Radioactive or Not?

Geiger counter

This experiment shows what radiation is and how it is measured. It is not a difficult experiment to conduct; however, you can only do it if you have access to a **Geiger counter**. Your teacher (or a parent) may be able to help you obtain one to use.

Materials:

Your choice of radioactive items
Some examples of radioactive items could be:

- Cloisonne jewelry.
- Old orange/red "Fiesta ware" dishes (the glaze has uranium in it). This type of glaze can also be found under the name of "Riviera", "Harlequin," and "Vistosa." Since these are collectable, look for pieces with cracks and blemishes – they should be less expensive. These types of ceramics can be found at antique malls and in auctions on the Internet.
- Another collectable item with uranium used for color is old greenish "Vaseline" glass.
- Old pair of dentures; many porcelain dentures contain uranium to give them a more natural color.
- Many camping lantern mantles (i.e. the Coleman type) contain thorium (the label should give you information about this).
- Thoriated-welding rod (found at a welding supply store).
- Some lenses have coatings containing thorium.
- Old watches and clock dials may contain radium.
- Most smoke alarms contain americium. (The americium primarily an alpha emitter is shielded by a bit of metal, but it could be carefully exposed.)
- Many rocks and fossils have radioactive ores. A rock and mineral shop will have inexpensive samples, for example carnotite, uranophane, and others. Trinitite, the rock created by the first atomic explosion at the Trinity site in New Mexico would be interesting to test.
- Depending on the quality of your Geiger counters, things high in potassium can give off detectable radiation. Try a fertilizer with a high potassium content or even cream of tartar (from the spice aisle in the grocery store).

Your choice of non-radioactive materials
Some good items that are not radioactive might include:

- Glow-in-the-dark toys.
- Interesting-looking rocks and minerals.
- Ceramic items.

- Items made with the element polonium (some old spark plugs and anti-static devices) are particularly good distracters.

Your choice of shielding materials
Some possible shielding you might want to try include:

- Glass.
- Plexiglas.
- Aluminum foil.
- Plastic wrap.
- Paper.
- Styrofoam.
- Wood pieces of different thicknesses.
- Metal sheeting.

Instructions:

- Be sure you understand how to use the Geiger counter.
- Develop your hypothesis before you begin: make a list of which items you expect to be radioactive. It's useful to have a variety of items to test.
- Test each item to determine whether your hypotheses were correct. Make a chart to show your results and how they compare with your hypotheses.
- Next, test the shielding materials. Do this by choosing the radioactive source that had the highest reading during your experiment; then one at a time, test each shielding material by placing it between the source and the Geiger counter.
- Record your results, clearly stating which shielding material was the most effective.

Topics to include in a report:

- Explain why it can be safe to use everyday items that are radioactive.
- How do things become less radioactive as time goes by?
- What materials proved best for shielding? Discuss whether the density of the shield is important, and if so, why?