University of Leipzig

Advanced Labs

Lab report

High-Resolution Gamma-Spectroscopy with Ge-Semiconductor Detector

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Parent Nuclide	Origin	Experimental Energy [keV]	Theoretical Energy [keV]	% Error
^{208}Tl	^{232}Th Series	2618.58	2614.51	0.16
^{228}Ac		911.49	911.20	0.03
^{208}Tl		583.50	583.19	0.05
^{212}Pb		239.05	238.63	0.18
^{228}Ac		209.67	209.26	0.20
^{214}Bi	^{238}U or ^{226}Ra Series	1766.32	1764.49	0.10
^{214}Bi		1121.32	1120.29	0.09
^{214}Bi		609.65	609.31	0.06
^{214}Pb		352.36	351.93	0.12
^{214}Pb		295.54	295.22	0.11
^{226}Ra		186.43	186.21	0.12
^{40}K	Primordial	1461.58	1460.82	0.05
Annihilation	β^+ Decay and Doppler Broadening	511.19	511.00	0.04

Table 1

Rock				
Parent Nuclide	**Origin**	**Experimental Energy [keV]**	**Theoretical Energy [keV]**	**% Error**
^{214}Bi	^{238}U or ^{226}Ra Series	1766.32	1764.49	0.10
^{214}Bi		1120.67	1120.29	0.03
^{214}Bi		609.32	609.31	0.002
^{214}Pb		352.36	351.93	0.12
^{214}Pb		295.54	295.22	0.11
^{214}Pb		242.27	242.00	0.11
^{226}Ra		186.43	186.21	0.12
^{234}Th	^{238}U Series (Doublet)	92.81	92.58	0.25
Bi Kα_1	^{212,214}Pb Decay	77.31	77.11	0.26

Table 2

Chernobyl				
Parent Nuclide	**Origin**	**Experimental Energy [keV]**	**Theoretical Energy [keV]**	**% Error**
^{208}Tl	^{232}Th Series	2616.64	2614.51	0.08
^{212}Pb		238.72	238.63	0.04
^{228}Ac		208.70	209.26	-0.27
^{40}K	Primordial	1461.90	1460.82	0.07
^{137}Cs	Fission	661.66	661.94	-0.04
^{234}Pa	^{228}Ac	131.22	131.20	0.02

Table 3

Soil				
Parent Nuclide	**Origin**	**Experimental Energy [keV]**	**Theoretical Energy [keV]**	**% Error**
^{214}Bi	^{238}U or ^{226}Ra Series	1766.32	1764.49	0.10
^{214}Bi		1239.15	1238.11	0.08
^{214}Bi		1121.32	1120.29	0.09
^{214}Bi		609.97	609.31	0.11
^{214}Pb		352.36	351.93	0.12
^{214}Pb		295.54	295.22	0.11
^{214}Pb		242.27	242.00	0.11
^{226}Ra		186.43	186.21	0.12
^{40}K	Primordial	1462.22	1460.82	0.10
Bi Kα_1	$^{212,\ 214}$Pb Decay	77.63	77.11	0.67

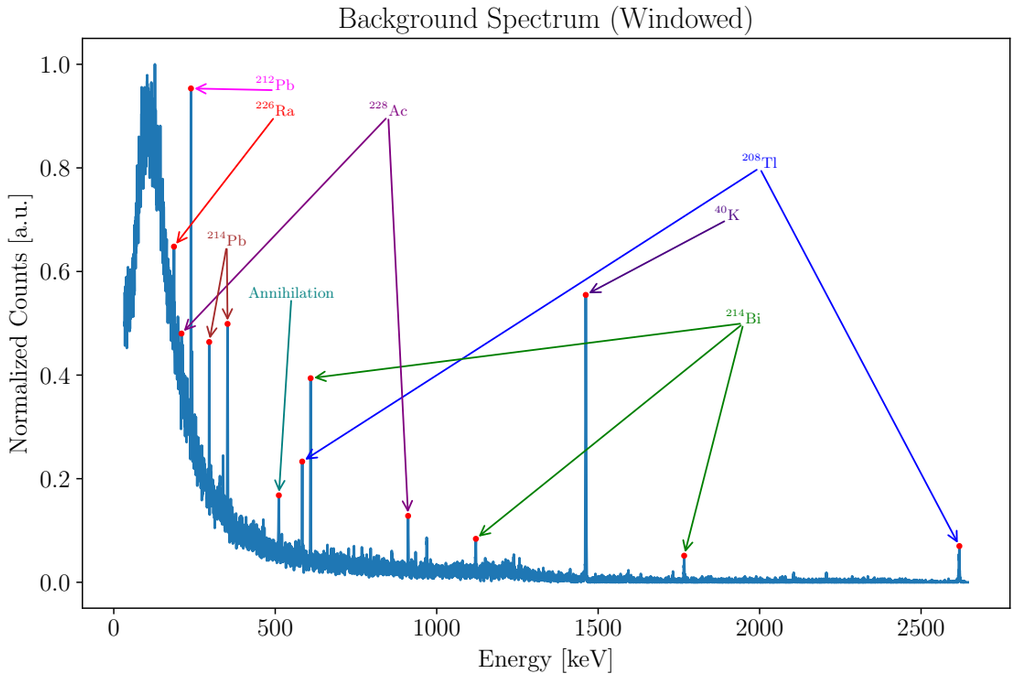
Table 4

V				
Parent Nuclide	**Origin**	**Experimental Energy [keV]**	**Theoretical Energy [keV]**	**% Error**
^{214}Bi	^{238}U or ^{226}Ra Series	1766.32	1764.49	0.10
^{214}Bi		1120.68	1120.29	0.03
^{214}Bi		609.65	609.31	0.06
^{214}Pb		352.36	351.93	0.12
^{214}Pb		295.54	295.22	0.11
^{214}Pb		242.60	242.00	0.25
^{226}Ra		186.43	186.21	0.12
^{234}Th		93.13	92.58	0.59

Table 5

W				
Parent Nuclide	**Origin**	**Experimental Energy [keV]**	**Theoretical Energy [keV]**	**% Error**
^{208}Tl	^{232}Th Series	2618.25	2614.51	0.14
^{228}Ac		969.60	968.97	0.07
^{228}Ac		911.16	911.20	0.00
^{208}Tl		583.50	583.19	0.05
^{228}Ac		338.48	338.32	0.05
^{212}Pb		239.05	238.63	0.18
^{228}Ac		210.00	209.26	0.35
Bi Kα_1	$^{212,\ 214}$Pb Decay	77.63	77.11	0.67

Table 6



3 Conclusion

Appendices