

Sittipong Polthum 2011: Quantitative Measurement of Specific Activities of ^{232}Th , ^{238}U and ^{40}K in Rock Phosphate, Phosphate Fertilizer and Phosphogypsum Sample with a High Purity Germanium Gamma Ray Detector. Master of Science (Physics), Major Field: Physics, Department of Physics. Thesis Advisor: Assistant Professor Teerasak Veerapasong, D.Eng. 106 pages.

This research aims to measure specific activities of primordial radionuclides, i.e., ^{232}Th , ^{238}U and ^{40}K in the rock phosphate, phosphate fertilizer and phosphogypsum samples imported from abroad by using a high – purity germanium (HPGe) detector and a gamma spectrometry analysis system. The radium equivalent activities (Ra_{eq}), external hazard index (H_{ex}), gamma hazard index (I_γ), adsorbed dose rate (D) and annual effective dose (E) were also calculated. The results showed that the specific activities of the three radionuclides ^{232}Th , ^{238}U and ^{40}K in rock phosphate samples range from 12.30 ± 1.81 to 138.35 ± 1.96 Bq/kg, 284.09 ± 3.77 to $3,511.07 \pm 11.64$ Bq/kg and 426.46 ± 16.10 to 474.43 ± 18.74 Bq/kg, respectively. In phosphate fertilizer samples range from 4.64 ± 0.72 to 38.01 ± 1.81 Bq/kg, 16.25 ± 1.47 to $2,085.85 \pm 9.58$ Bq/kg and 373.36 ± 11.67 to 635.81 ± 14.98 Bq/kg, respectively. In the phosphogypsum PG1 sample was found to be 15.93 ± 1.53 Bq/kg, $1,686.43 \pm 9.01$ Bq/kg and 499.99 ± 16.32 Bq/kg, respectively. In the phosphogypsum PG2 sample was found to be 10.96 ± 1.35 Bq/kg, $1,354.45 \pm 7.99$ Bq/kg and 483.60 ± 15.92 Bq/kg, respectively. Moreover, the rock phosphate RP1 had the maximum values of Ra_{eq} , H_{ex} , I_γ , D and E as 3,563.42 Bq/kg, 9.63, 23.83, 1,533.40 nGy/h and 1.88 mSv/y, respectively, which those values were greater than the safety limit set by UNSCEAR.

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