Contribution ID: **170** Type: **Poster**

Sorption of U(VI) by Submicron ZnS Particles from Aqueous Solution.

Monday, 12 May 2014 17:15 (1h 30m)

Uranium is one of the most dangerous radionuclides which makes a major contribution to the total alpha-activity of liquid nuclear wastes.
The most promising method for the extraction of radionuclides, including uranium from aqueous media is solid phase extraction. In the last time, different inorganic sorbents (including natural zeolites) having certain advantages over synthetic organic ion exchangers are widely used for the liquid nuclear wastes treatment.
Inorganic sorption materials have a high chemical and radiation stability and exhibit high selectivity for certain radionuclides which strongly depends on the pH of aqueous media. Among the inorganic sorbents considerable attention paid to the development of fine sorption materials, which open new possibilities for creating highly efficient process units. A feature of such materials is a large ratio between surface area and volume, which can significantly increase their adsorption capacity. Promising compounds that can be used to produce such materials are fine powders of divalent metal sulfides.
It is well known that functional properties of sorbents are largely determined by the size and shape of the particles as well as surface morphology.
The goal of this work was to obtain fine powders of ZnS and to study their sorption properties towards U(VI) at different pH of aqueous medium.
One of the possible ways of using zinc sulfide particles for analytical purposes is the creation on their basis of sorption-scintillator materials for the determination of low concentrations of alpha radionuclides in natural waters.
Sphalerite ZnS with the size of particles of 100-200 nm was obtained using the method of chemical deposition from thiourea solutions. Obtained powders were characterized by XRF, SEM and IR techniques. Sorptive properties of ZnS towards U(VI) at pH 2-9 were studied in batch experiments at 25 °C using the method of limited volume.The time required to establish sorption equilibrium between the solution and the sorbent was determined from the kinetic curves.It was found that sorption equilibrium in the studied system at pH 7 is established during 60-90 min. The concentration of U(VI) in solutions after sorption was determined by a luminescent method.Luminescence spectra and excitation of uranyl ions were recorded using spectrofluorimeters Avantes(Netherlands). Recovery rate of U(VI) in the range of pH 2-9 was 95-99%. Relative measurement error at a confidence level 0.95 didn't exceed 1%.
The observed sorption's features of uranyl ions by fine zinc sulfide enable to assume that for this kind of the sorbent may be different types of sorption processes.
Structure sulfide sorbents based primarily on close packing of atoms, which are almost always eliminates the formation of voids in the structure of the appropriate sorbents,than for them are less characteristic sorption acts related to the exchange and non-exchange absorption of ions in the structural voids.
High recovery rate of uranyl-ions obtained for ZnS fine powders makes possible their use for water decontamination purposes as well as for analytical concentration followed by determination of uranium radioactivity by alpha spectrometry.

Primary author: Ms RUBAILO, Anna (Yurievna)

Co-authors: Mrs KRASNOPYOROVA, Alla (Petrovna); Mr BELIKOV, Konstantin (Nikolaevich)

Presenter: Ms RUBAILO, Anna (Yurievna)

Session Classification: Poster Session - Separation Methods, Speciation

Track Classification: Separation Methods, Speciation