CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

Jared Henderson

Project Number

J1307

Project Title

The Effect of Different Materials on Particle Decay from a Radioactive Source

Abstract

Objectives

My project is about the effect of different materials on particle decay from a radioactive source. My question is How do different materials affect particle decay from a radioactive source? My hypothesis is If aluminum foil is the best shield against radioactivity, and I wrap a radioactive source in a variety of different materials, then the source wrapped in aluminum foil will show the least amount of radioactivity.

Methods

To prepare this experiment I used, disposable gloves, an ionizing smoke detector (which contains my radioactive source, Americium-241), pliers, glass container, hot glue, black pan, black felt, warm bowl of water, heavy block of metal, cardboard box, tape measure, tweezers, dark room, insulating gloves, safety glasses, dry ice, 40 ml Isopropyl alcohol 99%, eye dropper, and a bright flashlight. I will put blocks of dry ice in the cardboard box. I will hot glue black felt to the bottom of the glass container. Using pliers, I will remove the radioactive source from the ionizing smoke detector. Using tweezers, I will set the radioactive source on top of the black pan. I will soak black felt with alcohol using an eye dropper. I will set the glass container on top of the black pan so the radioactive source is in the center. I will put the black pan on top of the dry ice. I will take a cardboard box and black pan with the glass container to a dark room. I will set the sealed bowl of warm water on top of the glass container, then set metal the block on top of that. I will darken the room. I will shine the light at a 45º angle, and look at the container in the same direction. I will observe the container and take notes on the number of radioactive tracks. I will wrap the radioactive source in different materials (aluminum foil, mylar, latex, wax paper) and repeat the above two steps for each material.

Results

My data did not support my hypothesis. I thought that aluminum foil would be the best shield against radioactivity, but my data showed that wax paper was the best shield against my radioactive source. My tests showed aluminum foil with an average of 58 radioactive tracks, while wax paper had an average of 38 radioactive tracks. My results also showed mylar wrapping had an average of 90 tracks.

Conclusions

I can make a variety of conclusions from my results. First, wax paper is a better shield against alpha particle radiation than aluminum foil. Second, mylar can make a great shield if it is sealed. Otherwise, the radiation may reflect, amplify, and escape. Finally, latex is a very weak shield as it had almost no effect because it was only 8.5 tracks below the control test (bare source).

Summary Statement

How different materials affect alpha particle radiation

Help Received

I received help from my parents, my teacher Michael Matthews, along with help from online resources such as IEEE, Educational research, ANS and Wikipedia.