



Contribution ID: 247

Type: Verbal

Determination of Sorption Characteristics of Artificial Radionuclides in the Hydrosphere

Thursday, 15 May 2014 16:45 (15 minutes)

Adsorption onto solid particles plays an important role in behaviour and transport of radioactive contaminants in hydrosphere. Sorption is usually described with distribution coefficient; a ratio of radioactivity fixed on solid phase and dissolved in water in equilibrium.

In this study, distribution coefficients of sediment-water and suspended solids-water were determined using a method, developed in our laboratory.

For sorption characteristics determination, series of batch experiments were used. To prepare the experimental batch, assortment of artificial radionuclides, representing an accidental source term, was added to surface water containing suspended solids or to a mixture of sediment and water. After that, prepared test series were blended for 24 hours. Then, the solid phase was separated from the water and analysed using gamma spectrometry.

Using this method, distribution coefficients were determined for sediment-surface water and suspended solids-surface water systems, sampled along the Vltava River. This data was used for the method verifying –determination of its repeatability. The determined distribution coefficients show that most radionuclides are readily fixed on the solid phase, although moderate variations were observed among the radionuclides and the sediments. Evaluating sorption on suspended solids, slight differences were found compared to sediments, as a consequence of markedly lower solid-liquid ratio of suspended solids in the experimental mixture.

In summary, the method was developed to be able to obtain representative and comparable data on sorption characteristics of artificial radionuclides in hydrosphere. The results, show that sorption onto solid phase is an important factor influencing fate of radioactive substances in hydrosphere. Indeed, in the case of radioactive contamination of hydrosphere, we can expect a strong contamination of bottom sediments caused not only by the direct sorption but also by the sedimentation of contaminated suspended solids. On the other hand, consequently, certain decrease of radioactivity dissolved in water can be estimated.

Acknowledgement

This work was prepared with the support of the project VG20122015088 sponsored by Czech Ministry of Interior.

Primary author: Mrs JURANOVÁ, Eva (Department of Radioecology, T. G. Masaryk Water Research Institute, Public Research Institution; Faculty of Science, Institute for Environmental Studies, Charles University in Prague)

Co-author: Dr HANSLÍK, Eduard (Department of Radioecology, T. G. Masaryk Water Research Institute, Public Research Institution)

Presenter: Mrs JURANOVÁ, Eva (Department of Radioecology, T. G. Masaryk Water Research Institute, Public Research Institution; Faculty of Science, Institute for Environmental Studies, Charles University in Prague)

Session Classification: Radionuclides in the Environment, Radioecology 3

Track Classification: Radionuclides in the Environment, Radioecology