Nuclear Radiation Shielding

Purpose:

In this lab we will determine the penetrating power of different radiation by using different materials to shield the radiation.

Equipment:

Model E2 Nuclear Scaler, radioactive sources, cardboards, aluminum and zinc plates.

Tips:

Some of the sources in the lab may be very weak due to old age. Generally it is better to use sources with longer half-life because they last longer, but if the source you use is still too weak, you may use several of them at the same time to boost the output.

Procedure:

You will need to refer to the previous lab "The Geiger Plateau" to find the operating voltage of the counter. Record the voltage you use below.

Voltage of the counter: _____

1. Depress the COUNT switch to the 1 MINUTE COUNT. The counter will measure the decay for exactly one minute automatically.

2. Put an alpha source at the bottom of the counter window. Do a count and record your data in the table below.

3. Place a cardboard between the source and the counter. Do another count.

4. Add another cardboard and do another count. Repeat this process till you reach five layers.

5. Remove the cardboard and repeat steps 3 and 4 for aluminum and lead sheets.

6. Repeat steps 2 to 5 for beta and gamma sources.

Data

Table 1: Alpha: Counts per minute

Layers	0	1	2	3	4	5
Cardboard						
Aluminum						
Lead						

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Table 2: Beta: Counts per minute

Layers	0	1	2	3	4	5
Cardboard						
Aluminum						
Lead						

Table 3: Gamma: Counts per minute

Layers	0	1	2	3	4	5
Cardboard						
Aluminum						
Lead						

Analysis

Plot three graphs of counts versus the number of layers, one for each source. Each graph should have three lines, one for each material.

Describe the penetrating power of the three types of radiation. Explain which is the most penetrating, which is the least based on your graphs.

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