

Evaluation of Radioactivity Concentration of some selected Mineral Rocks From Mayo-Belwa Local Government Area of Adamawa State, Nigeria

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Abstract

Radiation from natural sources is constantly present around people and their surroundings. Natural Occurring Radioactive Materials (NORM) present in rock, soil and underground water are the major sources of this radiation. In this study, radioactivity concentration of ²³⁸U, ²³²Th, and ⁴⁰K from Ten (10) different Granite (GN), Gneiss (GS), and Migmatite (MG) rocks samples obtained from Mayo Belwa Local Government Area of Adamawa State were evaluated using a well calibrated and shielded Canberra 3 x 3 inch NaI(Tl) detector at the National Institute of Radiation Protection and Research (NIRPR), University of Ibadan. Rock samples were cleaned, pulverised and placed in the detector for counting, and based on standard expressions, the radionuclide content of the granite rock samples were evaluated. The result shows that the activity concentration of ²³⁸U, ²³²Th, and ⁴⁰K in GN samples varies from 62.44 – 117.67 Bq/kg, 76.59 – 165.58 Bq/kg, and 688.03 – 1472.42 Bq/kg with corresponding mean of 74.59 ± 3.12, 104.41 ± 3.12, and 950.16 ± 3.12 Bq/kg. Activity concentration of ²³⁸U, ²³²Th, and ⁴⁰K in GS samples ranges from 19.23 – 36.49 Bq/kg, 29.06 – 49.42 Bq/kg, and 310 – 924.21 Bq/kg with corresponding mean of 28.1 ± 5.36 Bq/kg, 38.92 ± 6.38 Bq/kg, and 664.21 ± 178.14 Bq/kg. Activity concentration of ²³⁸U, ²³²Th, and ⁴⁰K in MG samples ranges from 32.11 – 74.73 Bq/kg, 40.79 – 105.87 Bq/kg, and 453.34 – 1040.77 Bq/kg with corresponding mean of 50.19 ± 14.35 Bq/kg, 60.50 ± 19.96 Bq/kg, and 714.88 ± 200.37 Bq/kg. The mean activity from this study are higher than the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) global mean of ²³⁸U (32 Bq/kg), ²³²Th (45 Bq/kg), and ⁴⁰K (420 Bq/kg) in soil and rock samples except for ²³⁸U and ²³²Th in GS samples which are lower than the recommended standards. The results signifies that usage of such rocks as building construction raw materials might pose radiological hazards in the long run. Therefore, mineral content of the rock responsible for the high radionuclide concentration should be investigated.

Keywords: Natural Occurring Radioactive Materials, Radioactivity Concentration, Mineral Rocks, Granite, Gneiss, Migmatite.

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