

⁷Be AND ¹³⁷Cs IN LICHEN AND SOIL SAMPLES

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Falling from atmosphere, radionuclides (RN) ⁷Be ($T_{1/2}=54$ d, 478 keV) and ¹³⁷Cs ($T_{1/2}=30$ y, 661 keV) make a noticeable contribution to radioactivity of Earth surface. ⁷Be is a cosmogenic RN, which is formed in upper layers of atmosphere as a result of splitting reaction of air nuclei by cosmic rays. ¹³⁷Cs is a long-lived product of nuclear fission, which enters atmosphere as a result of nuclear weapon tests and accidents in nuclear power plants. The main of its quantity fell out on the earth surface during the 60-70's of XX century and for all this time, depending from physicochemical properties of environment, it migrated both along the surface and depth to different distances. For the ⁷Be, it is obvious, that it is mainly presented in the upper soil layers of environment.

The concentrations of ¹³⁷Cs and ⁷Be in the samples of lichen, which grows on rocks and 10 mm upper soil layers selected from northwest spurs of Zarafshan ridge (surrounding of Takhtakarcha pass) were studied using scintillation γ -spectrometer (NaI(Tl) $\varnothing 63 \times 63$ mm, $\Delta E_{\gamma}/661$ keV $\approx 10\%$) in Marinelli beaker geometry (V=1 l) and volumetric standard sources – ²²⁶Ra, ²³²Th, ⁴⁰K and ¹³⁷Cs.

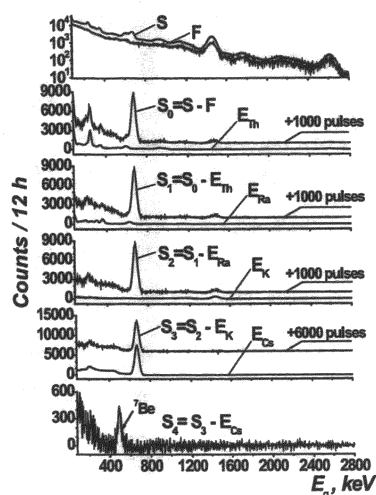


Fig.1 Spectrum – S of lichen sample and its components. Specific activities: ²²⁶Ra – 35(4) Bq/kg, ²³²Th – 58(6) Bq/kg, ⁴⁰K – 598(60) Bq/kg, ¹³⁷Cs – 486(50) Bq/kg, ⁷Be – 107(10) Bq/kg.

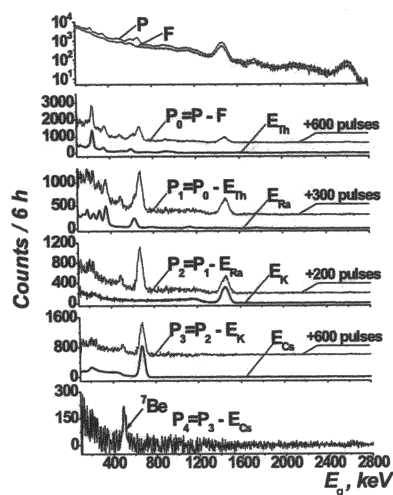


Fig.2 Spectrum – P, the sample of upper soil layer and its components. Specific activities: ²²⁶Ra – 32(4) Bq/kg, ²³²Th – 26(3) Bq/kg, ⁴⁰K – 620(65) Bq/kg, ¹³⁷Cs – 64 (7) Bq/kg, ⁷Be – 73(8) Bq/kg.

It should be noted, that for the comparable (in the range of factor ~ 2) activities of ²²⁶Ra, ²³²Th, ⁴⁰K and ⁷Be, the activity of ¹³⁷Cs in lichen ~ 7 times higher than in soil sample.

Reference

1.A.N AZIMOV, SH. KH. HUSHMURADOV, I. T. MUMINOV, T. M. MUMINOV, B. S. OSMANOV, A. N. SAFAROV, A. A. SAFAROV, Gamma spectrometric determination of natural radio nuclides and ¹³⁷Cs concentration in environmental samples. The improved Scintillation technique, Radiation measurements, 43 (2008), p 66-71.