Radioactivity in Products Derived from Gypsum in Tanzania

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Abstract
Scientific investigations have long concluded that prolonged exposure to low dose radiation can induce deleterious effects in humans. The aim of this paper is to investigate the radioactivity of gypsum and gypsum derived products as part of a bigger project aimed at establishing radiation levels in materials or/and products suspected to have natural radioactivity radiation risk in Tanzania. In response to the concern expressed by the users of chalk sticks in some schools in Arusha municipality, it was found necessary to establish levels of radioactivity in this product and associated radiation risk. Natural radioactivity content was determined in chalk dust, natural gypsum and normal background soil using a hyper pure germanium spectrometer (HPGe). The soil measurements were used as control. Results have shown that the concentration of 226Ra and 228Ra nuclides found in chalk dust were 24.25 Bq.kg-1 and 22.86 Bq.kg-1, respectively. These levels were lower or comparable to the corresponding 34.2 Bq.kg-1 and 21.5 Bq.kg-1, respectively, found in soil. However, the radioactivity levels found in the chalk dust were five times higher than that found in the gypsum 5 Bq.kg-1 for 226Ra and 4 Bq.kg-1 for 228Ra. These values compare well with the value recorded for natural gypsum in Denmark of 7 Bq.kg-1 for 226Ra and 4 Bq.kg-1 for 228Ra by UNSCEAR. The calculated external (0.21) and internal (0.31) hazard indices due to radioactivity in chalk dust were respectively, lower than (0.26 and 0.35) hazard indices calculated for normal background soil. In both cases, the hazard indices were lower than the acceptable limits ((1) recommended for building materials. This study has shown that natural gypsum and gypsum derived products have traces of radioactivity. However, the associated levels are not detrimental to health.