

The Thorium-232 Decay Series

Nuclide	Radiation	Energy (MeV)	Half-life
^{232}Th	"	4.01	1.41×10^{10} yr
^{228}Ra	\$	0.055	6.7 yr
^{228}Ac	\$(1.18, 0.96	6.13 hr
^{228}Th	" , (5.68, 0.084	1.91 yr
^{224}Ra	" , (5.68, 0.241	3.64 day
^{220}Rn	" , (6.29, 0.55	55 s
^{216}Po	"	6.78	0.15 s
^{212}Pb	\$(0.346, 0.239	10.64 hr
^{212}Bi (64%) ^{212}Po	\$("	2.26, 0.727 8.78	60.6 min 3.04×10^{-7}
^{212}Bi (36%) ^{208}Tl	" , (\$(6.07, 0.040 1.80, 2.61	60.5 min 3.10 min
^{206}Pb	stable	X	X

Some Properties of Common Ionizing Radiation

	Alpha Particle, α	Beta Particle, β	Gamma Radiation, γ
What is it?	High Energy Helium Nucleus	High Energy Electron	Very High Energy Light
Electrical Charge	+2	-1	0
Mass	4 amu	. 0 amu	0 amu
Speed (% of light speed)	3-8%	20-89%	100%
Penetration through paper, plastic wrap, etc.	stops		
Penetration through 1 mm metal, or 1 cm wood	stops	stops	
Penetration in water	few 0.01 mm	0.1 mm	few meters

Penetration in air	few cm	10 cm - 1 meter	. 100 meter
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