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Chemistry and Environmental Protection Division



6. simpozijum
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životne sredine
EnviroChem 2013

sa međunarodnim učešćem

6th Symposium
Chemistry and Environmental
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with international participation

KNJIGA IZVODA
BOOK OF ABSTRACTS

Vršac, Srbija
21 - 24. maj 2013.

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Contents of radionuclides in soils of urban area (Belgrade city parks)

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The paper presents the results of activity concentration (Bqkg⁻¹) determination of natural (²³⁸U, ²²⁶Ra, ²³²Th, ⁴⁰K, ²¹⁰Pb) and man-made (¹³⁷Cs) radionuclides in soils of urban area (Belgrade city parks). Main soil physical and chemical properties (pH value, particle size distribution, organic matter and carbonates percentages) were also determined. Soils that were classified as Anthrosols are characterised by a strong influence of human activities and therefore becomes the main concern due to their impact on human health and environment.

In May of 2011, soil samples were collected from four city parks: Studentski Park (SP), Botanicka Basta (BB), Zemunski Park (ZP) and Karadjordjev Park (KP). At each site, composite samples were taken mixing three subsamples from soil bellow the tree crowns and from soil of an open area not sheltered by the tree branches. Soil under the trees was sampled at each 10 cm up to 50 cm depth (except at the KP site up to 30 cm) and at an open area from the first 10 cm.

Soil samples were air – dried, sieved, packed in 500 ml Marinelli beakers and kept sealed for one month to attain radioactive equilibrium between ²³⁸U, ²³²Th and their progenies. Measurement of radionuclides activity concentration in soil samples were done by standard gamma spectrometry using HPGe detector (CANBERRA, relative efficiency 20%).

Radioisotope activities (Bqkg⁻¹) are in the range of 14-46 for ²³⁸U, 1.2-3.4 for ²³⁵U, 33-50 for ²²⁶Ra, 29-63 for ²¹⁰Pb, 28-50 for ²³²Th, 424-576 for ⁴⁰K and 0.7-36 for ¹³⁷Cs. The obtained values of radionuclides activity concentration are in agreement with the values for background gamma radiation reported in previous studies for soils in Serbia [1, 2].

Coefficient of variation of natural radionuclides content (²³⁸U, ²²⁶Ra, ²¹⁰Pb, ²³²Th and ⁴⁰K) is within experimental uncertainty of their activity determination, estimated to be 25%. At each site, ¹³⁷Cs varies significantly along the soil depth and among sites with total coefficient of variation 92%.

²³⁸U series activity ratios ²²⁶Ra/²³⁸U and ²¹⁰Pb/²²⁶Ra were calculated referred to quite immobile ²²⁶Ra nuclide that stays constant down the soil depth [2] and no important disturbances from radioactive equilibrium in soil were found [3].

At each location, for natural radionuclides (except ²¹⁰Pb) slightly higher activity concentration was noticed in the first layer of soil (0-10 cm) taken from soil of an open area compared to the same layer taken under the tree crown. This could be explained by the fact that main pathway of natural radionuclides accumulation in leaves is through resuspension from soils [1] and since tree's foliage is regularly removed from the parks, part of soil radioactivity could be lost.

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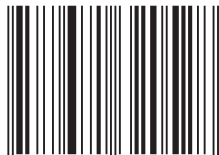


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