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CONSTRUCTION OF RADIATION DETECTING DEVICES TO IDENTIFY RADIOACTIVE MATERIALS

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Radioactivity, discovered during the golden era of science, marks the decay of unstable atoms or particles, into lighter particles and nuclei. It has significant scientific and industrial applications; improper handling of radioactive substances could pose serious health and environmental risks. Radioactive emissions are invisible to the naked eye and detection requires specialised instruments. However, many individuals unknowingly use radioactive materials, which shows the importance of raising awareness and accessible detection methods. This study examined three detection techniques: cloud chambers, ionisation chambers and Geiger Muller counters meanwhile emphasising their affordability and accessibility within Sri Lanka. Conventional instruments are often expensive and unavailable; therefore, this research focused on developing qualitative and quantitative radiation detection methods using locally obtainable materials. The constructed devices were applied to detect radioactivity in gas mantles and tungsten electrodes. The particle tracks were successfully visualised in the cloud chamber, while the Geiger Muller counter provided audible pulses to detect radioactive particles. These detections were later turned into counts per minute as measurable outputs. Background radiation was recorded at 3 counts in 10 min, which was increased to 48 counts when exposed to gas mantle ash, confirming its high radioactivity. The findings demonstrate simple, low-cost devices which can effectively detect radiation, providing practical tools for education and research, and encourage to explore fundamental aspects of nuclear, particle physics and subatomic world.

Keywords: Adiabatic cooling, Cloud chamber, Geiger counter, Radioactivity, Thoriated tungsten.