



Natural Radioactivity in Selected Clay, Ceramic and Granite Household Items

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Abstract: The natural radioactivity of different types of Household Items of clay, ceramic and granite were studied using gamma-ray spectroscopy (GRS). The gamma-ray activities emitted from the radioisotopes of ⁴⁰K, ²²⁶Ra and ²³²Th were measured at the gamma-ray spectrometer facility of the Energy Research Center, King Fahd University of Petroleum and Minerals. The detection setup mainly consists of a 5 inch x 5 inch NaI(Tl) detector coupled to a PC-based data acquisition and analysis system. The results of the activities were then compared with the rate of similar natural radioactive isotopes from the literature for the similar objects. The lowest activities of ²²⁶Ra, ²³²Th and ⁴⁰K which were from clay non-plated and ceramic non-plated samples. The highest activities for the same isotopes were from, ceramic plated, clay plated and granite samples. It was found that the average activities of ceramic plated samples were increased by 53 to 66% compared to that of ceramic non-plated samples. On the other hand, the average activities of clay plated samples were found to be 6 to 20% increased compared to that of clay, non-plated samples. This means that there is no big increase in activities from plated versus non-plated.

The comparison of activities in three isotopes with the normal concentration literature values from some references show that activity of ⁴⁰K and ²²⁶Ra were within the range of normal concentration values whereas the activity of ²³²Th especially in granite samples was greater than normal concentration values by about 17 times. The higher activity of ²³²Th may be due to the specific nature of geological formation or origin of the materials.

Keywords: *Gamma Ray Spectroscopy, Natural Radioactivity, ⁴⁰K, ²²⁶Ra and ²³²Th, NaI(Tl) detector, Standards, clay, ceramic, granite.*

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