129m	Mg- 27 Au-184 Mo- 93m
844.1 844.1	6.8E-04 1.1E-03	u Pa-234 u Pa-234m	B- B-	6.70 1.17	H M	Ti- 43 Sb-117 Cu- 72	Kr- 87 In-117m Xe-125	Dy-151 Cs-135m Ho-158gm	In-123 La-133 Cs-124	Po-199 Fr-228 Bi-196
846.1 846.7 846.7 846.78	8.2E-05 7.9E-04 1.4E-04 --	u Pa-234 a Fr-223 a Th-227 c Fe- 56	B- B- A NN	6.70 21.8 18.72	H M D	Mn- 56	Co- 56			
847.16	0.026	u Bi-214	B-	19.9	M	Nb- 99m Bi- 203 Mn- 52	I -134m Ho-158gm Pr-145	Cs-134 Nb-102m Sn-129	I -134 Ta-166 Re-176	Pa-237 Tc- 96m
848.7 848.9	5.6E-05 4.3E-05	a Th-227 u Pa-234	A B-	18.72 6.70	D H	Xe-137 Tc- 96m	Sm-142 Tc- 96	Pa-238 Nb- 96	Br- 73 Po-200	Tc- 94 Se- 73m
851.5	6.2E-03	u Pa-234m	B-	1.17	M	Cr- 57 Zn- 77 Os-183	Nd-154 In-112	I -114m Tc-108	Pm-157 Tm-158	Ho-158gm Ag-112
851.7 853.17	1.2E-04 1.2E-02	u Pa-234 t Ac-228	B- B-	6.70 6.15	H H	Np-231 Hf-171	Pu-238 Ni- 65	Pb-203m2 At-210	Y - 80 Ho-169	Es-249 Pr-150
854.3	6.6E-05	a Th-227	A	18.72	D	Lu-171 Nd-155 Bi-192gm Rb- 99 Au-182	Tb-142 Pa-237 Y - 98 Ho-170 Ru- 97	Rn-207 I -139 Cu- 58 Rn-209	Rn-211 Tm-160 La-135	Tb-149 Bi-197 W -189
857.3	5.6E-05	a Th-227	A	18.72	D	Ca- 49 Pm-136	Cd-115 Os-176	I -133 Ta-172	Sb-126 I -134	Eu-147
857.7 858.3 858.3	5.8E-05 <2.1E-06 2.2E-03	u Pa-234 a Fr-223 a Th-227	B- B- A	6.70 21.8 18.72	H M D	Ta-175 Rh-104m I -117	Pm-175 Tm-136m Ge- 81	Ag-104 La-133	Lu-181	Y - 83
860. 860.56	1.5E-03 4.47	u Tl-210 t Tl-208	B- B-	1.30 3.053	M M	Lu-179 Tm-164 Yb-163 In-106m Tm-160m	Pm-149 Zn- 78 Pt-187 Kr- 77	Sn-127 Ta-170 Au-180 Ca- 51	Cd-125 Cd-117m Sb-117 As- 80	Pm-150 Po-206 In-102 In-117m
863. 863. 863.2	5.4E-05 1.8E-05 1.2E-04	a Fr-223 a Th-227 u Pa-234	B- A B-	21.8 18.72 6.70	M D H	Br- 85 I -116 As- 69 Nb- 89 Sn-106	Tb-149 Pm-136 Ag- 98 Lu-164	Sm-159 K - 48 Es-250 Mn- 58	Br- 72 Re-174 Co- 58	Ta-164 Pa-238 Te-133m
865.93 866.	5.9E-03 --	a Pb-211 u Bi-214	B- B-	36.1 19.9	M M	Ta-166 Ce-149 Er-161 Tc-102 Rn-211	Nd-154 W -187 Pa-237 Ag-102 Ar- 44	Ho-150m Se- 73 Zn- 79	Np-232 Ag-111 Pb-187m	Ir-178 Br- 85

Energy 866.8 ~ 897.7 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
866.8	1.1E-03	u Pa-234m	B-	1.17	M	Ho-169	Ir-197gm	Pr-137	Se- 83	Pa-232
867.5	2.5E-05	a Fr-223	B-	21.8	M	Ag-111	Eu-156	Kr- 89		
867.5	6.6E-05	a Th-227	A	18.72	D	As- 74	Bi-197	Np-232	Np-240	Eu-152
867.9	--	c Ge- 73	NG			Ga- 82				
867.9	--	c Ge- 74	NN			Ga- 74	La-140	Sr- 85	At-206	Br- 88
869.7	3.1E-04	u Pa-234	B-	6.70	H	Er-151	Pr-148	In-121	Tc- 95	Dy-149
870.46	0.044	t Ac-228	B-	6.15	H	Eu-148	Fe- 52m	Bk-244		
						Eu-152m1	Lu-179	I- 138	Se- 71	Te-135
						Ir-180	Mn- 57	N- 17	Nb- 94m	Au-184
						Tc- 94m	Tc- 94	Nb- 94	Dy-149	Ce-135
873.07	0.018	u Bi-214	B-	19.9	M	Zn- 69				
						Cs-138m	Cs-138	Ge- 69	Ho-160	Sn-134
873.17	0.031	t Ac-228	B-	6.15	H	Po-205	At-205			
						Eu-154	Tb-154	Tb-154m1	Ho-154	Zn- 77
874.	5.8E-05	u Pa-234	B-	6.70	H	Rh-106				
874.44	0.047	t Ac-228	B-	6.15	H	Pb-191m	Pb-203m2	Pu-240	Pm-148	
						Zn- 79	Ne- 24	Cd- 98	La-135	S - 39
876.	4.0E-03	u Pa-234	B-	6.70	H	Co- 62m	Mn- 59	Tc- 94m		
						I- 138	I- 133	In-108	Bi-195gm	Tm-166
876.2	5.8E-04	a Fr-223	B-	21.8	M	Cu- 62	Sr- 93	Er-163	Ge- 81	Ru-105
876.2	1.5E-04	a Th-227	A	18.72	D	Tm-156	Kr- 92	I- 118	Pm-150	Mn- 62
877.46	0.014	t Ac-228	B-	6.15	H					
878.03	0.012	u Bi-214	B-	19.9	M	Mo-101	Tm-148	In-122m2		
878.2	1.1E-04	a Th-227	A	18.72	D	Hg-193m	Cu- 59	In-104		
880.5	1.7E-02	u Pa-234	B-	6.70	H	Si- 36	Tb-154	Pb-195m	As- 79	Rh- 97
						Ho-160	Tb-160	C- 18	Xe-140	Sm-159
						Xe-134m	Cs-126	Po-199m	Ag-108	Tb-150
						Pm-156	Pm-140m	Ce-143	Lu-164	Os-185
880.76	6.2E-03	t Ac-228	B-	6.15	H	Cd-117	Fm-251			
880.9	3.8E-03	u Pa-234m	B-	1.17	M	Bi-206	Tl-188m1	Ho-170m	Sr- 76	Zn- 75
						Br- 84	Rb- 84	Sb-132m	Pm-149	
883.24	3.5E-03	u Pa-234m	B-	1.17	M	Y - 83	Tb-162	Tb-148m	Co- 65	Zn- 79
883.24	0.015	u Pa-234	B-	6.70	H	Np-238	Cs-122	Cs-122m2	Eu-141	Eu-141m
						Pb-195				
883.3	0.011	t Tl-208	B-	3.053	M	Rb- 76	Ag-113	Se- 83	Ho-147	Po-204
						Tc-104	Ho-172	Tl-195	La-128	Ir-192
						Ho-156	Lu-168m	In-110	Ag-110m	Br- 78
						Cu- 70m	Rb- 81m	I- 134m		
887.28	7.1E-03	u Pa-234m	B-	1.17	M	Na- 32	Pa-238	Pm-133	Au-200	Ce-131
						Pm-141	Te-117	As- 74	Nb- 87	Pd- 96
887.33	0.027	t Ac-228	B-	6.15	H	Sb-114	Ga- 67	Nd-155	Os-183	Sr- 93
889.	1.6E-03	a Rn-219	A	3.96	S	Tb-162	Ho-162	S - 40	As- 78	Am-240
						Sc- 46				
890.1	4.3E-05	u Pa-234	B-	6.70	H	Eu-142	Lu-169	Bk-250	Os-183	Rh-114m
						Bi-195gm	Ge- 83	Pm-144	Po-201	Ho-170
891.	1.8E-05	a Th-227	A	18.72	D	Ir-182	Fr-206	Nb- 90	Ir-180	Ar- 43
						Pm-154				
891.8	--	u Bi-214	B-	19.9	M	Xe-142	Ag-102	Bi-197	Bk-244	Sr- 97
893.	3.7E-05	a Fr-223	B-	21.8	M	Ba-129m	Sr- 92	Ce-149	Tb-154m1	Ru- 91
893.	1.2E-05	a Th-227	A	18.72	D	Y - 97m1	Tc-104			
893.41	0.378	t Bi-212	B-	60.55	M	Gd-147	Bi-203m	Po-203	Eu-145	Bi-195gm
						As- 72	Tm-175	Pa-228	Pm-156	Pa-232
						Sb-112	Na- 31			
896.1	2.4E-04	a Fr-223	B-	21.8	M	Re-184	Re-184m	Ta-184	Re-182m	Sn-104
896.1	1.0E-04	a Th-227	A	18.72	D	La-142	Pr-154	Bi-206	Ba-143	Ba-142
						Pd- 98	Pt-187	Np-240	Pb-197	Lu-168m
						Pm-148	In-123m	In-119m	Ho-157	Po-209
						Bi-203				
897.7	1.5E-03	a Po-211	A	0.516	S	Cm-242	As- 67	Sb-111	In-119m	Tb-158

Energy 897.7 ~ 930.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
897.78	0.259	a Tl-207	B-	4.77	M	Tb-158			
897.78	--	c Pb-207	NN			Bi-207	Am-244	Rb- 88	Y - 88
898.67	5.2E-03	u Pa-234	B-	6.70	H	Cd-107	Cu- 69		Tm-164m
						Sr-100	Cd- 98	Pa-230	Yb-177
						Pb-204m	Bi-204	Sn-130m	Sn-132
								Nd-133m	La-132m
901.23	0.016	t Ac-228	B-	6.15	H	K - 42	Sc- 42m	Xe-123	Ir-178
						Re-174	Po-211m	Tm-162	Tm-162m
						Fr-210	Rh-108	Xe-125	Lu-172
						Pu-235		Cu- 70m	P - 36
904.2	0.77	t Ac-228	B-	6.15	H	Re-180	Tc- 91	Re-174	At-209
904.2	5.4E-04	u Pa-234	B-	6.70	H	Re-184m	Ta-184	Ho-171	Pm-148
904.29	0.085	u Bi-214	B-	19.9	M	Kr- 89	Fr-228	Rh-110m	Po-201
						Pa-238	S - 39	Dy-155	Pm-132
908.1	=1.7E-06	t Th-228	A	1.9116	Y	Y - 96m	Ta-166	S - 37	As- 70
						Ce-137m	Sr- 94	Te-114	In-129m
								Ni- 57	Tm-152m
									Ta-168
908.2	2.0E-04	a Fr-223	B-	21.8	M	Sc- 51	Ho-171	Tm-149	Cs-148
908.2	2.0E-03	a Th-227	A	18.72	D	I - 128	La-130		Pb-201
						Cs-140	Sb-128m	Au-202	Tb-145
						In-126	Bi-203m	Po-203	In-126m
						Am-237	In-121m	Sb-110	Cu- 61
910.	6.2E-04	u Tl-210	B-	1.30	M	Sr- 89	Y - 89m	Zr- 89	Nd-154
910.	1.5E-05	a Th-227	A	18.72	D	Te-121m	Nd-139m	Pu-235	Sr- 81
911.2	25.8	t Ac-228	B-	6.15	H	Pm-154	Pa-238	Ge- 67	Co- 61
911.3	1.1E-05	a Fr-223	B-	21.8	M	Sm-141m	Y - 97m2	Pb-204m	Zn- 71
						Ru-107	I -133m	Ir-182	Pa-228
913.6	6.2E-06	a Fr-223	B-	21.8	M	Nb- 92m	Sn-104	Te-119m	Bi-204
						Ir-187	Pd- 95m	Br- 85	Te-133m
						I -136m	Rn-210	Zn- 59	Te-133m
						Au-187		Br- 73	Pt-187
915.74	0.026	u Bi-214	B-	19.9	M	Te-133m	Ge- 67	Nb- 86	Sn-129
								Cs-124	Co- 63
916.5	3.8E-05	u Pa-234	B-	6.70	H	Pt-179	Pm-148m	Sn-125	Br- 73
917.8	5.0E-03	u Bi-214	B-	19.9	M	Am-240		Ce-137	Tc-105
						Gd-143m	In-103	Nd-139	Pm-148
						Cd-123	Ho-162m	Bi-198m1	Pm-148
						O - 22	Fr-211	Rb- 76	Pm-148
918.4	1.6E-04	u Pa-234	B-	6.70	H	Bi-204m2	Re-168	Bi-204	Np-240m
918.97	0.027	t Ac-228	B-	6.15	H	Np-238	Am-238	Y - 94	Pa-236
						La-143	In-121		Y - 96
920	1.1E-05	a Th-227	A	18.72	D	La-140	Sr- 85m		Ga- 64
920.5	4.6E-05	u Pa-234	B-	6.70	H	Nb- 89	In-119m	Au-181	Pm-152
						Bi-208m		Pr-145	Pm-152
921.7	0.013	u Pa-234m	B-	1.17	M	V - 55	Pm-154	Si- 36	Ta-184
921.98	0.015	t Ac-228	B-	6.15	H	Cd-105	Eu-150m		Sn-134
924.03	7.5E-03	t Ac-228	B-	6.15	H	Cs-125	Ag-100m	Pr-146	Bk-244
						At-206	Cd-119m	V - 54	Xe-116
925.	0.013	u Pa-234	B-	6.70	H	Te-117	Np-238	Ho-153	Ag-104
						La-146	Br- 85	Cd-101	Nd-139
						La-140	Cs-126	Pr-140	Er-148
926.	2.8E-03	u Pa-234	B-	6.70	H	In-121	Mn- 58	Te-137	Ho-146
						Ag-104	Nd-137	Sr- 91	Ag-120m
926.5	2.3E-05	a Fr-223	B-	21.8	M	Ce-137	Bi-199	Fr-206	
926.72	0.012	u Pa-234	B-	6.70	H	Tm-160m	Eu-160	Zn- 77	
926.72	1.2E-03	u Pa-234m	B-	1.17	M				
927.	6.6E-06	a Th-227	A	18.72	D	Bi-202			
927.6	0.047	t Tl-208	B-	3.053	M	Tc- 91m	Nb- 99m	Pb-195m	Nb-100
						V - 48	Te-112	Nb-100m	Sn-129
930.2	0.033	u Bi-214	B-	19.9	M	Gd-147	Nd-137	I -118m	Ti- 51
						Al- 34	Np-241	Pm-154m	Ag-105m
930.93	0.012	t Ac-228	B-	6.15	H	Pm-138m	Te-133	Re-176	Bk-250
						Co- 55	Co- 64	Cs-127	Ar- 35
								In-123	Tm-156
									Xe-121
									Rh-108

Energy 934.0 ~ 970. (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
934.06	3.03	u Bi-214	B-	19.9	M	Cd-117m	Br- 73	Bi-200	Ho-156	Sr- 96
						Er-161	Pr-150	Sb-116	La-145	In-116
						Ho-170	Ga- 65	Lu-166m1	Hg-193m	Rb- 81m
						La-124gm	Re-178	Th-235	Eu-147	Sb-131
						Ir-186	O - 21	Cd-115m	Pm-156	Cs-146
934.1	0.05	u Bi-214	B-	19.9	M	Pr-135	Ho-170	Cd-105	Mo-101	
934.5	1.0E-02	u Bi-214	B-	19.9	M	Nb- 92m	Y - 92	Te-131	Nb- 92	Si- 36
935.8	1.1E-04	u Pa-234	B-	6.70	H	Pr-148m	Cd-123m	Tb-145		
						In-128	V - 52	Mn- 52m	Mn- 52	Sb-113
936.3	1.8E-03	u Pa-234m	B-	1.17	M	Bi-201	Lu-176m	I -121	In-125	Cd-100
938.	9.7E-06	a Th-227	A	18.72	D	Np-238	Ga- 81	I -140	Lu-166m1	Pb-191m
						Ho-162m	Hg-205	La-123	In-110	Ag-110m
						Np-240m	Ga- 82			
938.65	0.013	u Bi-214	B-	19.9	M	Sr- 81	Gd-149	Ir-194	Lu-170	As- 81
939.6	0.018	u Bi-214	B-	19.9	M	Rn-208	Ir-197gm			
939.87	9.0E-03	t Ac-228	B-	6.15	H	Pr-138m	Pd- 97	Rh- 99	Sb-113	Pu-235
941.6	4.6E-05	a Fr-223	B-	21.8	M	Tm-175	Cd-119	Np-238	Ho-170	Am-238
941.6	6.7E-05	a Th-227	A	18.72	D	Mg- 28	Mo- 90	Cm-242	Rh- 95	Ag-104
941.94	2.5E-03	u Pa-234m	B-	1.17	M	Rh-104m				
						Yb-177	Am-244m	Sr- 77	Mn- 62	Tl-189
941.94	7.3E-05	u Pa-234	B-	6.70	H	Pb-190	Te-119m	Bi-196	Fr-208	
943.34	0.017	u Bi-214	B-	19.9	M	Hf-182m	In-104	Sb-131	Tc- 93m	
944.2	0.095	t Ac-228	B-	6.15	H	V - 48	Eu-158	Tb-158	Eu-156	I -118m
946.	9.9E-03	u Pa-234m	B-	1.17	M	Pu-235	Ta-177	Np-242	Sr- 95	
						Pa-228	Ho-158gm	Pb-201	Bi-199	Bk-243
946.	0.021	u Pa-234	B-	6.70	H	Ho-158gm	Rn-211			
947.7	2.6E-03	u Pa-234	B-	6.70	H	Mg- 31	Te-121m	Zn- 60	Y - 93	Rh-108
947.98	0.106	t Ac-228	B-	6.15	H	Tc- 95	In-122	Rb- 89	Mo- 93m	
						Cd-105	Tc- 90m	Tc- 90	Au-194	In-127m
949.3	5.0E-06	a Fr-223	B-	21.8	M	Ho-158gm	Nb-102m	Ba-142	Yb-152	Fr-228
949.8	5.5E-03	u Bi-214	B-	19.9	M	As- 81	Mo- 93m			
951.	0.022	a Pb-211	B-	36.1	M	Sb-109	Ga- 78	Dy-148	Sr- 85	
952.12	0.167	t Bi-212	B-	60.55	M	Ge- 82	Y - 83	Rn-208	Pa-230	Ac-230
952.2	6.0E-03	u Bi-214	B-	19.9	M	Cu- 60	Os-177	Pa-238		
952.7	1.3E-04	u Pa-234	B-	6.70	H	Cd-121m	In-130	Gd-145	Sr- 92	Br- 89
958.61	0.28	t Ac-228	B-	6.15	H	Sr- 97	Y - 95	Sn-111	Pb-196	Bi-202
						Pb-202m	I -132			
						Yb-165	Ho-172	Lu-176m	Pr-154	Lu-183
958.7	8.3E-06	a Fr-223	B-	21.8	M	In-123	Ho-170	K - 45	Pb-197m	Rn-210
						I -116	La-146m	Tm-156	Tb-144m	
958.7	5.8E-05	a Th-227	A	18.72	D					
960.	1.2E-04	u Pa-234	B-	6.70	H	Ho-170m	Nd-155	Au-202	Tl-202	
960.	9.0E-04	u Pa-234m	B-	1.17	M	Mg- 29	Eu-156	Pt-181	Lu-169	Bi-202
961.61	0.012	u Bi-214	B-	19.9	M	Mo- 99				
						Pm-152	Eu-152m1	Ca- 52	Ir-184	V - 55
962.06	--	c Cu- 63	NN			Bi-195gm	Ti- 45			
						Cd-105	Pm-154	Zn- 63	Ta-175	Tb-158
964.08	0.362	u Bi-214	B-	19.9	M	Tb-160	Ho-160	Sn-130m	Zn- 79	Br- 89
						Np-238	Am-238	Sm-143m1		
						Cd-103	Pm-152	Eu-152m1	Rb- 92	Co- 65
964.77	4.99	t Ac-228	B-	6.15	H	Sr-100	Rn-208	Eu-152	Po-201m	U -239
965.	1.0E-02	u Bi-214	B-	19.9	M	Tl-196	Pa-228	Zn- 71m	Zn- 71	
965.8	7.6E-04	u Pa-234	B-	6.70	H	In-120m2	Zn- 80	Tm-153		
968.97	15.8	t Ac-228	B-	6.15	H	Pr-134m	Pr-134	Tb-160	Ho-160	Sb-129
						Cs-142	Bi-195gm	Pu-240	I -130	Nb-103
						Po-201m	Tl-195	Sb-124	Pt-199	Os-179
970.	3.3E-06	a Fr-223	B-	21.8	M	In-108m	Os-178	Nb-100	Pa-228	Pa-232
						I -128	Cs-128			
						In-126	Pm-154	In-124m	In-124	Zn- 61
970.	2.8E-05	a Th-227	A	18.72	D	Y - 97m1	Ta-178	Eu-152m1		

Energy 971.7 ~ 1013.5 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
971.7	9.3E-06	a Th-227	A	18.72 D	Rb- 77	Ta-174	Te-112	Nb- 98	Fr-230
					Pm-138m	Y - 92	Nd-136	Sb-116m	Sb-116
975.1	4.3E-05	u Pa-234	B-	6.70 H	In-129m	Rn-207	I -119		
					Po-202	Sb-132m	Sb-132	Pr-134m	Pr-134
					Ti- 45	Y - 84m	Tb-152	In-122m1	Na- 25
975.2	2.5E-06	a Fr-223	B-	21.8 M	Sb-114	La-130	Ar- 43	I -120	
975.96	0.05	t Ac-228	B-	6.15 H	Ti- 42	Cd- 99			
976.18	0.019	u Bi-214	B-	19.9 M	Bi-197	I -120m			
					Te-119m	I -139	Ga- 76	I -136	Sm-159
978.2	1.4E-04	u Pa-234	B-	6.70 H	Tb-158	Eu-158			
					Ir-187	Rb- 96	Am-244m	Se- 71	Si- 36
978.7	1.1E-05	a Fr-223	B-	21.8 M	Pm-135	Pu-233	Cm-251	Te-133m	
979.48	0.026	t Ac-228	B-	6.15 H	Pr-134m	Pr-145	Mo- 93m		
980.3	7.1E-03	u Pa-234	B-	6.70 H	Sn-127	Lu-168m	Te-119m	Zn- 79	Zn- 78
					La-135	Ta-172	Tb-142	Rn-210	Po-206
981.6	1.2E-03	u Pa-234	B-	6.70 H	Fr-226	He- 8			
982.7	0.073	t Ti-208	B-	3.053 M	Ge- 67	Rb- 99	Pm-139	Co- 63	Nd-141
					Nd-139m	Te-137	Lu-180	Mg- 28	Sr- 76
984.2	2.6E-03	u Pa-234	B-	6.70 H	Fr-211	Sm-141m			
					Tc- 90m	V - 48	Sc- 48	Dy-151	Lu-168m
					Sb-118m	Np-238	Lu-166m1	Na- 27	Sb-110
					Ga- 82	Lu-170	Rb- 97	Na- 30	I -139
987.71	0.077	t Ac-228	B-	6.15 H	Cl- 39				
					Am-246m	Rb- 93	Sb-115	N - 16	Ta-168
					Ir-186m	Ir-197gm	Lu-170	Ca- 49	Ir-187
					Tb-146m1	Pu-245	Bi-205	Pb-205m	Np-240
988.63	0.077	t Ac-228	B-	6.15 H	Cd-121m	Tb-149m	Se- 83m		
					Rb- 77	Sm-157	Ag-113	Sb-120	Cd-123m
989.34	1.0E-02	u Bi-214	B-	19.9 M	V - 54				
989.5	1.6E-04	u Pa-234	B-	6.70 H	Xe-140	Tm-158	Es-250m	Bk-250	Sb-126
990.	2.1E-06	a Fr-223	B-	21.8 M	Sb-132				
990.	3.3E-05	a Th-227	A	18.72 D	Fr-228	Na- 25	La-148	At-208	In-120
991.49	1.0E-02	u Bi-214	B-	19.9 M	Y - 97m2	K - 43	Bi-201		
992.	1.3E-04	u Pa-234	B-	6.70 H	Sb-112	La-132m	Ga- 64	Pu-233	
					Tm-174	Er-151	Nd-134	Lu-174m	Po-207
992.9	1.5E-06	t Th-228	A	1.9116 Y	Rh-114m	Sn-132	Pd-101	Bi-200	Tb-154m2
					Tc- 94m	Cu- 69	As- 79	Ba-126	As- 74
994.6	9.9E-05	u Pa-234	B-	6.70 H	Se- 86	Ce-137m	Pb-195	Bi-197	Rn-210
995.	1.7E-06	a Fr-223	B-	21.8 M	Fe- 63	Eu-160	Rh- 97m		
995.	6.1E-06	a Th-227	A	18.72 D					
996.1	4.1E-03	u Pa-234m	B-	1.17 M	Eu-152m1	Tb-154	Tb-154m1	Eu-154	Sr-101
					Cd-125	Na- 24			
997.7	7.3E-05	u Pa-234	B-	6.70 H	Hg-207	In-110	Tb-147m	Te-131	Lu-166
					In-106	Br- 89	Te-121m	Ta-175	Pb-194
999.8	2.9E-06	a Fr-223	B-	21.8 M	Lu-170	Dy-155	Ho-154	Au-181	Ce-131m
999.8	2.8E-05	a Th-227	A	18.72 D	Nd-155	Nd-134	Re-181		
1000.69	5.0E-03	t Ac-228	B-	6.15 H	In-104	Pu-233	Eu-144	Pr-136	Te-133
1001.03	0.837	u Pa-234m	B-	1.17 M	Eu-136gm	Pu-238	Ba-142	Nd-155	Po-205
					In-122m2	In-122m1	Tb-144m	Po-199m	Sc- 44m
					Na- 26				
1004.	<1.8E-03	t Ti-208	B-	3.053 M	Lu-172	Tm-148	Re-174	Lu-170	Nb- 86
					I -119	Ba-130m	Pu-233	In-117m	Ce-137m
					Sb-117	Cu- 72	Eu-154	Tb-154m1	Tb-154m2
					Pm-152m1				
1009.9	1.1E-04	u Pa-234	B-	6.70 H	Pm-142	Es-249	Ho-172	In-129	Tc-105
					Fr-226	Sr- 99	In-106	Re-181	Si- 35
1011.8	—	u Bi-214	B-	19.9 M	Bi-195gm	Ba-143	Dy-151	Dy-149	
					Mo-101	La-142	Fe- 53m	Ru-109	Ir-194m2
1013.58	4.6E-03	t Ac-228	B-	6.15 H	Pu-233	Mo-101			
					Ti-199	Ge- 81	In-122	Sb-113	Rh- 97m

Energy 1013.8 ~ 1054.1 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
1013.8	8.3E-03	u Bi-214	B-	19.9	M	Mg- 28			
						Re-180	Pm-140	Pb-205m	Pm-148m
1014.64	0.017	a Pb-211	B-	36.1	M	Pm-138m	Er-150	Bi-201	
						Cd- 99	Mg- 27	Si- 27	Cu- 68m
						Re-168	Tb-145	W -177	Pa-238
1015.2	1.5E-05	a Th-227	A	18.72	D	Ge- 79m	Pa-238		
1016.44	0.019	t Ac-228	B-	6.15	H	La-146	Br- 84	Ru- 93	Ru- 93m
						Eu-142m	Rb- 84	Pm-135	Po-204
1017.92	5.7E-03	t Ac-228	B-	6.15	H	Pm-154	Sn-125m	Sb-130m	Ir-178
1019.5	4.3E-05	u Pa-234	B-	6.70	H				Te-113
1019.86	0.021	t Ac-228	B-	6.15	H	In-123			
1020.	1.8E-05	a Th-227	A	18.72	D	Ar- 45	Ar- 46	In-117m	
1021.	0.014	u Bi-214	B-	19.9	M	Sb-117	Se- 83m	Cd-121m	Sn-123
						Zr- 97	Cr- 49		Sb-117
1021.8	2.3E-04	u Pa-234	B-	6.70	H	La-145	Tl-206m	K - 43	C - 10
									Cs-118gm
1023.6	9.9E-05	u Pa-234	B-	6.70	H	Nb-100	Re-184		
						Ho-170m	K - 42	Br- 74	Bi-199
						In-120m2	In-120m1	Ta-176	Pr-148
						Zr- 87	Te-121m	Sb-120m	Eu-142m
1025.	2.1E-06	a Fr-223	B-	21.8	M	Sr- 91	Nb- 98	Nb- 97	Tc-100
1025.	1.5E-05	a Th-227	A	18.72	D	K - 44	Kr- 91	Ag-102	Cd-119m
1025.3	8.2E-05	u Pa-234	B-	6.70	H	In-109m2	Np-238	Sn-109	Ga- 78
						Bi-200	Ag-119	Au-182	Sn-111
1028.7	9.1E-04	u Pa-234	B-	6.70	H	K - 50	Ho-154	Pb-203m2	Sb-133
						Cd-125m	At-208	Yb-177	Er-148
								I -130m	Fe- 61
						Bk-250	Cs-118gm	Ag-116m	Pm-140m
						Yb-165	Y - 85m	Sb-129	Cd-117m
1032.37	0.078	u Bi-214	B-	19.9	M	Se- 83m	Ho-156	Cs-132	La-132
						Bk-250	Te-115m	Es-250m	La-132m
						Sc- 52	Tb-146m1	Rb- 89	Ti- 45
1032.8	2.8E-05	u Pa-234	B-	6.70	H	Sb-111	Lu-168m	Mo- 91m	In-108
1033.25	0.201	t Ac-228	B-	6.15	H				
1033.3	0.024	u Bi-214	B-	19.9	M	Rh- 94m	La-124gm	Bi-203	Po-199m
						Bi-199			Eu-148
1035.9	4.1E-05	u Pa-234	B-	6.70	H	Ho-149m	Au-181	Os-183m	Sb-126m1
									Br- 92
						Te-121m	Cs-122	Sr-102	Am-246m
						W -177	Tl-196m	Cd-102	Bk-246
1037.9	2.8E-05	u Pa-234	B-	6.70	H	Yb-167	Rb- 96	Np-232	Sc- 48
						Mn- 56	Br- 85	Co- 56	Ce-138m
1038.	8.3E-03	u Bi-214	B-	19.9	M	Cd-105			Rn-209
1039.2	--	c Ge- 70	NN			Cs-134	I -135	Al- 29	Sn-109
						Ga- 70	Ga- 66	Tc- 95m	S - 29
1039.65	0.044	t Ac-228	B-	6.15	H	Y - 84m	Dy-149	Na- 29	Nb- 86
						Cd-121			Fe- 52
1040.92	0.044	t Ac-228	B-	6.15	H	Tl-194	La-128	Sb-128m	As- 70
									Cu- 68m
1041.7	5.1E-05	u Pa-234	B-	6.70	H	Gd-140	Sb-132m	Ne- 18	In-121m
1041.7	1.2E-03	u Pa-234m	B-	1.17	M			Gd-145	Ru-107
1044.4	4.9E-05	u Pa-234	B-	6.70	H	Fr-228	Bi-205	Br- 82	Rb- 82m
						Ir-184	Ba-129m	Cd-125m	Kr- 92
1045.6	0.026	u Bi-214	B-	19.9	M	Sb-124	Ho-151	V - 52	Ag-106m
									Dy-148
						La-132m	Rh-102	Rh-102m	Ni- 57
						Hg-188	Ir-196	Fr-212	Rh-106m
1051.4	9.9E-05	u Pa-234	B-	6.70	H	Bi-196m2	Bi-196	Sr- 99	Ga- 65
						Tm-176	Cd-119	Sc- 52	Lu-160gm
						In-118m1	Ru- 95	Te-129m	Tm-164m
								Ag-106	Lu-170
								Ga- 72	In-118m2
									Sb-118m
1051.96	0.315	u Bi-214	B-	19.9	M	La-145	Ar- 44	Pr-145	
1053.09	0.013	t Ac-228	B-	6.15	H	Cd-117	Sm-159	Ge- 69	Cd-123
1054.11	0.018	t Ac-228	B-	6.15	H	Bi-199	La-143	La-128	I -133
						Pd- 97	Se- 83m	Rh- 97	Ho-158m2
						Tc- 90m		Ag-100	I -120m

Energy 1055. ~ 1106.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
1055.	6.5E-04	a Rn-219	A	3.96	S	In-129	Br- 72	Ru-111	In-128m	Te-116
1057.8	=2.8E-05	u Pa-234	B-	6.70	H	Cr- 57	In-108	Lu-183	O - 20	Nb- 88
						Sm-143	Tm-155	Pm-140	Au-190	Ta-168
						Sm-141	Ag-118m	P - 36		
1059.4	1.1E-03	u Pa-234m	B-	1.17	M	Dy-149	Fe- 49	Y -102m	Y -102	Pb-194
						Pm-136m	Pa-238	Fr-222	Os-181	Pa-238
1061.86	2.3E-03	u Pa-234m	B-	1.17	M	Rb- 90	Rb- 90m	Xe-123	Rb- 99	Lu-170
						Cs-116	Br- 72	Sb-126m1	Sb-109	Cs-141
						Bk-246	Am-246m	Dy-146		
1062.55	0.01	t Ac-228	B-	6.15	H	Ra-213m	Am-244m	Tm-152m	Ir-182	Bi-198m1
						Pb-207m	Bi-207	Nb-100		
1065.1	4.3E-05	u Pa-234	B-	6.70	H	V - 48	Xe-123	Y - 99	Cs-142	Te-116
1065.18	0.132	t Ac-228	B-	6.15	H	Pt-184m	Lu-174	Ga- 73	Tb-156	
1067.2	0.027	u Bi-214	B-	19.9	M	Eu-156	Ga- 63	In-119m	Cd-117m	Re-171
						Nb- 87	Dy-146	Cd-127	Pb-195	Sn-125
						Tb-162	Pb-195m	Eu-140	Rh- 94	
1069.96	0.275	u Bi-214	B-	19.9	M	Co- 63	Ne- 25	Tm-176	Gd-147	Re-176
1070.	2.5E-03	u Tl-210	B-	1.30	M	Au-189	Rh- 99	Cd-105	Te-115m	Lu-168m
1073.6	0.016	t Bi-212	B-	60.55	M	Hf-171	Gd-145	Sb-116m	Rh- 94	I -134
1073.6	1.6E-04	u Pa-234	B-	6.70	H	Gd-141	In-124m	Ac-232	Br- 82m	Ho-149
						Tl-194	Yb-165	Lu-164	Tc- 95	Nb- 88
1074.71	0.01	t Ac-228	B-	6.15	H	Nd-139	In-129	Pr-150	Ta-172	Se- 69
						Re-182	As- 82m	As- 82	La-143	Y - 86m
1078.62	0.564	t Bi-212	B-	60.55	M	Sb-116m	Al- 24	Rb- 86	Eu-147	Ga- 68
						Se- 73m	Cu- 68	Cu- 68m	Sb-109	Pm-135m
						Bi-195gm	Ar- 32	Ba-142	Tb-146m1	Bk-246
						Tb-148	Eu-156			
1080.16	0.012	a Pb-211	B-	36.1	M	Pm-152	Dy-165	As- 82m	As- 82	Cd-103
						Yb-177	Ne- 18	Cs-116	Br- 82m	Ge- 67
1083.2	8.9E-04	u Pa-234m	B-	1.17	M	Bi-197	Pr-138	Mo- 91m	Mo- 91	Nb- 88m
1083.2	8.1E-04	u Pa-234	B-	6.70	H	Nb- 88	Nb- 87	Pa-238	Ga- 80	Lu-168m
						Te-129	Am-244m			
1085.4	4.8E-04	u Pa-234m	B-	1.17	M	Cd-123	Po-200	Ba-127	In-127m	Am-246m
1085.4	4.3E-05	u Pa-234	B-	6.70	H	Ce- 77	Ta-172	I -114m	I -114	Ho-153
						Mo-103				
1088.18	5.9E-03	t Ac-228	B-	6.15	H	Lu-183	Au-198	Pd- 98	Sn-125	Ag-105
						Re-174	Tm-176	Sn-123	Pr-137	Sn-125
1090.5	2.6E-03	a Pb-211	B-	36.1	M	Rb- 94	Bi-197	Tb-148	In-128	Eu-152
						In-124	In-119m	Dy-155	Yb-165	Te-117
						Ba-139	Po-203	Y - 97m1	Cl- 39	I -114
						Tc- 96	Nb- 96	Au-196	In-118m2	Sb-118m
						In-122m1	Rb-101	Ge- 82	Sm-141	
1093.9	0.143	t Tl-208	B-	3.053	M	Pm-137	Pr-136	In-121	Fr-228	Sb-132
						Xe-123	Np-242m	Ag-101	Tm-172	I -118m
						Ba-142	In-127			
1095.68	0.129	t Ac-228	B-	6.15	H	Fr-230	Se- 71	As- 71	Sn-127	Co- 63
						Pm-154	Cd-121	Bi-195gm	Sb-133	Tc- 96m
						Ru- 95	Pr-137	Ru- 91	In-118	Pm-152m1
						Sb-116	Cu- 76gm	Gd-141m		
1103.41	0.015	t Ac-228	B-	6.15	H	Yb-153	Lu-170	Cd-119m	Os-183m	Te-121m
						In-121m	Ag- 99	Tc-102	Y - 97	Y - 97m1
						Rh-102	Ce-143	Tc-102m	At-209	
1103.52	4.6E-03	a Pb-211	B-	36.1	M					
1103.64	0.1	u Bi-214	B-	19.9	M	Sr-102	Np-242	Au-194	Tm-160m	
1104.79	0.077	u Bi-214	B-	19.9	M	Rh-116m	Os-183m	Ir-184	Am-244m	Tc-102
						Rb-102				
1106.9	1.3E-04	u Pa-234	B-	6.70	H	Lu-179	Y - 79	Ag-108	Ta-178	Mn- 48
						Tb-152m	Tm-152m	Lu-180	Ge- 69	Ar- 45
						Y - 96m	Eu-143	Te-121m	Eu-158	Tb-158

Energy 1109.4 ~ 1165. (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
1109.48	0.115	a Pb-211	B-	36.1	M	Os-183m Ga- 76 Ta-172	Bi-201 Kr- 91 Ga- 80	Np-231 Cu- 70m Rb- 78m	Eu-152	Tb-152
1110.	1.5E-03	u Tl-210	B-	1.30	M					
1110.6	9.9E-05	u Pa-234	B-	6.70	H					
1110.61	0.304	t Ac-228	B-	6.15	H	Se- 73 Tm-176 Ir-187 As- 70 Ni- 67	Ce-145 Ru- 93m Eu-152 Sn-127 Lu-160gm	Rh- 94 Bi-197 Pm-152m1 Dy-151 Ni- 65	Re-178 As- 85	Hg-195 Te-129
1115.55	—	c Cu- 65	NN			Pd-111m In-124m Sb-134	Ge- 80 Re-176 Ge- 79m	Nb- 97 Pb-197m Os-181m	Sn-129 Tc-108 Ta-170	Re-180 Nd-131 Sn-109
1117.63	0.054	t Ac-228	B-	6.15	H	Re-177 Yb-177	Kr- 90 Zn- 71	Os-181m Os-172	Ta-170 Pd-111	Sn-109 In-121m
1118.9	0.04	u Bi-214	B-	19.9	M					
1120.29	15.1	u Bi-214	B-	19.9	M					
1120.6	1.7E-03	u Pa-234m	B-	1.17	M	Sc- 46 Sb-115 In-122m2 Rh-114m	Sc- 50 Te-119 Sc- 40 Nd-151			
1121.7	4.0E-04	u Pa-234	B-	6.70	H					
1125.2	5.8E-04	u Pa-234	B-	6.70	H	Sb-131 Y - 97m1 Te-131m Cl- 33	Zn- 63 Br- 72 In-110m	I -135 Au-202 Ag-110	Bk-246 Lu-183 Bi-195gm	Sr-101 Pr-134m K - 44
1125.7	1.8E-03	t Tl-208	B-	3.053	M	Rn-211 Ag-106	Tc- 96 Ag-106m	Nd-141 Rh-106	Nb- 89 Sc- 52	Rh-106m Sn-129m
1126.8	4.8E-04	u Pa-234	B-	6.70	H					
1126.8	4.0E-03	u Pa-234m	B-	1.17	M					
1130.29	0.04	u Bi-214	B-	19.9	M	Fr-230 Nb- 90 Cd-107 In-123	Co- 62 Na- 26 Co- 54m La-124gm	Cu- 62 Al- 26 Tm-163 I -135	Co- 62m Dy-151 In-123 In-124	Sn-107 Br- 76 Re-178 In-124m
1133.66	0.248	u Bi-214	B-	19.9	M	Sm-135 Ne- 25 Lu-170 Sc- 52 Br- 72 Np-242m	Nb- 92m Xe-135m Ho-162 Pb-199 Te-119m	Re-188 Es-250m Am-240 Lu-168m	Y - 92 Te-135 Hg-205	Cd-115m Tb-144 Cs-132 Bi-199
1135.24	9.8E-03	t Ac-228	B-	6.15	H					
1142.85	0.01	t Ac-228	B-	6.15	H	Hg-205 Ho-172 Tl-190 Lu-170	In-126m Dy-151 Tb-144 Ge- 81	In-126 Sb-130m Rh- 98m Te-131	Pr-150 La-146m Ca- 49	Sn-131gm Ta-164 Br- 78
1148.12	5.9E-03	t Ac-228	B-	6.15	H	Bi-199 Nd-141 Rb- 78 La-143	Sb-113 Cs-114 Rb- 78m Nb- 97	Te-131 Sb-111 Zr- 97 In-109	Ca- 47	Cs-141
1151.4	5.1E-05	u Pa-234	B-	6.70	H	Yb-177 Zn- 80 C - 17	Tm-158 I -114 Tb-147	Mn- 60m Cu- 76gm Al- 29	Pr-145 Ta-174 P - 29	I -118 Sb-134m
1153.5	7.3E-05	u Pa-234	B-	6.70	H	Sn-111 Cs-141 Sb-114	Co- 54 Eu-156 Fr-222	Bk-244 Fr-222	Y - 86 Mo- 89	Y - 86m Tb-156
1153.52	0.139	t Ac-228	B-	6.15	H					
1155.19	1.63	u Bi-214	B-	19.9	M	Fr-230	Tm-164	Ag-103		
1155.6	0.016	u Bi-214	B-	19.9	M	Dy-155	Sn-129m			
1156.	7.0E-03	u Bi-214	B-	19.9	M	Tc-110	Pb-197	Ge- 81		
1157.14	7.0E-03	t Ac-228	B-	6.15	H	Pt-187 Ta-176	K - 44 I -130	Sc- 44m Sb-128m	Sc- 44 Rh-102	Ag-121 Mo- 91m
1160.8	3.9E-03	t Tl-208	B-	3.053	M	Zr- 87	Tb-156	Lu-176m	Ta-176	Y -102m
1164.5	0.065	t Ac-228	B-	6.15	H	Au-189 Y - 94 Os-183 Rh- 98	Te-114 Sn-108 Co- 62m Ba-129	Mo-101 Hf-171 In-122m1	Dy-146 Fr-230 Co- 63	Sn-129m In-119m
1165.	0.1	u Tl-206	B-	4.199	M	La-143	Tm-164	Eu-150m	Pm-150	Cd-123m

Energy 1167.3 ~ 1241.2 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
1167.3	0.012	u Bi-214	B-	19.9	M	Bi-197 Es-250m In-128 Na- 27 Sb-120	Ce-131 Ca- 51 In-128m In-123m In-120m1	Sb-132m Se- 87 Sn-128m At-209 In-120m2	Tb-152m Gd-163 Nb- 98m Er-149m Cs-141	Pm-134 Cs-134 S - 37 La-130 Sb-120m
1171.3	--	c Sn-119	NG							
1171.3	--	c Sn-120	NN							
1171.3	1.4E-04	u Pa-234	B-	6.70	H	Pd- 97				
1172.98	0.051	u Bi-214	B-	19.9	M	Hg-195	In-120	Co- 62m	Co- 62	Sb-118
1173.1	7.3E-05	u Pa-234	B-	6.70	H	Cd-125m	Sm-143	Co- 60	In-118	Bi-195gm
1174.2	1.9E-03	u Pa-234m	B-	1.17	M	Re-184m	Ta-166	Ag-101	Sr- 76	Fr-228
1175.31	0.024	t Ac-228	B-	6.15	H	Y - 98m	Po-201	Au-194	Kr- 87	Tb-149
						Es-250m Tm-166 Br- 82m At-210 Ta-178	Y - 82 Te-119 Cu- 69 Ge- 79 Nd-131	Cs-142 Sn-123 Xe-125 Cd-121m Ir-194	Cd- 98 Er-150 Nd-151 Sb-128	Cl- 34m Rn-208 Te-113 Ag-103
1182.1	=1.5E-05	u Pa-234	B-	6.70	H					
1185.2	6.1E-03	t Tl-208	B-	3.053	M	Te-135 Cs-118gm Cd-119m Tm-160m	K - 35 Lu-169 Fr-212 Ag-110	Rh- 97m Lu-168 In-120 Ga- 78	Eu-158 Cu- 61 Sn-107 Po-201	Pr-154 Y - 80 Eu-158 Eu-158
1190.81	6.2E-03	t Ac-228	B-	6.15	H	Cu- 59	Re-182	Ta-182	Re-182m	Au-187
1193.77	3.3E-05	u Pa-234	B-	6.70	H	Ta-176	In-122m1	Sr-102	Xe-135m	
1193.77	0.013	u Pa-234m	B-	1.17	M	Ir-181 Cs-141 Er-151	Gd-141 Ru- 93	Ge- 83 Ag-106	Np-234 Rh-106	Pm-150 Rb- 81m
1196.33	0.01	a Pb-211	B-	36.1	M	Ho-162	Pb-192	Ag-121	Ba-143	Tc- 94m
						Sn-129 Lu-180 Y - 91 Ag-101 Os-181m	Rb- 75 Rn-210 Nb- 91m Ag-100m	Zn- 73 Sr- 99 Lu-176m Tl-200	Ba-141 Pm-140 Ta-174	Pm-140m Tm-163 Te-131m
1206.4	--	u Bi-214	B-	19.9	M					
1207.68	0.451	u Bi-214	B-	19.9	M	As- 80 Mo- 91m	Po-201 Ta-173	Ge- 69	Sb-131	In-120
1210.	3.5E-03	u Tl-210	B-	1.30	M	Os-176 Y -102 Bi-204	Ag-114 Y -102m Zn- 79	Ir-188 Ho-157	Zr- 87 La-134	Nd-155 Sr-101
1217.03	0.021	t Ac-228	B-	6.15	H	Sn-104 Ba-124	Ba-139 Lu-178	Au-181	As- 76	Br- 76
1217.3	3.5E-04	u Pa-234	B-	6.70	H	Br- 86 Hg-205	Dy-147m	I -137	Lu-170	Es-249
1220.37	9.0E-04	u Pa-234m	B-	1.17	M	Ba-139	Tb-165	Gd-143m	Ar- 35	Ru- 92
1220.4	9.9E-05	u Pa-234	B-	6.70	H	Lu-168m Y - 85m Re-182m	Ho-162m Tm-156 In-129m	I -137 In-130m2	In-130	Re-182
1226.7	< 0.018	u Bi-214	B-	19.9	M	Ta-176 Sn-131gm	Au-200 Rn-208	Tl-200 Ho-170m	Ta-175 Cs-141	Lu-170 Lu-176m
1229.4	7.5E-03	t Ac-228	B-	6.15	H	Ho-152 Yb-153 Rh- 97	Zr- 87 Cs-118gm Sn-131gm	Xe-142 Ta-174 Sb-118	K - 42 As- 76	Sc- 42m Ir-196
1229.68	--	c Sn-117	NG			In-118m1	In-118m2	Sb-118m	In-118	Ge- 65
1229.68	--	c Sn-118	NN							
1230.6	0.015	u Bi-214	B-	19.9	M	Rh- 96	Eu-156	Re-182	Ta-182	Tm-164m
1234.3	1.3E-03	a Pb-211	B-	36.1	M	Er-149 Sr- 77 Cd-127	Br- 90 Sb-113 Nb-102m	Lu-168 Cd-117m Cs-136	Lu-168m Tb-165 Pb-190	Gd-142 K - 46 Ga- 80
1237.24	<1.5E-05	u Pa-234	B-	6.70	H	O - 19	I -133	Ti- 45	Sb-115	Rh-104
1237.24	5.3E-03	u Pa-234m	B-	1.17	M	Rh-104m	Np-234			
1238.11	5.79	u Bi-214	B-	19.9	M	Bi-192gm	Rh-104			
1238.28	--	c Fe- 56	NN			Mn- 56 Sn-132	Co- 56	Cr- 59	Ag-104m	Po-205
1241.2	3.6E-04	u Pa-234	B-	6.70	H	As- 78	Cd-123m	Cd-127	Hg-195m	Yb-177

Energy 1245.0 ~ 1330. (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
1245.05	0.095	t Ac-228	B-	6.15	H	Tb-165	Lu-174	Tm-174	Po-203	Eu-156
1247.08	0.5	t Ac-228	B-	6.15	H	Na- 33	Rb- 90m	Sm-143	Sm-142	Zr-102
1247.8	3.5E-05	u Pa-234	B-	6.70	H	Sb-110	Ac-230	Y - 97m1	As- 84	Dy-148
						Mn- 52	Au-181	I -136	Eu-150	Po-199m
						Lu-176m	Mn- 52	B - 14	Rb- 89	
1250.04	0.062	t Ac-228	B-	6.15	H	Ho-154m				
						Tm-160m	Br- 74m	In-119m	Ta-175	Tm-162
1252.6	2.8E-05	u Pa-234	B-	6.70	H	In-120	Mo-101			
						Cu- 72	Cu- 70m	Cu- 69	Bi-197	Sn-129
						In-116				
1253.14	--	u Bi-214	B-	19.9	M	Ta-176	In-112	Ba-139	Lu-178	
1256.5	9.4E-05	u Pa-234	B-	6.70	H	Y - 84m	Pt-187	P - 36	Ge- 80	Br- 80
						Lu-166m2	Te-113	Ba-139	Ge- 83	I -122
						I -118	Sb-112	Rb- 80	Ag-102	Lu-170
						I -118m	Sr- 97			
1270.71	6.8E-03	a Pb-211	B-	36.1	M	Br- 74	Br- 74m	Lu-178	Sr- 93	Pt-187
						Ag-118	As- 74	Tm-160	Tm-159	Nb- 90
						Cd-121m	Tb-160	Ru-107	Mo- 89	
1274.53	99.94	c Na- 22	EC	2.6088	Y	Ga- 81	Xe-137	Al- 29	P - 29	Au-200
						Tm-166	Ag-103	Ar- 35	Pb-204m	Sm-140
						Dy-149	Eu-154	Tb-154	F - 22	Cd-105
						Re-184	Ta-164			
1276.69	0.014	t Ac-228	B-	6.15	H	Rh- 96	Ga- 64	Ho-153	Dy-148	Er-149m
1277.7	7.1E-05	u Pa-234	B-	6.70	H	Sr- 95	Eu-156	I -138	Y - 80	Nb- 89m
1279.	0.012	u Bi-214	B-	19.9	M	Tb-164	Mg- 22	Sb-134	Sb-134m	Pm-138m
						Hg-189gm	Sb-115			
1280.96	1.43	u Bi-214	B-	19.9	M	Cs-142	Lu-170	Nb-100m	Sr- 91	Ho-148m1
1282.8	0.019	t Tl-208	B-	3.053	M	Cd-123m	Mn- 50m	Te-112	Pd-111m	Cd-127
						Lu-169				
1284.	0.011	u Bi-214	B-	19.9	M	Lu-166m1	Pa-236	Gd-143		
1285.1	0.017	u Bi-214	B-	19.9	M	Pm-137				
1286.27	0.05	t Ac-228	B-	6.15	H	Br- 86	Tm-156	Ga- 81		
1287.68	0.08	t Ac-228	B-	6.15	H	Eu-142	Sb-117	Cd-103	Tb-165	Fe- 53
						Ca- 49	In-129m	Pb-197	Pd-101	V - 53
1292.8	7.4E-04	u Pa-234	B-	6.70	H	Os-176	Y - 97	Tb-154	Tc- 90m	Fe- 59
						Tb-165	Rb- 94	Sm-141	Nd-141	Cu- 68
1293.56	--	c Sn-115	NG			In-116	In-116m1	Sb-116	Sb-116m	Ar- 41
1293.56	--	c Sn-116	NN			Sc- 51	As- 80	Ag- 97	La-144	In-122m2
						In-120m1	Lu-170			
1296.4	4.6E-05	u Pa-234	B-	6.70	H	Tm-164	Eu-146	Ca- 47	Cs-132	I -133
1301.2	2.8E-05	u Pa-234	B-	6.70	H	In-108	Lu-180	In-114	Sb-114	Kr- 77
						Pr-147	Ho-154	Eu-160	Sm-155	Ag-114
						S - 39	Cd-105			
1303.76	0.112	u Bi-214	B-	19.9	M	I -137	I -117	Sb-118m	Cd-117	Cs-128
						Mo-101	Pb-195	Ag-116	Se- 87	Bi-197
						Ru-109	Bi-199			
1309.71	0.019	t Ac-228	B-	6.15	H	Cs-139	Br- 78	As- 78	Mo-107	Xe-140
						Pt-181	O - 20	Lu-178	Ta-178	Rh- 97
						Al- 30	Ba-139	Zn- 61	Os-179	Gd-163
1315.34	0.015	t Ac-228	B-	6.15	H	Ho-152	Bi-197	Eu-152m1	In-124	Ca- 51
						Cd-121	K - 48			
1316.	4.4E-03	u Tl-210	B-	1.30	M	Cd- 99	Zn- 75			
1316.96	0.08	u Bi-214	B-	19.9	M	Co- 55	Br- 72	Cd-119	Rh- 95	As- 84
1317.7	--	u Bi-214	B-	19.9	M	Rb- 82m	Br- 82m	Br- 82	Cs-132	Au-181
						Tm-162	Au-187	Ho-162		
1327.	2.8E-05	u Pa-234	B-	6.70	H	Tm-164	Bi-201	I -124	Sb-124	Sn-134
						Te-115				
1327.03	--	c Cu- 63	NN			Zn- 63	Co- 53	Fe- 53m	Tc- 91m	
1330.	0.011	u Bi-214	B-	19.9	M	Se- 69	Os-179	Ta-172	As- 83	Os-178
						Rh-114m	Cd-123	Sr- 96	Hg-207	Au-187

Energy 1337.3 ~ 1407.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
1337.33	4.9E-03	t Ac-228	B-	6.15	H	Pd- 99 Y - 83 Sc- 43 Br- 78	Cr- 57 Ge- 69 Po-203	Cs-124 Os-177 Kr- 87	Lu-164 Cu- 76gm Cd-105	Rb- 96 Sn-123 Te-119
1341.49	0.022	u Bi-214	B-	19.9	M	Cu- 59 Ta-176 Sm-143	Cu- 68m Rh-100 Eu-142m	Fr-224 Rh-104m Si- 26	Lu-178 Rh-104 Sb-109	Ta-178 Ag-104m Sm-142
1342.9	2.0E-05	u Pa-234	B-	6.70	H	Mg- 28	Dy-146	Ir-197gm	Sb-109	
1344.59	9.0E-03	t Ac-228	B-	6.15	H	Eu-150 Pm-141	Cd-119m Cu- 64	Ta-170 I -120m	K - 46 Zr-103	Sm-142
1347.5	0.015	t Ac-228	B-	6.15	H	Co- 64 Tl-195	Kr- 75 Sn-127m	K - 46 Pr-138m	Ir-181 Ga- 82	Pr-139 In-129
1351.	--	u Bi-214	B-	19.9	M	Ta-178	Te-115m	Pd- 95m	Br- 89	
1352.9	1.8E-03	u Pa-234	B-	6.70	H	Rh- 95	Sb-134	Tm-162	Dy-146	
1353.	6.2E-04	u Pa-234m	B-	1.17	M					
1353.4	--	u Bi-214	B-	19.9	M	Mn- 51				
1354.6	2.1E-04	u Pa-234	B-	6.70	H	Ga- 82	La-141	Ga- 65		
1357.78	0.02	t Ac-228	B-	6.15	H	In-116 Xe-135m	O - 19 Pm-154m	Ne- 19 Au-183	Pr-148	Zn- 77
1359.	2.5E-04	u Pa-234	B-	6.70	H	Lu-166m2	Au-187	Rb- 98m	Pr-136	Cd-102
1361.2	--	u Bi-214	B-	19.9	M	Co- 56 Br- 86 Rh-102 Tl-200	Br- 87 Tc-102 Br- 90 Rn-211	Cd-105 Tc- 91m In-125 Tc- 93	Kr- 92 Tc- 91 Au-181 Mo- 93m	Ta-174 Tc-100 Zr- 97 Nb- 86
1365.7	0.014	t Ac-228	B-	6.15	H	Pr-152	Tl-195	Lu-168m	Mn- 48	Cd-119m
1371.9	--	c Pb-204	NG			Co- 63 Co- 55 Mg- 28	Lu-170 Ba-139	Tm-164m Ca- 37	Cs-134 Ho-168	Tc-105 Au-181
1374.19	0.014	t Ac-228	B-	6.15	H	As- 78 Ho-149	C - 17 Rb- 90m	Tm-166 Ac-230	Tm-163 Pr-139	Ag-119
1377.67	4.	u Bi-214	B-	19.9	M	I -124 Tb-164	Pr-144	Pr-146	Tm-175	Cd-100
1378.23	5.9E-03	t Ac-228	B-	6.15	H	In-126m Na- 25	Fr-224	I -126	Rn-208	Lu-169
1381.1	2.5E-03	t Tl-208	B-	3.053	M	Br- 89	Er-149m	I -130m	Ba-142	Rh-100m
						Te-115 Cd-121m Pb-199	Ho-153 La-146	Ir-181 Y - 88	Tc- 93 Pm-156	Pr-148 In-123
1385.31	0.757	u Bi-214	B-	19.9	M	S - 29 Eu-160	Sr- 92 Cs-122	Pm-134m Rb- 93	Mg- 21	Ag-110m
1385.39	0.011	t Ac-228	B-	6.15	H					
1387.5	--	u Bi-214	B-	19.9	M	In-105 Tb-145 Cd-105	Tm-172 Dy-147m Pd-111	Sr- 93 Re-168	Ga- 64 Bi-197	Lu-168 Ac-232
1389.6	1.2E-04	u Pa-234	B-	6.70	H	Dy-146	Eu-152m1	In-122	Br- 86	Dy-149
1392.5	0.019	u Bi-214	B-	19.9	M	Fr-226				
1392.7	3.4E-03	u Pa-234m	B-	1.17	M	Tb-165	Np-234	Au-204	Zn- 63	
1393.9	3.3E-03	u Pa-234	B-	6.70	H	Au-181 Sm-140 Y - 80	Pm-154 Tm-160	Ca- 51 F - 21	Hg-181 Rb- 82	K - 43 Cu- 59
1397.5	1.3E-04	u Pa-234	B-	6.70	H	Lu-170 Sn-107 Tm-163 Lu-162	Ru- 93m Fe- 53	Tb-165 Tm-172	Ge- 79 Mg- 29	Pm-144 I -132
1400.3	2.8E-04	u Pa-234	B-	6.70	H	Se- 86	Tb-142	Y - 97	Zr- 87	Tm-150
1401.49	0.012	t Ac-228	B-	6.15	H					
1401.5	1.27	u Bi-214	B-	19.9	M	Cr- 55 In-121m	Ir-196 Sm-143	I -116 Pm-141	Rb- 96	Ta-178
1407.98	2.15	u Bi-214	B-	19.9	M	As- 81 Ag-116	Co- 54m Ti- 45	Sn-104 Au-187	Pt-181 Ta-168	Ti- 43 Co- 55

Energy 1409.1 ~ 1501.5 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide									
1409.1	7.1E-05	u Pa-234	B-	6.70	H	Ca- 49	Cr- 57	Re-180							
1410.	1.0E-03	u Tl-210	B-	1.30	M	Zr- 85	Ru- 95	Tl-197	Na- 26	Eu-152m1					
1413.88	2.3E-03	u Pa-234m	B-	1.17	M	Zn- 63	Gd-142	As- 70	I -139	Ho-150m					
						As- 68	Sr- 91	Lu-168	Xe-140	Rh- 98m					
1414.4	<4.3E-06	u Pa-234	B-	6.70	H	Au-204	Rh- 98	I -118							
1415.66	0.021	t Ac-228	B-	6.15	H	Ge- 83	Tc-110	Ag- 96							
1415.8	0.481	u Bi-214	B-	19.9	M	Fe- 52m	Cd-105	Tc-108	Cd-101	Tb-146m1					
1419.7	5.1E-03	u Bi-214	B-	19.9	M	Mo- 93m	Ge- 79	Nb- 98	Sn-125	Br- 87					
						I -126	Eu-140	Ba-139	Tl-198	Cs-139					
						Lu-168m	Tb-156								
1426.9	2.6E-04	u Pa-234	B-	6.70	H	Au-183	Y - 93	I -139	Hg-183	Lu-166m2					
						Se- 85	Ag- 98	Re-182	In-109m2	Sr- 94					
						Os-181m	Lu-170								
1430.95	0.035	t Ac-228	B-	6.15	H	Ge- 81	Cu- 69	Mg- 29	Tc- 91m	Rh- 94m					
						La-144	Si- 33	Nb- 98m	Te-114	Nb- 98					
1434.13	9.7E-03	u Pa-234m	B-	1.17	M	Cu- 68	Cd-117m	Pm-156	Si- 26	Au-187					
						Bi-197	V - 52	Mn- 52m	Mn- 52						
1434.22	8.0E-03	t Ac-228	B-	6.15	H	I -128	Tm-163	K - 45	Nd-141	Ge- 83					
1435.8	66.4	La-138	EC	1.05E+11	Y	Np-234	Tl-198	Fr-224	Cs-138	Cs-138m					
						At-210	Dy-147m								
1438.01	5.9E-03	t Ac-228	B-	6.15	H	Sc- 51	Pr-137	V - 48	Pm-152m1	Cd-123					
						Rb- 95	Ar- 43	Tb-165	Pm-154m	Pm-154m					
1442.8	4.9E-05	u Pa-234	B-	6.70	H	Ag-108	Au-190	Bi-207	Mn- 50m	Ga- 74					
						Tb-164	O - 19	Ne- 19							
1445.4	5.1E-04	u Pa-234	B-	6.70	H	Br- 92	Sb-117	Pr-152	Mn- 58m	Tb-145					
						Tl-198	Mo- 91								
1451.4	0.011	t Ac-228	B-	6.15	H	Bi-196	Lu-169	Lu-170	O - 21	Y - 93					
						Pr-146	Rh- 96m								
1452.7	1.3E-03	u Pa-234	B-	6.70	H	Au-187	Ho-152	I -120m	Tb-150	Pm-148					
						Te-117	Cu- 58								
1458.5	1.8E-03	u Pa-234m	B-	1.17	M	Pm-154m	Mn- 62	I -135	Eu-143						
1458.9	1.5E-04	u Pa-234	B-	6.70	H	Pd-111									
1459.14	0.83	t Ac-228	B-	6.15	H	Ba-129m	Ru- 95	Ar- 44	Lu-166	Lu-170					
1460.83	10.67	K - 40	EC	1.277E+9	Y	Pb-195	Tm-160	Dy-147m	Cl- 40	Ag-102m					
						Br- 84m									
1469.71	0.02	t Ac-228	B-	6.15	H	Os-181m	Er-149m	Nb-104gm	In-112	Ir-196					
						Ir-194	Tm-163	Pr-152	Ce-131	Re-170					
						Tm-172									
1470.9	9.2E-03	u Bi-214	B-	19.9	M	Cd- 99	Lu-162	Pr-146	In-124	In-106					
						Sc- 50	Cl- 33	Kr- 89	Ge- 67						
1475.8	1.3E-05	u Pa-234	B-	6.70	H	Ar- 35	Br- 82	Br- 82m	Rb- 82	Rb- 82m					
						La-143	Dy-151	In-110m	Ag-110	As- 72					
						Sb-126m1	Cd-103	Mo- 93m	Tc- 93						
1479.15	0.051	u Bi-214	B-	19.9	M	Lu-166m2	Ga- 78								
1480.37	0.016	t Ac-228	B-	6.15	H	Ca- 51	Sb-118m								
1481.84	—	c Cu- 65	NN			Sn-131gm	Fe- 59	Ni- 65	Sb-110	Na- 30					
						Ni- 69	Cd-121	At-210	Tb-144	La-134					
1485.4	4.8E-05	u Pa-234	B-	6.70	H	Sn-125m	Ho-158m2	Ca- 51	In-108						
1488.	2.1E-05	u Pa-234	B-	6.70	H	Na- 27	Cd-121m	Cu- 58	Sn-109						
1490.	4.2E-04	u Tl-210	B-	1.30	M	Pr-144	Rh- 95	Pm-140	Sm-141m	Er-150					
1493.6	1.6E-04	u Pa-234	B-	6.70	H	Tc- 93m	Cr- 57	Te-114	Pd- 97	Fe- 63					
						Rh- 95									
1495.91	0.86	t Ac-228	B-	6.15	H	Se- 88	Cs-122	Ho-149	Ge- 81	Sm-141					
						Tl-196									
1496.	5.8E-05	u Pa-234	B-	6.70	H	Ta-178	Lu-178	Tm-151m	Np-240m	La-136					
						In-116	Tc- 96m	Se- 87							
1500.	1.8E-05	u Pa-234	B-	6.70	H	La-146	K - 44	Sc- 44	Sb-112	I -122					
						Ho-148m1	Ce-133								
1501.	~1.3E-03	u Pa-234m	B-	1.17	M										
1501.57	0.46	t Ac-228	B-	6.15	H	Kr- 91	Nb-100	Pb-199	Ru-109	Te-112					

Energy 1507.3 ~ 1620.5 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
1507.3	3.1E-05	u Pa-234	B-	6.70	H	Na- 30 Rb- 96 Mo- 91m	Kr- 93 In-119m	Ge- 79 Zr- 89m	Bi-199 In-112	Bi-203 In-116m1
1509.23	2.11	u Bi-214	B-	19.9	M	Cr- 49	Tc- 94	I -124	Tc- 92	
1510.1	<1.5E-05	u Pa-234	B-	6.70	H					
1510.2	0.013	u Pa-234m	B-	1.17	M	Pr-138	Ag-121	Tc-105	Au-204	Tm-151m
1512.7	0.288	t Bi-212	B-	60.55	M	Tl-195	Cd-123m	La-141	I -137	Tc-100
1515.5	6.9E-03	u Bi-214	B-	19.9	M	Cr- 49	Lu-180	Tl-200	Sm-143	Pr-136
1515.6	1.2E-04	u Pa-234	B-	6.70	H	Nb- 97	Ru-111	Pm-156	Ba-147	Cl- 39
1520.7	-1.5E-05	u Pa-234	B-	6.70	H	Ca- 50	Pb-194	Tc- 93	Dy-149	Tc- 94m
1527.27	2.4E-03	u Pa-234m	B-	1.17	M	Ge- 83 Np-234	La-130 Ag-106m	Tm-160 Cr- 55	Rh-104m	Ag-104
1529.05	0.057	t Ac-228	B-	6.15	H	Ir-181 Kr- 88 Fe- 52	Rh-106m As- 78 Er-149m	In-108m Kr- 89	Tm-172 Sm-140	Cu- 68m V - 52
1532.8	—	u Bi-214	B-	19.9	M	Ho-149m	Lu-152	Ag- 99	Au-183	Mo-101
1537.89	0.047	t Ac-228	B-	6.15	H	Eu-146	Al- 30	I -137	Tc- 91m	Lu-170
1538.5	0.376	u Bi-214	B-	19.9	M	Bi-203 Rb- 89	Au-183 Dy-151	Ru-109	Eu-143	K - 48
1538.8	2.1E-05	u Pa-234	B-	6.70	H	In-112	Bi-201			
1540.	4.2E-04	u Tl-210	B-	1.30	M	Tc- 93	Rn-211			
1543.32	0.2	u Bi-214	B-	19.9	M	Rh- 94	Ag-108	Cu- 72	Cu- 68m	As- 82m
1543.9	—	c Pb-204	NG			Sn-107	Sn-111	Fe- 63		
1548.65	0.038	t Ac-228	B-	6.15	H	Nb- 88	Ta-172	Sm-143	La-142	
1550.	1.8E-03	u Pa-234m	B-	1.17	M	Zn- 63	Cl- 32	Ga- 81	Tm-151m	Er-151
1550.1	1.2E-04	u Pa-234	B-	6.70	H	Ho-151	V - 47	Sb-116		
1553.74	8.1E-03	u Pa-234m	B-	1.17	M	Te-113	Dy-147m	Pr-138	La-136	Ba-136m
1553.77	83.	V - 50	EC	1.4E+17	Y	Cd-103	Pm-142	Er-149m	Au-204	Tl-196
1557.11	0.178	t Ac-228	B-	6.15	H	Sc- 50m	Sc- 50	O - 19	Ne- 19	La-134
1558.4	7.5E-04	u Pa-234m	B-	1.17	M	Sb-113	La-143	Xe-141	Pr-148m	Cd-103
1559.85	0.02	t Ac-228	B-	6.15	H	Cd-105	In-125	Np-234	Sc- 43	Tl-190
1567.	1.8E-05	u Pa-234	B-	6.70	H	Ir-183 Ni- 56	Pa-236	Tc-105	Er-149m	Re-179
1570.67	1.1E-03	u Pa-234m	B-	1.17	M	Te-117	Pt-179	Ir-181	Ba-127	Sb-112
1571.52	5.7E-03	t Ac-228	B-	6.15	H	Sc- 51	Ca- 38	I -114	Re-170	
1573.26	0.033	t Ac-228	B-	6.15	H	Au-200	Cr- 49	Cd-103	Np-234	In-126
1579.9	1.2E-04	u Pa-234	B-	6.70	H	Br- 72	In-124	P - 35		
1580.53	0.6	t Ac-228	B-	6.15	H	Fr-228	Cl- 34m	Sm-143m2	Sn-109	Pr-134
1583.22	0.69	u Bi-214	B-	19.9	M	Er-149	Sb-117	Tm-150	Tb-146m1	
1585.9	2.3E-04	u Pa-234	B-	6.70	H	Nb- 89	Mo- 91	Ag-102		
1588.2	3.22	t Ac-228	B-	6.15	H	Ho-166	Ge- 81	Cd-105	P - 37	Cd- 99
1590.	4.2E-04	u Tl-210	B-	1.30	M	Ho-149	Ta-176	Cd-121		
1592.5D	—	t Tl-208	B-	3.052	M	Ag- 98	Cd-125	Ta-175	Ti- 42	Rh- 97m
1593.88	2.7E-03	u Pa-234m	B-	1.17	M	I -114	Nb- 86	Ag-100m	Pa-228	
1594.	4.9E-04	u Pa-234	B-	6.70	H	Cd-125m	Mg- 28	Y - 98m	Ca- 50	Y - 98
1594.73	0.25	u Bi-214	B-	19.9	M	Tc- 94	Au-183	Ac-232	Dy-151	
1595.	5.0E-03	u Bi-214	B-	19.9	M					
1598.	6.0E-03	u Bi-214	B-	19.9	M	Eu-141m	Pr-140	La-140		
1599.31	0.23	u Bi-214	B-	19.9	M	La-145	Pr-139	Ga- 72	Tc-104	Lu-183
1601.8	4.7E-04	u Pa-234m	B-	1.17	M	In-127	Cs-146			
1609.41	7.7E-03	t Ac-228	B-	6.15	H	At-210	Te-115	Gd-145		
1618.3	1.5E-05	u Pa-234	B-	6.70	H	Pd- 95m	Sm-141	In-108m	Lu-165	Kr- 75
1620.5	1.49	t Bi-212	B-	60.55	M	Er-149m	As- 74	Pr-136	Pm-139	
						Si- 34	Tb-147m	Nd-141	Tm-172	Ag-117
						Cd-119	Re-188	Sn-111	Ba-129	Tm-164
						Ir-186m	Y - 95			
						C - 18	Fe- 53	Mg- 28	Tc- 95m	Cs-139
						Tl-196	Si- 26	In-109		

Energy 1625.0 ~ 1732.2 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
1625.06	0.255	t Ac-228	B-	6.15	H	Ni- 65	Ba-129m	Ga- 79	Pm-154m	Sc- 51
1627.3	1.2E-04	u Pa-234	B-	6.70	H	Mg- 31	Nb- 89	Dy-149	Tb-147	Tb-147
1630.63	1.51	t Ac-228	B-	6.15	H	Cs-128	Eu-150m	Rb- 78m	Pr-139	Ir-183
						Pr-144m	Zn- 71			
1636.3	0.012	u Bi-214	B-	19.9	M	Cs-140	In-122	O - 14	Cd-105	Ne- 23
						Ca- 52	In-126m	Am-238		
1637.	6.0E-03	u Bi-214	B-	19.9	M	Hg-207	Mo- 91			
1638.1	3.3E-04	u Pa-234	B-	6.70	H	Na- 29				
1638.28	0.47	t Ac-228	B-	6.15	H	P - 36	Pd- 97	Ar- 45	Ca- 76	
1640.5	1.6E-05	u Pa-234	B-	6.70	H	Ir-181	Tc- 91	Mo- 89	Tb-149	Ac-232
1644.	--	u Bi-214	B-	19.9	M	Cl- 38	Tb-147m	Sb-114	Cd-105	Br- 88
1644.9	1.6E-05	u Pa-234	B-	6.70	H	O - 20	Se- 88	Rb- 78m	As- 80	Fe- 61
1647.5	7.1E-04	t Tl-208	B-	3.053	M	Ir-181	Ir-186	Cd-121	Tm-161	
1650.	4.2E-04	u Tl-210	B-	1.30	M	Er-149m				
1650.2	<8.2E-06	u Pa-234	B-	6.70	H	Bi-201	N - 18			
1655.7	4.1E-05	u Pa-234	B-	6.70	H	Sb-134	In-131m1	In-131	Si- 26	Te-115m
1657.	0.046	u Bi-214	B-	19.9	M	Cs-146	Zr- 89	Te-112	Cu- 72	Eu-142
						Pb-199	Eu-145	P - 28		
1661.28	1.15	u Bi-214	B-	19.9	M	Fe- 61	I -114m	Se- 83m	Eu-144	Ag-114
						Sn-130m	Ti- 45	I -139	Ho-166	
1664.8	2.8E-05	u Pa-234	B-	6.70	H	Ho-149	Zn- 77	Tb-165		
1665.8	8.3E-03	u Bi-214	B-	19.9	M	Rb- 90m	Cd-105			
1666.52	0.178	t Ac-228	B-	6.15	H	La-136				
1667.6	8.2E-04	u Pa-234m	B-	1.17	M					
1668.4	1.2E-03	u Pa-234	B-	6.70	H	Pt-181	Ir-185	Cd-119m	K - 46	
1671.64	4.1E-03	t Ac-228	B-	6.15	H	Y - 94				
1672.8	5.4E-05	u Pa-234	B-	6.70	H	I -138	Ag-110	Tm-164	Mn- 58	Co- 58
1677.67	0.054	t Ac-228	B-	6.15	H	Cu- 68	Tc-104	Ar- 41	Ho-148	Ho-148m
						Cs-126				
1679.5	1.2E-04	u Pa-234	B-	6.70	H	Lu-178	Bi-203			
1679.7	0.058	t Bi-212	B-	60.55	M	Ru- 92	Re-179	Rb- 76	Ga- 80	Pt-181
						Tb-149m				
1683.99	0.216	u Bi-214	B-	19.9	M	Ba-139	Te-133m	In-112	Nb- 87	
1684.01	0.015	t Ac-228	B-	6.15	H	Cs-128	Gd-163			
1685.7	4.9E-04	u Pa-234	B-	6.70	H	Sr-101	Ag-100			
1686.09	0.095	t Ac-228	B-	6.15	H	Cd-127	Lu-168	Ho-171	Cs-130	
1693.4	--	u Bi-214	B-	19.9	M	Ga- 63	Rh- 96m	S - 38	Rb- 98	La-141
1693.8	1.1E-03	u Pa-234	B-	6.70	H	Kr- 89	Ag-100m			
1694.1	4.5E-04	u Pa-234m	B-	1.17	M	Ce-131				
1695.	4.3E-04	u Pa-234	B-	6.70	H	Cd-123	Al- 31	Nd-155	Dy-146	Nb- 99m
						Ta-176	Tl-196			
1700.5	1.6E-04	u Pa-234	B-	6.70	H	Cd-121	Pt-181	Sr- 93	Sb-118	
1700.59	0.01	t Ac-228	B-	6.15	H	Ne- 18	Cd-125	F - 23	Nb- 98m	
1702.43	0.048	t Ac-228	B-	6.15	H	Dy-151	Cd-119m	Rb- 82	Ar- 44	Au-204
1706.19	8.5E-03	t Ac-228	B-	6.15	H	Pm-139	Sm-143m2	K - 45	Tl-195	I -135
						Cs-130	La-143	As- 70		
1711.	1.8E-03	u Bi-214	B-	19.9	M	Sb-112	Pr-230	Ni- 69		
1713.47	5.4E-03	t Ac-228	B-	6.15	H	Rb- 92	Fe- 53m	Zr- 89	Ho-149	Ga- 81
						Ca- 51	Br- 74m	In-106m		
1717.	--	u Bi-214	B-	19.9	M	Ir-188	Mg- 21	Tm-152m	In-106m	Te-117
						Te-133				
1719.7	2.8E-05	u Pa-234	B-	6.70	H	Co- 62m	Bi-206	Tb-144	Si- 27	Bi-203
1720.5	3.2E-04	u Pa-234m	B-	1.17	M	Br- 78	Ag-104m			
1721.4	5.7E-03	t Ac-228	B-	6.15	H	Ta-176				
1723.2	2.5E-05	u Pa-234	B-	6.70	H	Cd-101	Cd-117	Au-192		
1723.7	--	u Bi-214	B-	19.9	M	Rh- 98				
1724.21	0.029	t Ac-228	B-	6.15	H	Cd-105	Dy-147m	Ni- 65		
1727.8	3.1E-05	u Pa-234	B-	6.70	H	Br- 85	V - 52	Mn- 52m	Fe- 52	Sb-133
1729.6	2.92	u Bi-214	B-	19.9	M	Na- 27	Ti- 53	Zr- 85	O - 21	Ni- 57
1732.2	1.8E-03	u Pa-234m	B-	1.17	M	As- 82m	As- 82	Al- 30	In-108m	La-134

Energy 1737.7 ~ 1847.4 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
1737.7	1.2E-04	u Pa-234	B-	6.70	H	Cd-119 Sb-110 Rh- 96	Lu-165 Pm-150	Ho-149m	Sb-129	Ho-149
1737.73	0.021	u Pa-234m	B-	1.17	M					
1738.22	0.018	t Ac-228	B-	6.15	H	Ir-185				
1739.1	--	u Bi-214	B-	19.9	M	Bi-194	La-141	Bi-200m1		
1740.4	0.011	t Ac-228	B-	6.15	H	Mo- 91	Kr- 87			
1741.1	7.7E-05	u Pa-234	B-	6.70	H					
1742.	8.0E-03	t Ac-228	B-	6.15	H					
1743.2	5.3E-05	u Pa-234	B-	6.70	H	Rh- 96m	Rb- 81m	In-124		
1744.	7.1E-04	t Tl-208	B-	3.053	M	Cu- 68 Ag-102	Os-177	Y - 98	Ga- 68	Zr- 89
1745.28	6.5E-03	t Ac-228	B-	6.15	H	Cd-127	Ga- 74	S - 38	F - 21	
1747.2	--	u Bi-214	B-	19.9	M	Yb-163	I -122	Cl- 40	Er-149	Cd-103
1750.	1.0E-04	u Pa-234	B-	6.70	H	Te-119	Pb-199	Ho-166	Zr- 97	
1750.54	8.0E-03	t Ac-228	B-	6.15	H	Y - 96	K - 35	Y - 96m		
1751.4	9.0E-04	u Bi-214	B-	19.9	M	Ac-234	Cr- 57	Sb-122	K - 44	Eu-140
1757.5	3.8E-05	u Pa-234	B-	6.70	H	Hg-207	La-142	Au-187	Ru-109	Ac-230
1758.11	0.035	t Ac-228	B-	6.15	H	Gd-145	In-118	Sc- 52	Nb- 98	
1759.81	1.4E-03	u Pa-234m	B-	1.17	M	Ba-147	Pd- 97	I -130m	Tc-108	Y - 90
1764.49	15.4	u Bi-214	B-	19.9	M	Pa-236	Po-201m	Ar- 35	Cd-119	Bi-205
1765.44	8.7E-03	u Pa-234m	B-	1.17	M	Er-149m	I -137			
1768.	3.1E-05	u Pa-234	B-	6.70	H	Se- 69	Mn- 58	Zr- 85	Xe-138	K - 38
1770.8	1.1E-04	u Pa-234	B-	6.70	H	Bi-207	Re-177	In-130m1	Be- 11	Co- 56
1772.2	1.8E-03	t Ac-228	B-	6.15	H	Rb- 98m				
1773.	1.1E-04	u Pa-234	B-	6.70	H	Rh-100m				
1778.85	100.	c Al- 28	B-	2.2414	M	Hg-181	As- 68	Zn- 79	In-103	Al- 28
						Gd-142	Ho-151	Rb- 88	In-128m	K - 46
1783.7	4.0E-05	u Pa-234	B-	6.70	H	Ag-104m	Pm-142	Na- 32	Xe-137	Cu- 76gm
1784.4	5.9E-03	t Ac-228	B-	6.15	H	Y - 54				
1787.3	1.3E-03	t Ac-228	B-	6.15	H	Mg- 29 P - 34	Sm-141m	Tm-150	O - 21	As- 76
1795.1	2.1E-03	t Ac-228	B-	6.15	H	Ta-175	Mn- 50m	Al- 29	V - 47	Hg-207
1796.2	3.1E-04	u Pa-234m	B-	1.17	M					
1797.1	3.8E-04	u Pa-234	B-	6.70	H	Ag-106				
1797.5	2.1E-03	t Ac-228	B-	6.15	H	Au-181	Tb-147m	K - 35		
1800.2	4.1E-03	t Bi-212	B-	60.55	M	Fe- 63	Ga- 64			
1800.86	4.4E-03	t Ac-228	B-	6.15	H	Ru- 93	Y - 98m	Dy-146		
1805.8	8.2E-06	u Pa-234	B-	6.70	H	Eu-145	Eu-143	Y - 95		
1806.	0.09	t Bi-212	B-	60.55	M	Dy-149	Tc-110	Au-181	Gd-143m	Xe-123
1809.04	3.7E-03	u Pa-234m	B-	1.17	M	Au-181	Pa-236	Sn-107	Ar- 45	Rb- 93
						Al- 26	Bi-197m	I -138	Ge- 67	Tm-151m
1812.03	--	c Pb-204	NG			Mn- 56				
1813.73	0.011	u Bi-214	B-	19.9	M					
1815.3	1.5E-05	u Pa-234	B-	6.70	H	Mn- 62	Ac-232	Rh- 98		
1819.2	<1.4E-03	u Bi-214	B-	19.9	M	Nb- 88m	Pr-139			
1819.69	9.0E-04	u Pa-234m	B-	1.17	M	La-145	Ag-100m			
1819.8	6.6E-06	u Pa-234	B-	6.70	H	Mg- 31	Nb- 98	Ru-111		
1823.22	0.044	t Ac-228	B-	6.15	H	Hg-183	F - 23	Ta-176		
1825.1	1.5E-05	u Pa-234	B-	6.70	H	Fe- 51				
1826.7	2.1E-03	t Ac-228	B-	6.15	H	Rh-100m				
1830.8	6.6E-06	u Pa-234	B-	6.70	H	Ir-185	Au-183	Ac-232	Tb-148	Ba-129
						Cd-123				
1831.3	0.017	u Pa-234m	B-	1.17	M	V - 54	Sm-143m2	Zn- 77	Br- 85	Tl-198
1835.43	0.038	t Ac-228	B-	6.15	H	Ag-102m	Cr- 57	Rb- 88	Y - 88	
1838.	6.6E-05	u Pa-234	B-	6.70	H	Rb- 98	Bi-197m			
1838.36	0.36	u Bi-214	B-	19.9	M	Er-159	Zn- 77	Pm-154m		
1842.13	0.042	t Ac-228	B-	6.15	H	Te-114	Ag-115	Cd-123	Si- 26	As- 84
						O - 20				
1847.42	2.11	u Bi-214	B-	19.9	M	Ac-234	Ca- 51	Bi-203	Y - 92	Nb- 92m

Energy 1849.8 ~ 2000.9 (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life	Relational artificial radionuclide				
1849.8	4.4E-05	u Pa-234	B-	6.70	H	As- 80	Tc-100		
1850.13	4.4E-03	t Ac-228	B-	6.15	H	Rb- 91	C - 17		
1863.09	1.2E-03	u Pa-234m	B-	1.17	M	In-108m	Cr- 57		
						Ga- 72	Cu- 60	Bi-205	I -114m
						Tb-148	In-129		O - 22
1867.68	9.2E-03	u Pa-234m	B-	1.17	M	Br- 89	Rb- 94	In-128m	Tm-166
						S - 31	Ge- 79		Te-113
1870.83	0.024	t Ac-228	B-	6.15	H	Fr-230	Rb- 93	Cd-105	Ni- 69
1872.8	5.6E-05	u Pa-234	B-	6.70	H	Cu- 66	Au-183		
1873.16	0.219	u Bi-214	B-	19.9	M	I -137			
1874.85	8.2E-03	u Pa-234m	B-	1.17	M	O - 22	Cu- 70	Tb-144	La-143
						Sc- 40			Eu-145
1879.6	1.3E-03	t Ac-228	B-	6.15	H	Ca- 47	Se- 87	Cd-103	Gd-145
1884.1	2.5E-05	u Pa-234	B-	6.70	H	Ge- 81	Ti- 43	Ga- 68	Cu- 68
						Ga- 79	Nb- 87	Xe-123	O - 21
								Pr-144m	
1887.1	0.09	t Ac-228	B-	6.15	H	Au-194	Ar- 44	Co- 62	In-120m1
1890.1	2.3E-04	u Pa-234	B-	6.70	H	Pa-238			Y - 97
1890.3	0.08	u Bi-214	B-	19.9	M	F - 21	Ge- 69	Y - 94	
1893.4	9.9E-06	u Pa-234	B-	6.70	H	Y - 85m	Ho-150m	Cd-105	Bi-203
1893.5	2.2E-03	u Pa-234m	B-	1.17	M	Ho-170m			
1895.92	0.16	u Bi-214	B-	19.9	M	Se- 83	As- 82m	As- 83	Na- 26
1896.7	1.6E-04	u Pa-234	B-	6.70	H	Te-114	Cd-105	Br- 84	Ac-234
1898.7	0.057	u Bi-214	B-	19.9	M	Br- 84m	Rb- 84	Ag-119	Ac-232
1900.07	2.8E-03	t Ac-228	B-	6.15	H	Mn- 51	F - 22	La-142	Cs-142
1907.18	0.012	t Ac-228	B-	6.15	H	C - 17	Sb-118	Rh- 96m	Te-114
								Pr-139	Ir-183
						In-118			
1911.17	6.3E-03	u Pa-234m	B-	1.17	M	Ga- 82	Cd-105	La-132	Sn-109
						Eu-143			Re-177
1915.5	3.1E-05	u Pa-234	B-	6.70	H	Sa-111			
1915.9	8.0E-04	t Ac-228	B-	6.15	H	Dy-146	As- 83		
1919.5	2.1E-03	t Ac-228	B-	6.15	H	Y - 93	Ga- 66	F - 23	Ni- 57
1925.4	4.8E-04	u Pa-234	B-	6.70	H	Au-194	Zn- 73		Y - 86
1926.5	4.4E-04	u Pa-234m	B-	1.17	M	Sb-114			
1927.9	8.6E-05	u Pa-234	B-	6.70	H				
1929.78	0.02	t Ac-228	B-	6.15	H	Ru-109	Rh-100	Cd-103	Sn-131gm
									Sc- 43
1935.2	1.5E-05	u Pa-234	B-	6.70	H	In-106m	Ga- 78	Si- 35	
1935.5	0.041	u Bi-214	B-	19.9	M				
1936.3	2.1E-03	t Ac-228	B-	6.15	H	Au-181	Mg- 22	Cd- 99	
1937.01	2.9E-03	u Pa-234m	B-	1.17	M	Dy-147m	Cu- 60	Ni- 67	
1937.7	6.6E-05	u Pa-234	B-	6.70	H	Eu-156	La-143	N - 18	Ag-118
1943.7	--	u Bi-214	B-	19.9	M	S - 38			
1944.2	2.1E-03	t Ac-228	B-	6.15	H	Rb- 78m	Ir-188	Tb-147m	Ar- 46
1952.33	0.059	t Ac-228	B-	6.15	H	Mg- 23	Eu-140		Mn- 50m
1953.4	--	u Bi-214	B-	19.9	M	Cu- 70m	Ba-129	S - 29	Ac-234
1955.9	8.0E-04	t Ac-228	B-	6.15	H	N - 16	Lu-170	Br- 82m	
1958.	1.6E-05	u Pa-234	B-	6.70	H	T -130m			
1958.4	1.5E-03	t Ac-228	B-	6.15	H	Ac-232	As- 80	La-134	Au-181
1965.24	0.02	t Ac-228	B-	6.15	H	Ru-109	Te-112	Au-187	P - 36
						Eu-156	I -130m	Br- 86	Na- 25
						Au-181	Cs-146	Mn- 60m	Re-177
1970.	5.5E-04	u Pa-234m	B-	1.17	M	K - 36			Cl- 33
						Au-181	As- 82	Sb-110	Tc-106
1971.2	4.3E-06	u Pa-234	B-	6.70	H	Tb-146m1	Ho-170m	Na- 32	Dy-147m
1971.9	3.6E-03	t Ac-228	B-	6.15	H	In-128m			
						Ag-123	Tl-195	Ac-232	
1977.4	2.6E-05	u Pa-234	B-	6.70	H	Na- 30	Pr-144	Zn- 73	La-143
1979.3	1.8E-03	t Ac-228	B-	6.15	H	Ho-149	C - 15	Au-181	V - 52
1989.6	1.2E-05	u Pa-234	B-	6.70	H	Cu- 72	Br- 89	Dy-147m	Au-187
1994.6	5.0E-03	u Bi-214	B-	19.9	M	Ag-114	Lu-166m2	Ca- 51	Si- 35
						Ir-183	As- 69	In-123	La-134
2000.9	1.0E-03	t Ac-228	B-	6.15	H				Mn- 51

Energy 2010. ~ 2430. (keV)

Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
2010. 2010.78	1.5E-03 0.047	u Tl-210 u Bi-214	B- B-	1.30 19.9	M M	Ac-232 Se- 86 Hg-187gm	Rh- 97m Tl-196	In-120m1 Fe- 61	Sc- 46 Kr- 87	Tc- 93m
2016.7 2021.6	6.0E-03 0.02	u Bi-214 u Bi-214	B- B-	19.9 19.9	M M	Co- 56 Cs-124	Au-181 As- 70	Xe-138 P - 36	Mn- 62 Cd-119m	Au-187 Hg-189gm
2029.4	1.8E-03	t Ac-228	B-	6.15	H	Na- 31 Al- 29 Br- 84	K - 49 P - 29 Dy-149	In-130 I -137	In-130m2 Kr- 88	Cd-105 Au-187
2062.94 2072.2	0.069 6.6E-06	u Bi-214 u Pa-234	B- B-	19.9 6.70	M H	Sc- 51 Ca- 52	Se- 83m Br- 87	Tm-166 Au-181	Ag-102m Ga- 76	Pm-141
2085.1 2089.7 2090. 2103.2S	9.1E-03 0.05 1.0E-03 --	u Bi-214 u Bi-214 u Tl-210 t Tl-208	B- B- B- B-	19.9 19.9 1.30 3.052	M M M M	Cu- 62 Te-119m Sb-124 Cs-140 La-132	Au-187 I -124 In-130 Au-181 In-128	As- 84 In-130 As- 81 Cd-119m Te-115m		Eu-143 Co- 62m
2109.92 2118.55 2120. 2147.9 2160.4	0.088 1.14 7.0E-03 0.014 1.8E-03	u Bi-214 u Bi-214 u Bi-214 u Bi-214 u Bi-214	B- B- B- B- B-	19.9 19.9 19.9 19.9 19.9	M M M M M	Br- 89 Au-181 Tb-154 Cd-125	Zn- 73 In-129 Sb-110	Cu- 68m Ag-100m Er-148	As- 76 Br- 89	In-126 Rb- 88
2176.5 2184.8	3.2E-03 --	u Bi-214 u Bi-214	B- B-	19.9 19.9	M M	Co- 60 Co- 63 Nb-102m Y - 90 Y - 93	Co- 60m Y - 95 N - 17 Eu-156	Cu- 60 Hg-187gm Y - 93 Lu-170	I -114 Er-149m Dy-147m In-131 I -122	Ag-102m Pr-144
2192.58 2193.3	0.034 --	u Bi-214 u Bi-214	B- B-	19.9 19.9	M M	Y - 93 Na- 31	Lu-170 Ga- 64			
2204.21 2223.25	5.08 --	u Bi-214 c H	B- NG	19.9	M	As- 83 Er-149m Sb-116	Zn- 78 Zr- 87	Sc- 50 Ti- 42	Mg- 29	P - 38
2251.6 2260.3	5.5E-03 8.7E-03	u Bi-214 u Bi-214	B- B-	19.9 19.9	M M	Xe-138 In-128	Cr- 55 In-130m1	Y - 54 I -138		
2266.51 2270. 2270.9 2284.3 2287.65	0.018 6.2E-04 1.3E-03 5.1E-03 4.6E-03	u Bi-214 u Tl-210 u Bi-214 u Bi-214 u Bi-214	B- B- B- B- B-	19.9 1.30 19.9 19.9 19.9	M M M M M	La-141 In-132 Rb- 94 I -124 Sr- 97	Cr- 55 Dy-147m Ni- 67 F - 22 Ti- 43	Eu-156 Cd-105 Pm-148 K - 46 Al- 32 I -136		Fe- 52m
2293.4 2310.2 2312.4 2319.3	0.305 1.4E-03 9.0E-03 4.0E-04	u Bi-214 u Bi-214 u Bi-214 u Bi-214	B- B- B- B-	19.9 19.9 19.9 19.9	M M M M	Fe- 53 Mn- 51 Al- 31 Er-149m	O - 14 In-110m In-110m	Cl- 33 Er-149m	Nb- 90 Y - 90m	
2325. 2331.3 2348.	1.7E-03 0.022 1.4E-04	u Bi-214 u Bi-214 u Bi-214	B- B- B-	19.9 19.9 19.9	M M M	Cd-117m Cs-140 Br- 89 Kr- 93	Si- 26 Pr-134 Pb-197 Dy-147m	Sn-111 Dy-147m Co- 62	Lu-166m2 Cd-121m Pr-140 Br- 86	Er-149m
2353.5	4.0E-04	u Bi-214	B-	19.9	M	Ar- 33	V - 54	K - 45	Ga- 74	O - 19
2358. 2360. 2361. 2369. 2376.9 2390.8	-- 1.7E-03 1.7E-03 2.7E-03 8.8E-03 1.6E-03	u Bi-214 u Tl-210 u Bi-214 u Bi-214 u Bi-214 u Bi-214	B- B- B- B- B- B-	19.9 1.30 19.9 19.9 19.9 19.9	M M M M M M	Cd-119 La-145 Sb-118m V - 47 Ga- 64 K - 48 Kr- 88	Ar- 45 Ti-191m Er-149m V - 48 In-130m1 Cd-125m	As- 80 Ca- 49 Rh-100 In-130m2 Na- 28 Tc- 94m	La-146 Br- 72 In-131m2 Mg- 23	
2396.5 2405.1 2413.1	-- 4.1E-04 --	u Bi-214 u Bi-214 u Bi-214	B- B- B-	19.9 19.9 19.9	M M M	La-142 I -120m Rb- 82	Cu- 72 I -136	F - 23	In-122	
2421. 2423.27	-- 4.6E-03	u Bi-214 u Bi-214	B- B-	19.9 19.9	M M	Mo- 89 Cd-119m	Rb- 78 S - 29	Y - 98 Ga- 66	In-110m Eu-144	V - 48 K - 42
2430. 2430.	1.9E-03 --	u Tl-210 u Bi-214	B- B-	1.30 19.9	M M	Fe- 63	O - 20	K - 36		

Energy 2444.7 ~ 3269.7 (keV)

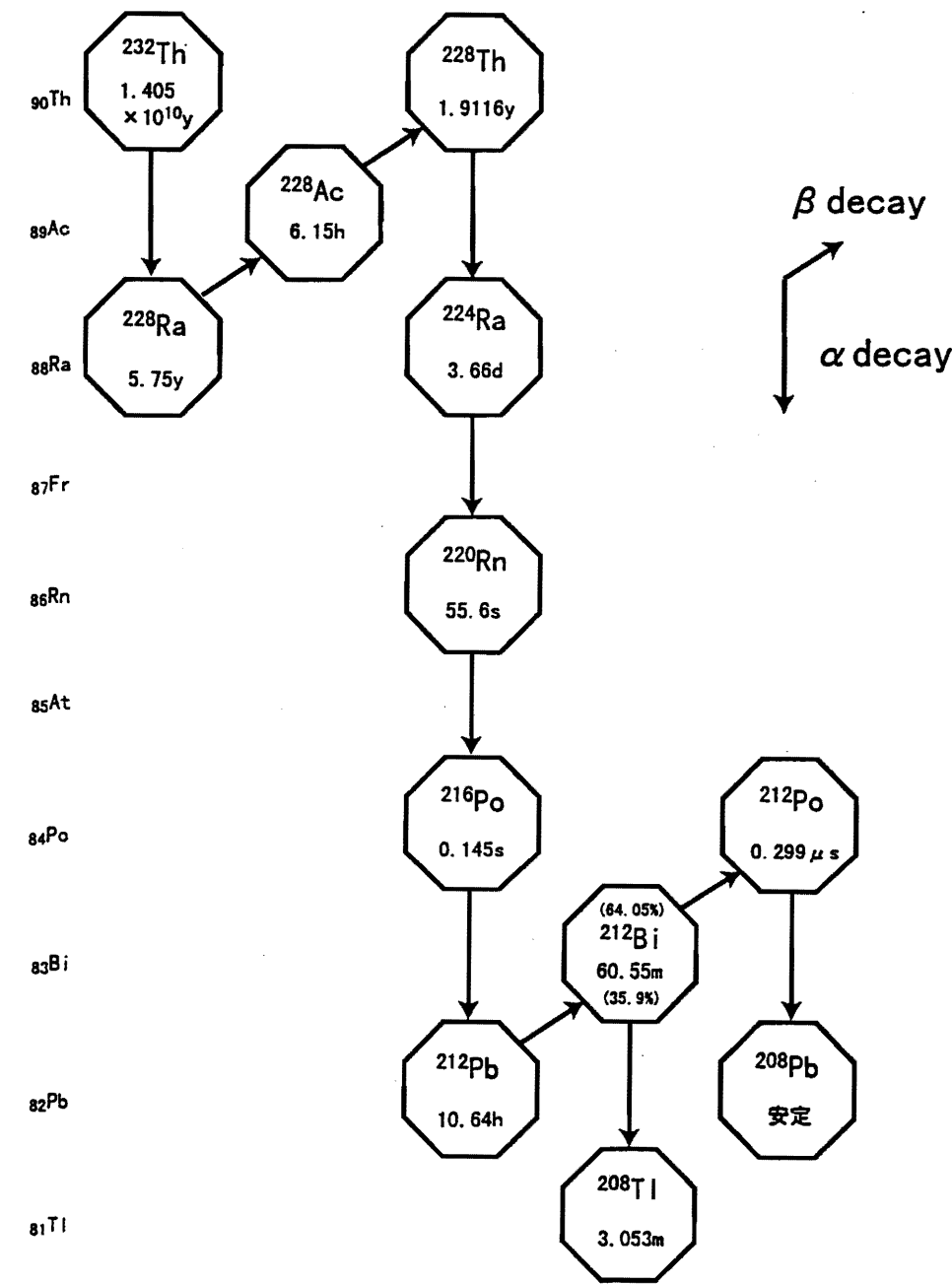
Energy (keV)	Intensity (%)	Nuclide	Decay mode	Half life		Relational artificial radionuclide				
2444.7	8.0E-03	u Bi-214	B-	19.9	M	Ga- 81				
2447.86	1.57	u Bi-214	B-	19.9	M					
2459.	--	u Bi-214	B-	19.9	M	Ti- 53	Cl- 40	Ti- 43	As- 68	As- 84
2469.4	--	u Bi-214	B-	19.9	M	Mg- 32	Sc- 52	Er-149m	K - 36	Pr-138
2482.8	1.5E-03	u Bi-214	B-	19.9	M	Dy-147m	Br- 84	Kr- 91		
2505.4	5.7E-03	u Bi-214	B-	19.9	M	Mn- 49	Co- 60	Na- 27	Ag-112	Ga- 72
2529.7	--	u Bi-214	B-	19.9	M	Rh- 98	Mg- 31	Tc- 94m	Cs-139	
2540.3	--	u Bi-214	B-	19.9	M	Si- 33	P - 36	Mn- 50m	Na- 26	Ne- 23
2550.7	4.6E-04	u Bi-214	B-	19.9	M	V - 47				
2553.	-1.0E-04	u Bi-214	B-	19.9	M					
2555.1	--	u Bi-214	B-	19.9	M	Kr- 87				
2562.	1.8E-04	u Bi-214	B-	19.9	M	Na- 29	Cl- 34m	Cd-121m		
2564.	1.4E-04	u Bi-214	B-	19.9	M	K - 52	Rb- 91	I -120		
2604.5	4.0E-04	u Bi-214	B-	19.9	M	Cd-123m	Kr- 93	Er-149m		
2614.53	35.64	t Tl-208	B-	3.053	M	Ag-102	Ag-102m	Sm-143	C - 18	Na- 29
2614.53	--	c Pb-208	NN			Na- 29	Br- 74	Cd-125m		
2630.9	8.0E-04	u Bi-214	B-	19.9	M	Sb-134	Rh- 94m	Mo- 91	Y - 95	
2662.4	3.0E-04	u Bi-214	B-	19.9	M	Se- 86	Sr-101	Br- 74	Ag-116	Lu-170
2694.7	0.031	u Bi-214	B-	19.9	M	Ar- 35	Sr-101	Ag-118m	In-123m	
2699.4	2.8E-03	u Bi-214	B-	19.9	M	Tc- 93m	Tc-106			
2719.3	1.8E-03	u Bi-214	B-	19.9	M	Tc- 91	Sr- 95			
2769.9	0.025	u Bi-214	B-	19.9	M	Y -100				
2785.9	5.5E-03	u Bi-214	B-	19.9	M	Lu-170	Ag-119	Ag-118		
2827.	2.3E-03	u Bi-214	B-	19.9	M	Sn-107	Ho-149			
2861.1	3.8E-04	u Bi-214	B-	19.9	M					
2880.3	9.2E-03	u Bi-214	B-	19.9	M	Co- 62m				
2893.5	6.0E-03	u Bi-214	B-	19.9	M	Br- 89	Se- 88	Be- 11		
2921.9	0.014	u Bi-214	B-	19.9	M	Ga- 76				
2928.6	1.1E-03	u Bi-214	B-	19.9	M					
2934.6	4.6E-04	u Bi-214	B-	19.9	M	Dy-147m	Sr- 95	K - 35		
2978.9	0.014	u Bi-214	B-	19.9	M	Si- 27	Ne- 23			
3000.	8.8E-03	u Bi-214	B-	19.9	M	Br- 87	S - 29	Ar- 35		
3053.9	0.021	u Bi-214	B-	19.9	M					
3081.7	4.8E-03	u Bi-214	B-	19.9	M	Na- 28	Rb- 78	Ca- 49		
3094.	4.4E-04	u Bi-214	B-	19.9	M	Nb- 89				
3142.6	1.2E-03	u Bi-214	B-	19.9	M	Tb-146m1				
3149.	-8.8E-05	u Bi-214	B-	19.9	M	Rb- 98	Mo- 91			
3160.6	3.2E-04	u Bi-214	B-	19.9	M	Co- 62	Mn- 52m			
3183.6	1.3E-03	u Bi-214	B-	19.9	M	In-130m2	Rh- 95m	Tc-106		
3233.2	-1.0E-04	u Bi-214	B-	19.9	M	Br- 90	In-123m	Ru- 93	Te-136	
3269.7	-6.0E-05	u Bi-214	B-	19.9	M	Cu- 62				

Appendix A. Natural radioactive families

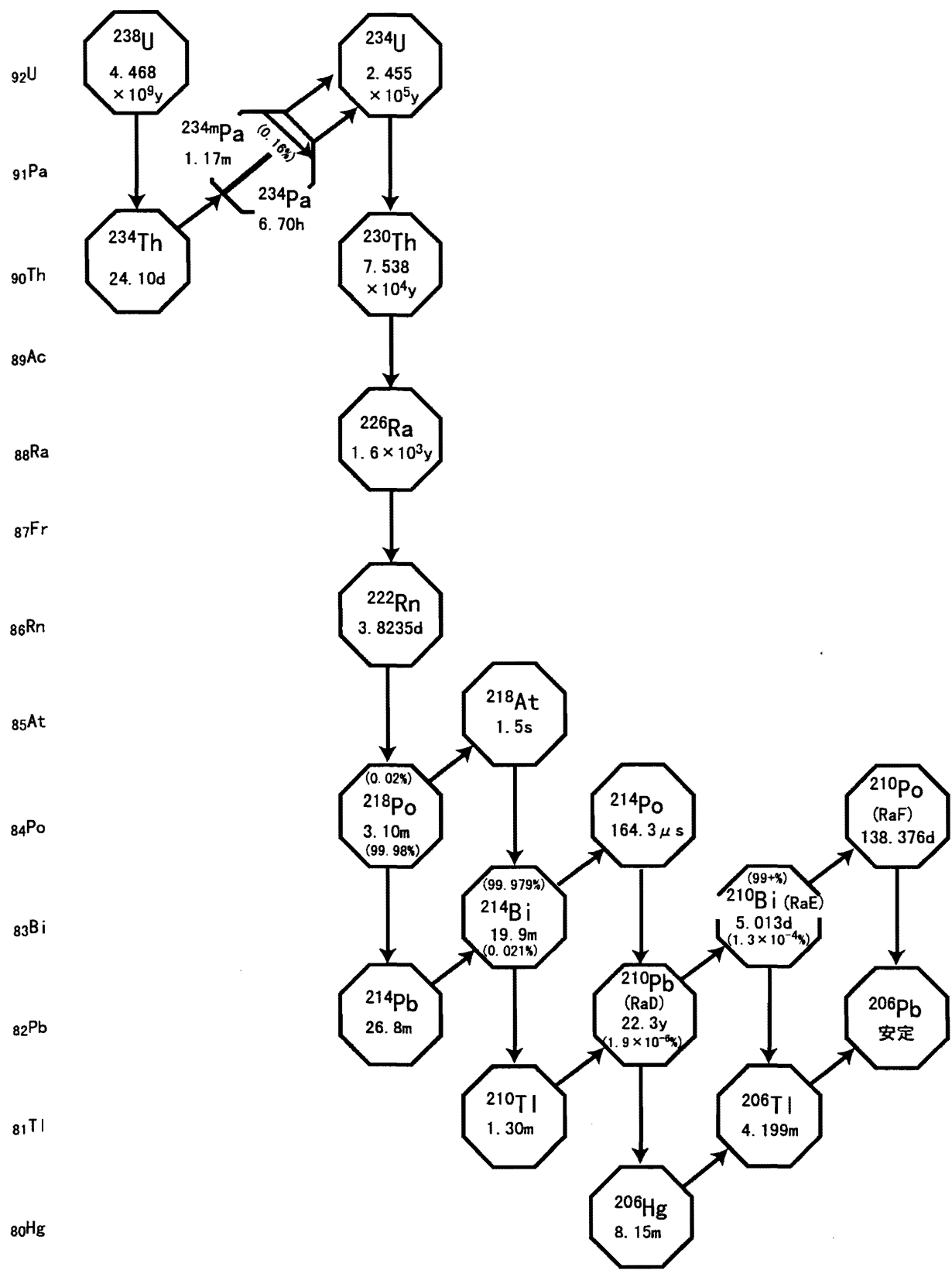
- Thorium series ($A=4n$)
- Uranium series ($4n+2$)
- Actinium series ($4n+3$)

Natural Radioactive Families

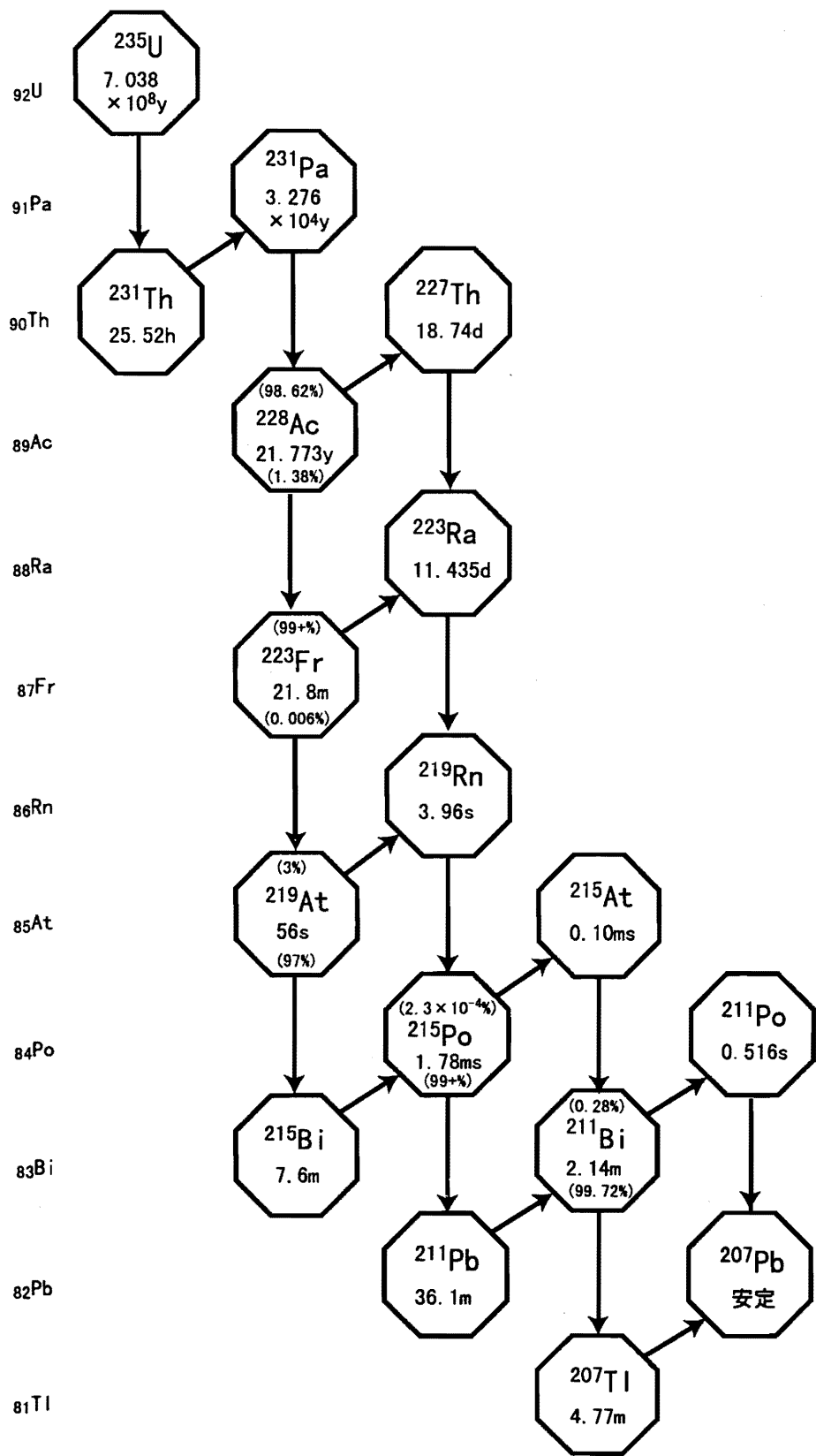
Thorium Series



Uranium Series

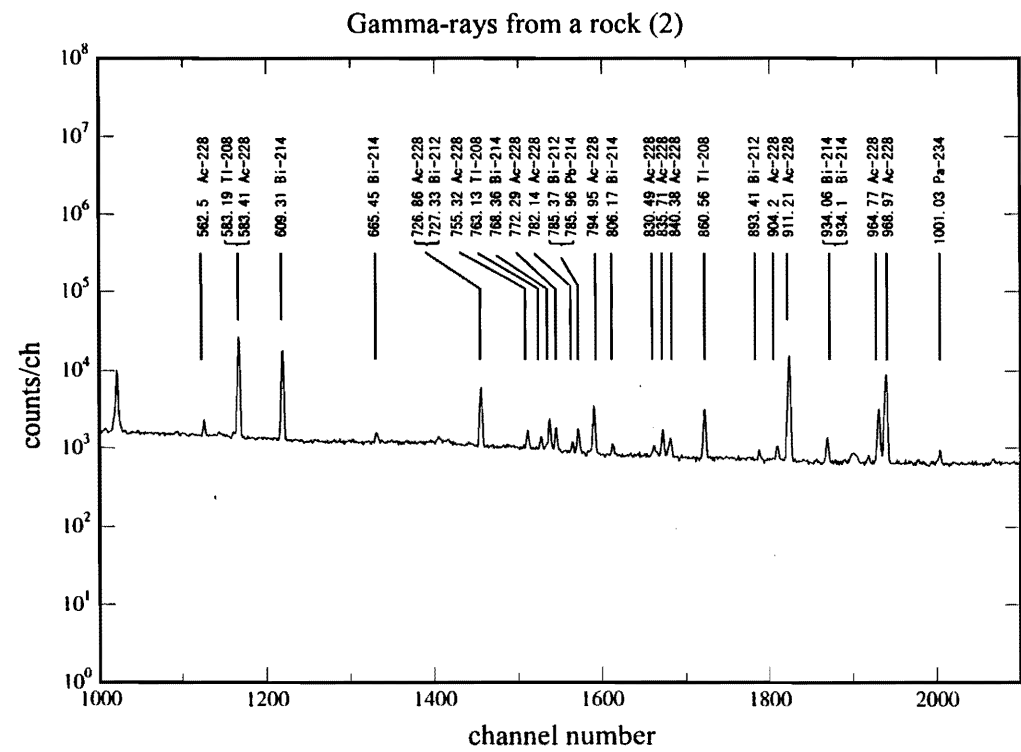
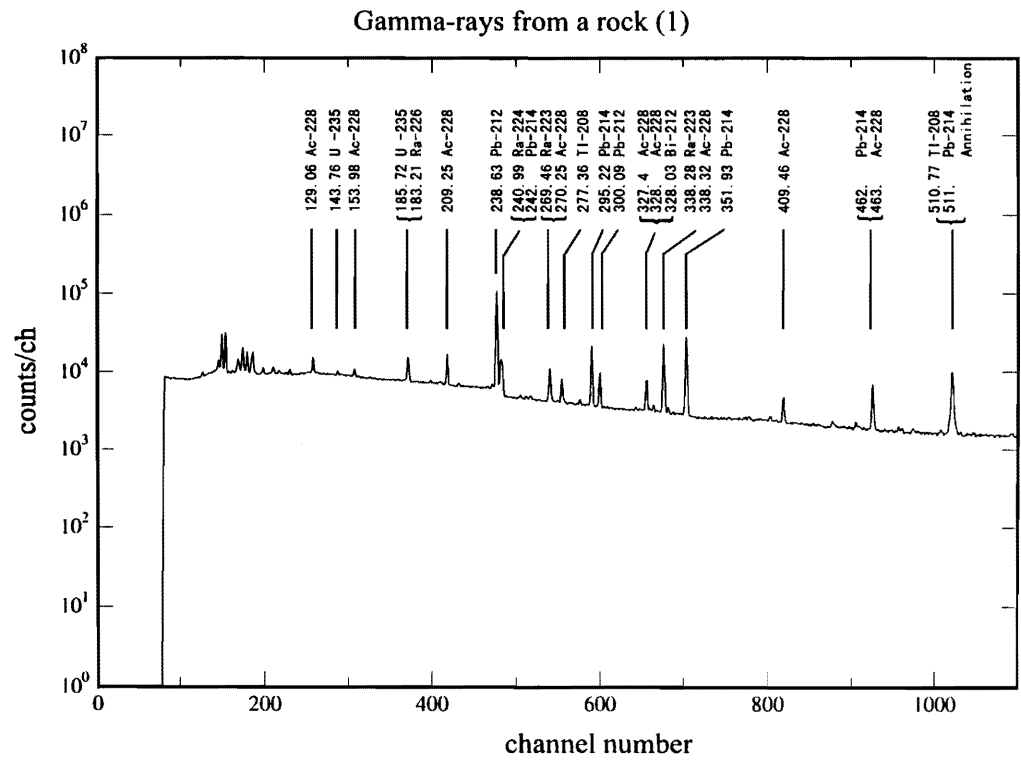


Actinium Series

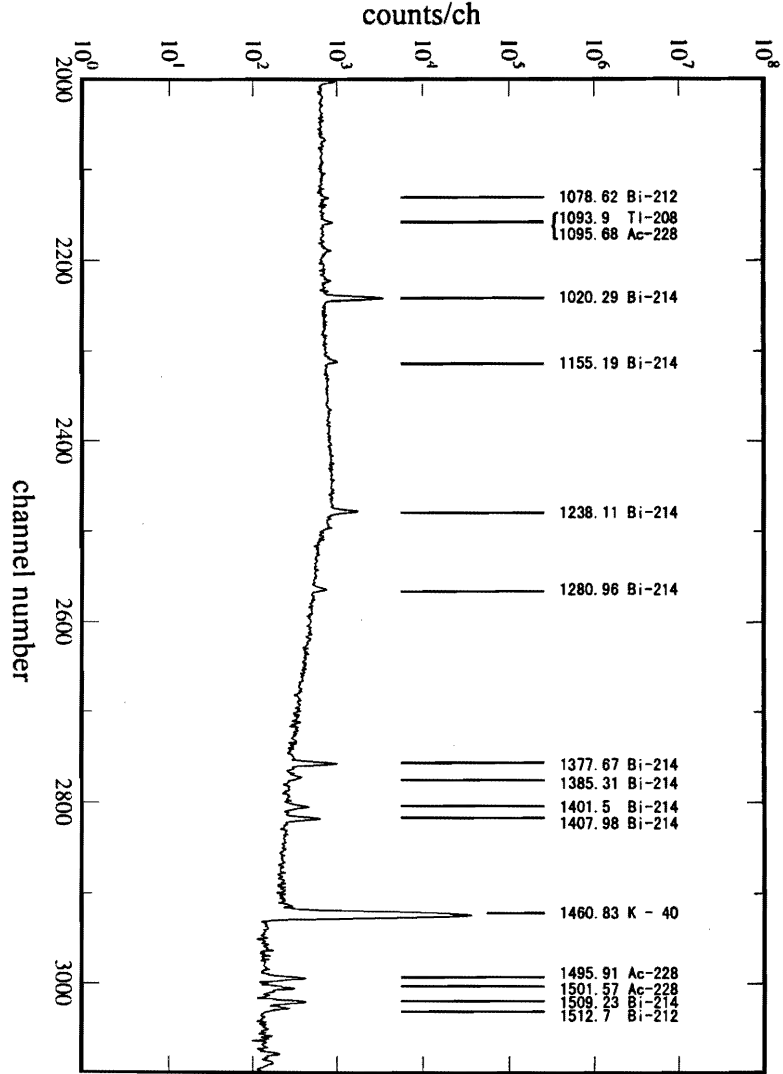


Appendix B. Some examples of natural gamma-ray spectrum

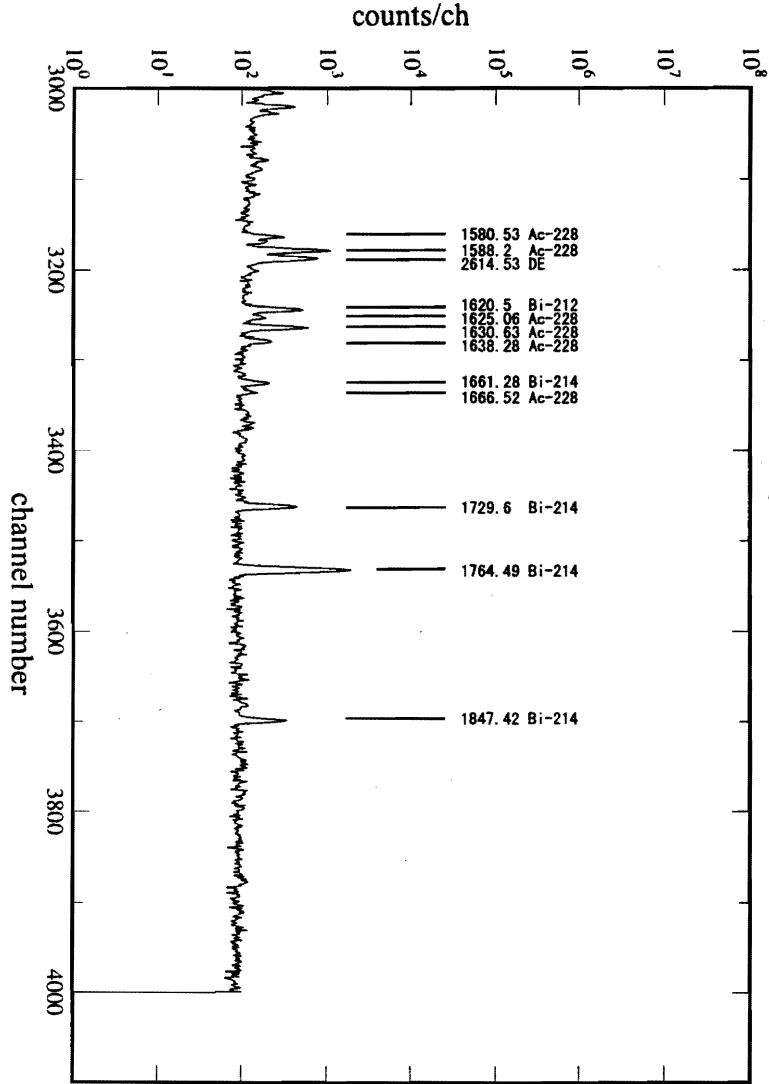
Rock, Uranium ore, Thorium, Monazite, Uraninite, and
Natural background

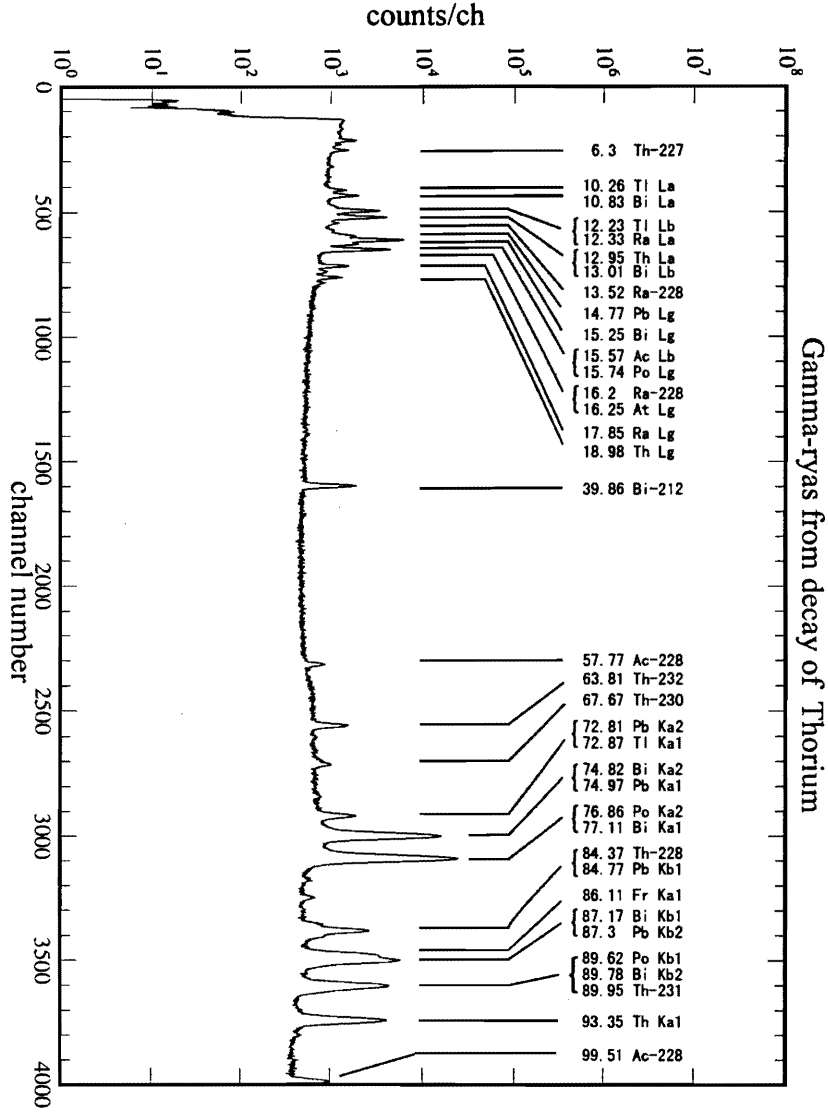
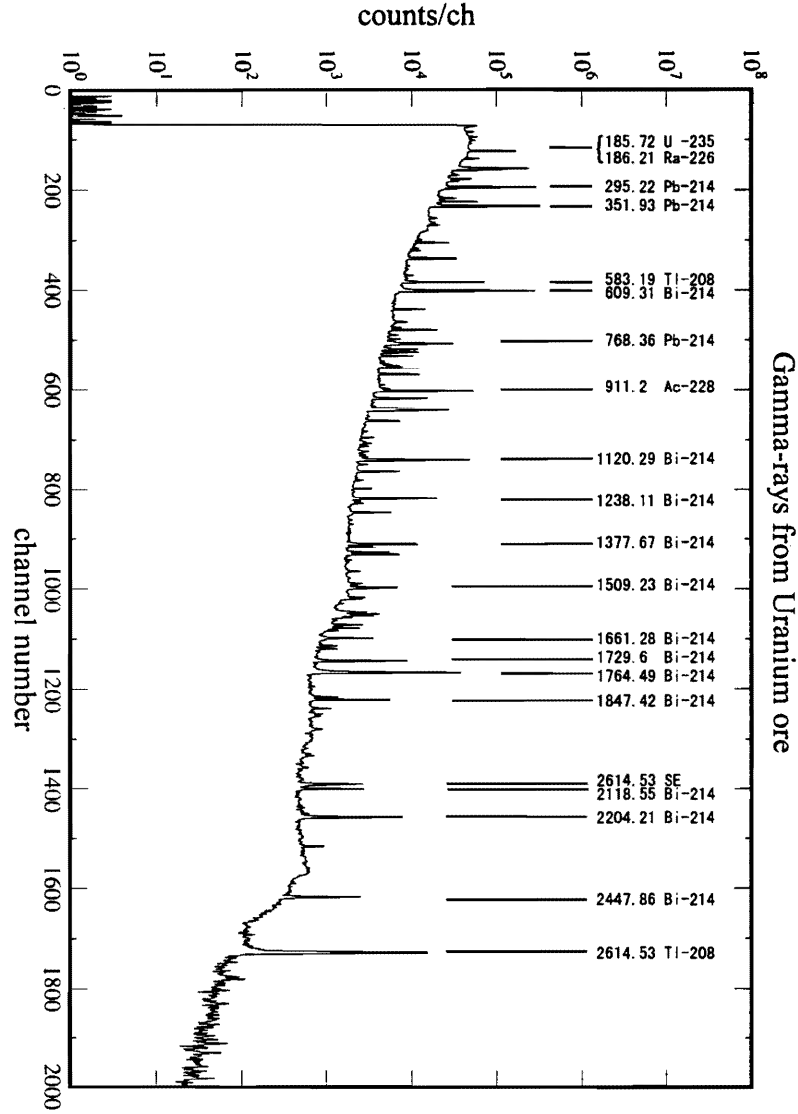


Gamma-rays from a rock (3)

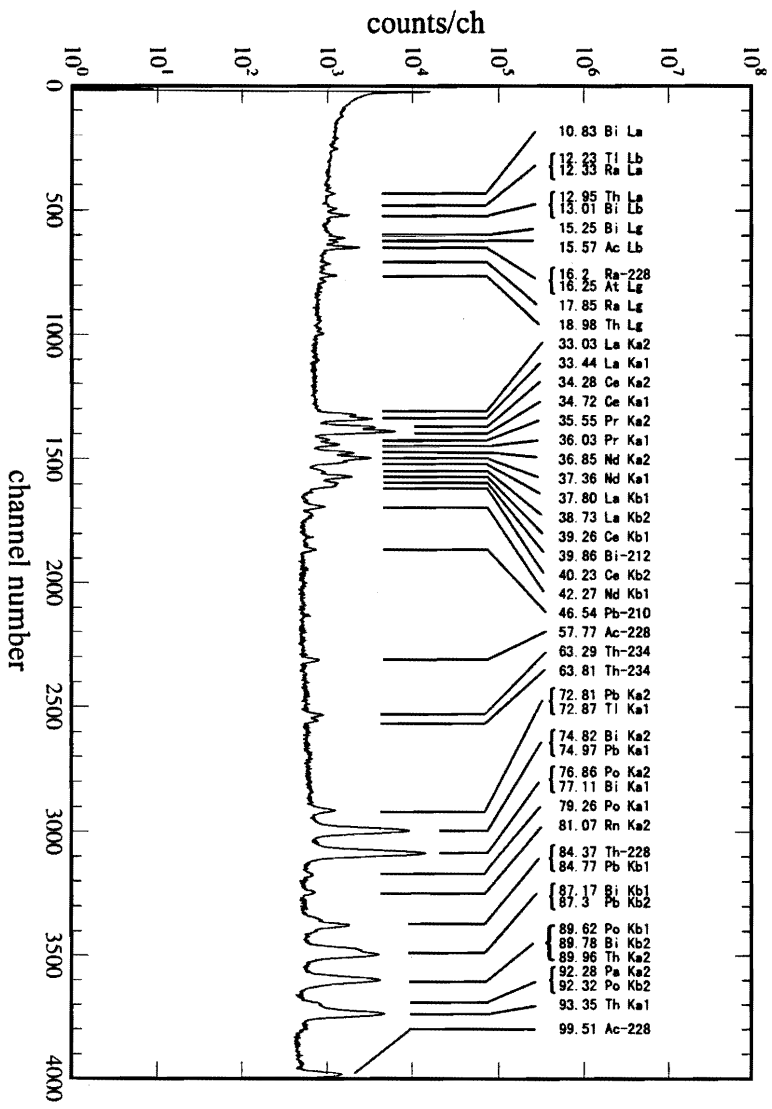


Gamma-rays from a rock (4)





Gamma-rays from monazite



Gamma-rays from uraninite

