

# GAMMA RAY ATTENUATION BY LEAD

Andy French. Winchester College. P1. 2/11/2020

Counts per 100s. Source: L2461 Cobalt-60 5 microcurie pure gamma.  
Fixed GM tube to source distance of 77mm.

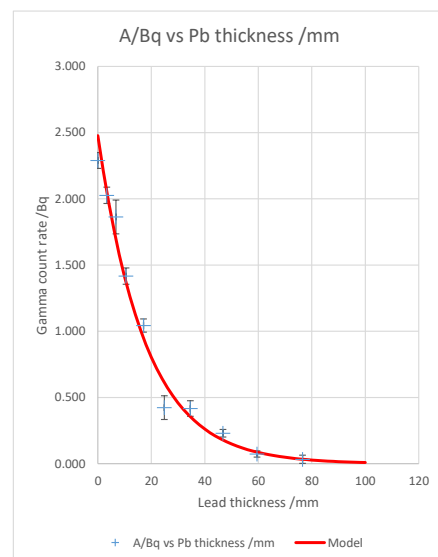
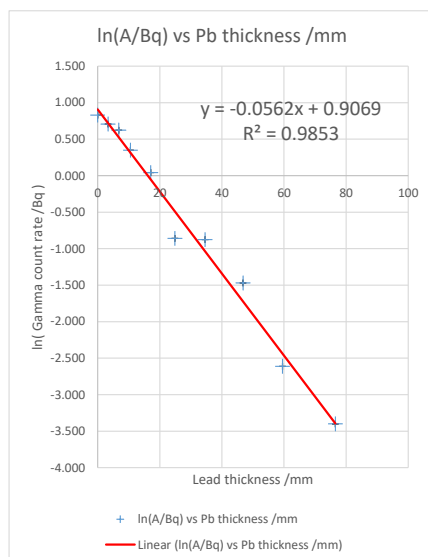
Counts per 100s				Background subtracted		
Lead thickness /mm	A1	A2	A3	Mean A/Bq	A standard deviation	ln(A/Bq)
0	270	267	256	2.290	0.060	0.829
3.35	230	239	245	2.027	0.062	0.706
6.78	205	224	236	1.863	0.128	0.622
10.54	169	178	184	1.417	0.062	0.348
17.08	145	141	133	1.043	0.050	0.042
24.86	74	69	90	0.423	0.090	-0.860
34.59	79	83	69	0.417	0.059	-0.875
46.79	58	62	55	0.230	0.029	-1.470
59.52	46	41	41	0.073	0.024	-2.613
76.54	37	36	43	0.033	0.031	-3.401

Background count (100s) i.e. without source.

29	36	41
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Mean background (Bq)

0.353
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MODEL

HALF THICKNESS /mm

12.33

A0 /Bq

2.477

Lead thickness /mm	A /Bq
0	2.48
2	2.21
4	1.98
6	1.77
8	1.58
10	1.41
12	1.26
14	1.13
16	1.01
18	0.90
20	0.80
22	0.72
24	0.64
26	0.57
28	0.51
30	0.46
32	0.41
34	0.37
36	0.33
38	0.29
40	0.26
42	0.23
44	0.21
46	0.19
48	0.17
50	0.15
52	0.13
54	0.12
56	0.11
58	0.10
60	0.08
62	0.08
64	0.07
66	0.06
68	0.05
70	0.05
72	0.04
74	0.04
76	0.03
78	0.03
80	0.03
82	0.02
84	0.02
86	0.02
88	0.02
90	0.02
92	0.01
94	0.01
96	0.01
98	0.01
100	0.01

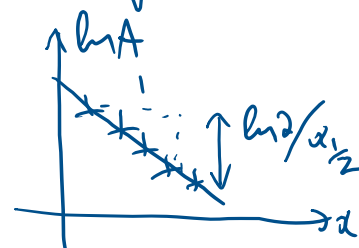
$$A = A_0 / 2^{x/x_{1/2}}$$

$$2^{x/x_{1/2}} = A_0 / A$$

$$\frac{x}{x_{1/2}} \ln 2 = \ln A_0 - \ln A$$

$$\therefore \ln A = \ln A_0 - \frac{\ln 2}{x_{1/2}} x$$

Half thickness of Pb



In our case:  $\ln(A/Bq) = -0.0562x + 0.9069$

$\therefore A_0 = e^{0.9069}$

$x_{1/2} = \frac{\ln 2}{0.0562}$

2.477

12.33