

NUCLEAR CHEMISTRY

Experiment 3 – Shielding

Experimental Procedure

1. Open the worksheet for Experiment 3. Enter the data within the Excel spreadsheet so that the graph can be created. After completing the experiment, copy all data and graphs to the printed report sheet.
2. Move the cursor over the apparatus until the “lighted area” appears. Click on this to start the experiment. The experimental setup includes three radioactive sources (one each of an α , β , and γ emitter), several 1-mm thick sheets of the three types of shielding, and the apparatus to measure the radioactivity. On the right is a Geiger counter that will measure radiation in counts per second. On the left is a holder for the radioactive source, and in the middle is a holder for the shielding material.
3. Click on the drop-down list of radioactive sources and choose radon-222, an α emitter. Drag the source into the sample holder. (There is information on each nuclide in the box that pops up. After reading it, you can close the box, or it will close on its own when you click on something else.)
4. Click on the Geiger counter switch to turn it on. Read the activity from the gauge. (The needle on the gauge may move around a bit. You should try to get an average reading. Note that the scale on the gauge is not linear.) Record the activity of the sample in counts/sec in the worksheet.
5. Click the switch again to turn it off.
6. Click on the drop-down list of shielding materials and choose a single sheet (1 mm) of one of them. Drag the shielding into its holder in the apparatus.
7. Again click on the Geiger counter switch, and again record the activity in the appropriate column in the worksheet.
8. Repeat steps 6 and 7 for the other types of shielding material.
9. Click on the drop-down list of radioactive sources and choose iron-59, a β emitter. Drag the source into the sample holder and measure its radioactivity.
10. Choose one of the shielding materials and measure the radioactivity using 1, 2, 3, and 4 mm thicknesses. Record the activity values in the appropriate cells of the worksheet. Note the graph developing as you enter data.
11. Repeat step 10 for the other shielding materials.
12. Repeat steps 9-11 for strontium -85, a γ emitter.