

STUDY OF VOLUMETRIC ACTIVITY OF RADON IN AQUATIC MEDIUM BY METHOD LIQUID-SCINTILLATION SPECTROMETRY

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Currently, an indirect method of measuring the volumetric activity of Rn-222 in an aqueous medium, which is measured in liquids by depositing its daughter decay products or by bubbling liquid, is used to analyze samples of water bodies of regions with a naturally elevated level of radiation and its effect on the human body. These methods have a number of disadvantages, such as low particle detection sensitivity, since Rn-222 concentration measurements are made not on a straight line, but indirectly through the determination of the concentration of daughter elements. Measuring the volumetric activity of radon and calculating the equivalent equilibrium volumetric activity (EEVA) with model weighing coefficients consists of several stages and is carried out using solid-state standards of Ra-226, ionization chambers, semiconductor gamma spectrometers with detectors from particularly pure germanium and other devices. In this regard, the development and implementation of a new method for measuring radon in water are relevant.

This paper proposes a new method of experimental measurement of the ratios of the current activity of radon and EEVA in a liquid, based on the effect of the total alpha-beta radiation of radon decay products by liquid scintillation spectrometry - a modern highly sensitive means for measuring alpha-beta radionuclides in a liquid medium. During the study, the radon concentration in the rock sample from the uranium deposit in the Aldan region of the Republic of Sakha (Yakutia) was determined by calculating the ratio of instantaneous and equivalent equilibrium volumetric activities of radon in the water tincture of crushed uranium ore. The experiment was carried out using a scheme for the decay of Ra-226, developed at the Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University. To measure the concentration of radon and its daughter decay products, a low-phonon liquid scintillation alpha and beta spectrometer of Hidex SL-300 (Finland) was used, which allows measuring the tritium content in water up to 1 Bq/l. During the experiment, values of the activity of the daughter decay products of radon corresponding to its EEVA were obtained, taking into account the formation of α - and β -particles during the decay of the radon itself and its daughter elements, such as Po-218, Pb-214, Bi-214, Po-214, Pb-210, and using the law of radioactive decay of Rn-222.

This method of analysis of radon concentration can be used more effectively in studies of the degree of radioactivity of samples from various media compared to existing methods of measuring radon concentration, which require high time and other resource costs

The speaker is a student or young scientist

Yes

Section

1. Nuclear technology and methods in medicine, radioecology

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