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Efficiency calibration of the laboratory based gamma-ray detector for various sample geometries

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Radioactivity has been present on earth since its formation and is part of the environment we live in. Humans are exposed every day to radioactivity through the radioactive elements that occur naturally in the environment. Radionuclides are found naturally in air, water, soil, plants and inside our bodies. The radionuclides we encounter in the environment can be classified into the following three categories; primordial, cosmogenic and anthropogenic (Knoll, 2010). In the study radiometric measurements using various sample containers/holders are performed. Available sample holders under study are marinelli beaker, cylinder (pill bottle) and point source. The gamma-ray spectrometry method is the tool used to analyse samples. For absolute photo peak efficiency measurements IAEA reference material RGU-1, RGT-1 and potassium chloride powder were prepared for 100 ml pill bottles and the Marinelli beakers (1L) then each measured in HPGe detector for a day. Additionally, certified reference point sources bought from NMISA were also measured. From the known activities of the point sources and the prepared volume sources, photopeak efficiency was calculated and efficiency parameters for these geometries were obtained. The experimentally determined efficiency parameter of various geometries, will therefore be compared with simulated results of similar setups. For this contribution, the efficiency of the detector as function of gamma-ray energy in various measuring geometries will be discussed.

Apply to be considered for a student award (Yes / No)?

Yes

Level for award (Hons, MSc, PhD, N/A)?

MSc

Main supervisor (name and email) and his / her institution

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Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

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