OFFICIAL ABSTRACT and CERTIFICATION

Calculating and Predicting the Effectiveness of Leaded Water as a Gamma Radiation Shielding Material

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This project was conducted to find if leaded water had a significant shielding effect on gamma radiation as compared to pure water. Leaded water has come into public focus as communities such as Flint have been affected by it and its poisonings. Gamma is the most dangerous radiation type and can only be stopped by heavy or dense materials such as lead, which has the drawbacks of being a very heavy limiting material and also being environmentally scarce. However, water can also act as an effective shielding material, as using a greater volume of it can compensate for its low weight and density. It was hypothesized that the lead in leaded water could act as making water a stronger shield than it already is. This would give an alternative to gamma shielding other than lead and give value to leaded water. For the experiment, a thin metal cap was placed atop a Barium-133 disc source and counts per minute were recorded for no solution, distilled water, and three leaded water solutions of increasing lead density. The results were plotted on the line graph in Figure 2 and were mathematically extrapolated to quantify how much more effective leaded water was in shielding, as seen in Figure 3. The hypothesis was supported. Leaded water should be considered as a valuable resource in gamma shielding.

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