STUDY OF ADSORPTION OF RADIONUCLIDES FOR TRANSFER URANIUM ISOTOPES AND FOR PRODUCTION OF HIGH PURITY AMMONIUM SALTS

Hajar Shiraliyeva Nohbala qizi,
Mirzayev Nijat Agil oglu
Junior Researchers
Institute of Radiation Problems, Ministry of Science and Education of Azerbaijan,
Baku, AZ1143, Azerbaijan
xajar05@mail.ru

Numerous scientific studies are devoted to the development of complex technologies for soil and water purification, in addition to purification processes using adsorbents. The results of researches on the study of mechanisms and processes for cleaning contaminated environmental objects from radioactive waste have been published [1, 2]. The search for possible natural sources of radionuclides, or the study and development of effective methods for cleaning environmental objects and soil areas contaminated with radioactive emissions are an urgent task of radiation safety. Pre-sterilized dishes were used for soil and water sampling, transportation and storage. Evaporation of water samples and soil extracts from laboratory heat-resistant glass beakers was carried out on laboratory heathers. The measurements of the radioactive background were carried out by "InSpector-1000" (Canberra Co.) radiometer, "Radiagem 2000" (Canberra Co.) radiometer equipped with alpha, beta, gamma, neutron detectors, “ИСП-РМ1401К-01 IP65” (Polimaster) dosimeter equipped with gamma and neutron counters and "GR-135 Plus" (Exploranium Co.) radiometer-dosimeter for isotope determination [2, 3]. Atomic absorption AA-6800 spectrometer (Shimadzu), SEM (scanning electron microscope, Carl Zeiss), X-ray fluorescence spectrometers were used to determine elements and their quantities in the mass of minerals, isolated by analytical-chemical procedures from soil and water samples. Uranium isotopes were transferred from soil samples to solutions.

The uranium isotopes activities in prepared aqueous solutions were 130, 131 and 6 Bq for U^{238} (99.24%), U^{234} (0.0054%), U^{235} (0.702%), respectively, which shows that soil samples taken from areas around springs contain uranium isotopes in similar proportions found in natural uranium deposits. The activity of U^{238} isotope (130 Bq) in water solutions after adsorption these isotopes on 100 g adsorbents used in our studies (granular elastomer DOWEX HCR S/S, activated carbon, expanded clay, pebble gravelly sand and granular anthracite masses) become 38, 65, 70, 76 and 86 Bq, respectively. The requlrities of adsorption of radionuclides on adsorbent masses from water solutions can be used for cleaning process of the drain water of the physical stage of crude oil refining.

The adsorption trend of 60 elements (Th, U, etc. radionuclides) in aqueous solutions of the salts on Dowex 50w-x8 cation-exchange and Dowex 1-x8 anion-exchange granular elastomer adsorbents were studied in order to purify the salts purchased from the commercial network to suitable purity level for low-background measurements. . The concentration of metal mixtures, as well as Th, U radionuclides in ammonium chloride and ammonium acetate salts synthesized by the developed method of production of pure substances was lower than the sensitivity of modern physico-chemical analysis methods. These salts are purer than their commercial analog. Ammonium salts for soldering of low-background measuring device schemes and for using in nuclear medicine were obtained from commercial available reagents with purification of trace amounts of radionuclides and other heavy metal mixtures by adsorption on DOWEX cation- and anion-exchange sorbents.

References

1. Y. Ji-Da, L. Hong-Shi, W. Zong-Mei, W. Xiao-Fei. Radioactivity level of the ambient environment of Anren bone-coal power station // *J. Environ. Radioactivity*. 2002, No.1, pp. 50-56.
2. Mammadov Kh. Effect of Natural Radionuclides on the Processes Occur in the Environmental Objects. Studying the Cleaning Methods of Water Contaminated with Organic Emissions and the Methods for Cleaning of Soil Contaminated with Heavy Metals and Radionuclides. International Journal of Applied Chemistry. DOI: 10.14445/23939133/IJAC-V7I1P105, 2020. V.7, No.01, pp.18-24.
3. Adsorption on the surface of a solid. Textbook /T.A.Yermakova, V.V.Akatyev, E.S.Dryuchkov and oth./, VolSU Publishing House, 2021, 32 p.