

GAMMA-RAY EMITTER RADIONUCLIDES IN SOILS FROM AN INSTITUTE OF TECHNOLOGY CAMPUS IN SÃO PAULO CITY

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Mankind is continuously submitted to the environmental radiation, from both artificial and natural sources. Among the natural sources, an important contribution arises from the gamma radiation emitted by radionuclides present in the soil, especially ⁴⁰K and those from the ²³⁸U and ²³²Th series. In this work, a radiological characterization of the soil from the São Paulo city campus of the Instituto Federal de Educação, Ciência e Tecnologia de São Paulo (IFSP), a federal institute of technology, was performed. At the site, 30 superficial soil samples were collected and analyzed in order to determine their pH, according to procedures adopted by EMBRAPA¹. The sampling points were chosen to be uniformly distributed, in order to be representative of different local characteristics, such as vegetation coverage and visual color and aspect of the soil. The sampling site was mapped and georeferenced, excavation of perforations with 50 cm diameter and 50 cm depth was done, and the samples were collected within a depth range of 25 – 50 cm. They were sieved with a mesh aperture of 6 mm in order to remove impurities and dried in oven. After drying, the samples were again sieved with mesh aperture 2.4 mm and the passing fraction was taken for analysis. In order to determine the contents of natural gamma-ray emitters present in the soil of the studied site, the samples were analyzed by using the technique of high-resolution gamma-ray spectrometry with highpurity germanium detectors (HPGe). The pH of the samples varied in the range from 5.56 ± 0.06 to 7.26 ± 0.05 . Activity concentrations of ²²⁶Ra, ²²⁸Ra, ²¹⁰Pb and ⁴⁰K were found in the following ranges: for ²²⁶Ra, 39.4 ± 1.2 Bq.kg⁻¹ to 47.9 ± 1.2 Bq.kg⁻¹; for ²²⁸Ra, 84.3 ± 2.4 Bq.kg⁻¹ to 127 ± 3 Bq.kg⁻¹; for ²¹⁰Pb, 47 ± 8 Bq.kg⁻¹ to 61 ± 8 Bq.kg⁻¹; for ⁴⁰K, from below 40 Bq.kg⁻¹ to 248 ± 15 Bq.kg⁻¹. Considering the entire samples set, very strong correlations of ²²⁸Ra and ⁴⁰K activity concentrations with pH were found, negative for ²²⁸Ra ($r = -0.855$) and positive for ⁴⁰K ($r = 0.845$). For ²²⁸Ra concentration, a strong negative correlation ($r = -0.614$) and for ²¹⁰Pb, a moderate negative correlation ($r = -0.345$) with pH were found. The results are in agreement with the order of magnitude of reported results from worldwide soils and could contribute as input data to the information system on environmental radioactivity established in Brazil².

REFERENCES

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