

Radioactive Sources Laboratory:

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Students' Guide

Goals

- To give you information about radiation
- To give you some hands-on experience with radiation

The Activity

In this class, you will use radioactive sources in order to learn about radiation, its effects, and about ways to protect from it. You will use Geiger counters to study the effects of shielding materials and distances from the radioactive source on the measured radiation.

Materials for Each Group

- A series of radioactive sources
- A Geiger counter
- A series of blocking materials in different widths (teflon, lead, paper...)
- A meter stick
- Tongs
- Protective wear and shields

SAFETY

No student may work with any radioactive materials unless the work is carefully supervised by a certified staff member. For example guidelines, see the following:

<http://www.isbe.state.il.us/secondaryed/Science%20Ed/Guidebook%20Science%20Safety/ch10.pdf>
Guidelines from the State of Illinois. See especially 10.2 "Radioisotope Use."

Instructions

Turn the Geiger counter ON.

Allow it to stabilize and measure the background counts for the room: _____

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Measure the radiation of the provided alpha, beta and gamma sources and record their radiation (counts per minute) at a minimum distance from the detector (ZERO). Record your results in the following table.

Source	Zero	__cm	__cm	__cm	__cm	__cm	__cm
Alpha1							
Alpha1							
Beta1							
Beta1							
Gamma 1							
Gamma 2							

Use the meter stick to choose other distances of the source from the Geiger counter, and record your results for at least three sources (one each: alpha, beta, gamma).

Plot your results: radiation (y-axis) vs. distance (x-axis). Explain the effect of distance on the amount of radiation measured. What can you conclude? _____

Observe shielding effects. You have different shields made up from different materials and in different thicknesses. Put the different shields over the sources and see if the counts per minute drop with the presence of the shield. Compare the different kinds of sources with shields from different materials:

Source	Shield 1	Shield 2	Shield 3	Shield 4	Shield 5
Alpha1					
Alpha1					
Beta1					
Beta1					
Gamma 1					
Gamma 2					

Write down your conclusions: Which shield stops which radiation better? _____

Choose one source and measure its radiation with different shields at the same distance:

	Shield 1	Shield 2	Shield 3	Shield 4	Shield 5
Shield Thickness					
Counts/min Source A					

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Plot your results, and discuss the effect of shield thickness on the measured radiation: _____

Think and imagine: If you had been a nuclear expert, what would be your considerations in protecting population from nuclear radiation? _____
