

Evaluation of ^{40}K , ^{238}U AND ^{232}Th in Selected Cosmetics Using Gamma Ray Spectroscopy

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Abstract

Activity concentrations of Potassium-40 (^{40}K), Thorium-232 (^{232}Th) and Uranium-238 (^{238}U) in most cosmetics used by consumers are not known. Some consumers of these products may have suffered unexplained radiation-related diseases due to ignorance. This study is aimed at evaluating activity concentrations of naturally-occurring radionuclide (^{40}K , ^{232}Th and ^{238}U) in some commercially-available cosmetics. Twenty six different samples of six classes of cosmetics comprising Nail polish (Np), Lipstick (Lt), Eye-shadow (Es), Perfume (Pf), Body spray (Bs) and Powder (Pd) bought from three popular markets in Lagos State Nigeria, were evaluated for the activity concentrations of these radio-nuclides of interest using a gamma spectroscopy set-up. The results showed the activity concentrations in the samples to range from 19.54 ± 1.36 to $1462\pm 9.00\text{Bq/Kg}$, 0.50 ± 0.04 to $9.94\pm 0.69\text{Bq/Kg}$ and 0.94 ± 0.16 to $12.61\pm 1.99\text{Bq/Kg}$ respectively for ^{40}K , ^{232}Th and ^{238}U . Potassium-40 had the highest activity concentrations in all the samples; its concentration exceeding the international threshold of 400Bq/kg in some of the samples that were analysed. The mean annual effective dose computed for all the sampled cosmetics were well below the recommended radiological limit to both the eye and skin.

Keywords: Radionuclides, Uranium, Thorium, Potassium, Ionizing Radiation, Effective dose.

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