Lab 8: Radioactivity and Shielding

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1 Source Choice

Gamma has more energy than beta, and thats why we want to use a thicker material for gamma because gamma waves can pass through metal. That's why we use metal plates for cesium and it's gamma waves.

2 Table

Strontium-90			Cesium-137		
Thickness (cm)	Count Rate I (cpm)	$\ln[I]$	Thickness (cm)	Count Rate I (cpm)	$\ln[I]$
0	73	4.29	0.5	48	3.87
0.1	44	3.78	0.8	49	3.89
0.2	51	3.93	1.0	37	3.61
0.3	37	3.61	1.2	36	3.58
0.4	34	3.53	1.4	41	3.71
0.5	34	3.53	1.6	27	3.30
0.6	34	3.53	1.8	28	3.33
0.7	37	3.61	2.1	37	3.61
0.8	34	3.53	2.4	29	3.37
0.9	26	3.26	2.7	33	3.50
1	38	3.64	3.0	37	3.61
1.1	23	3.14	3.3	24	3.18
1.2	39	3.66	3.6	20	3.00
1.3	32	3.47	3.9	29	3.37
1.4	26	3.26	4.2	33	3.50
1.5	24	3.18	4.5	26	3.26
1.6	29	3.37	4.8	23	3.14
1.7	18	2.89	5.1	25	3.22
1.8	32	3.47	5.4	22	3.09
1.9	28	3.33	5.7	23	3.14

Table 1: Collected data of Strontium-90 and Cesium-137 along with data used to plot the equations. I_0 is the first row of both sections.

3 Linearization

So I really wanted our μ as our slope. So I was thinking to just natural log both sides! Kinda like:

$$I(x) = I_0 e^{-\mu x}$$
$$\underbrace{\ln[I(x)]}_{y} = \underbrace{-\mu}_{\text{m}}\, x + \underbrace{\ln[I_0]}_{\text{b}}$$

4 Graph

5 Thickness

6 Banana Equivalent

References

[1] Department of Physics. *PHYS 126 Lab Manual*. University of Alberta, 2025.

[2] TA assisted with the lab, and provided guidance on the data collection and analysis.

[3] Lab partner Morgann Reinhart assisted with the data collection and analysis.