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## **INVESTIGATION OF MIGRATION FORMS OF POLLUTANTS IN THE TRANSBOUNDARY RIVERS OF CENTRAL ASIA**

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Studying of migration forms of heavy metals (HM) in the river waters was conducted by the following scheme: Neutron-activation analysis of divided fractions of separate forms of HM; experimental modeling by using of appropriate radio nuclides and thermodynamic modeling methods. There was developed and used neutron-activation method for getting quantitative data about forms of being HM in water.

The ultra-filtration and electro-dialyze fractionating and concentrating of separate forms of HM was carried out before neutron activation analyses. There were established optimal conditions of division form of being of HM by using radionuclides  $^{60}\text{Co}$ ,  $^{51}\text{Cr}$  and  $^{124}\text{Sb}$  in cationic and anionic forms. During 2003-2005 we have studied space-temporarily variations of content and phase distribution of Hg, Zn, Cd, Sb, Co, Th, Br, Cr, Au, La and Eu in the waters of Amudarya, Syrdarya and Surkhandarya rivers. Average concentration of HM fluctuates from 4,1 mg/l for Fe, till 2 ng/l for Au. Suspended composing of river waters makes from mountain rock and lands in river-heads and concentration of elements in weight form not exceeding the level of Clark's contents.

In formation of solved phase of river water main role plays atmospheric precipitation. This fact concern to the technogenic elements (Hg, Cd, Zn, Sb, Cr, Se, V) mainly. Limits of determination of HM –  $10^{-6}$ - $10^{-10}$  g/l. Relative mistake of definition of 20 HM, including Hg, Zn, Cd, Sb, Co, U, Br and Cr in the river and sewage waters makes 10-25 %.

It was established that researching elements in river waters migrates in suspended, colloid, cationic, anionic and neutral forms. Contents of colloid form of HM fluctuate between 5 % and 20 %. A comparable low content of organic matters in river waters of arid zones stipulates perceptivity of applying of thermodynamic methods in studying of being forms of HM. The thermodynamic calculations for determination being forms of HM in river waters were also carried out.

On the base of experimental data and thermodynamic modeling, it was established that in distinction of river waters of humid zones, in migrations of HM in surface water in arid zones main role plays inorganic ligands ( $\text{OH}^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ ). Received results about forms of being HM and radionuclides may be the base for developing the technology of water preparation on water-pipe stations of researched rivers, and for effective clearing water from HM and radionuclides.

In this work the contents of the different forms of heavy metals in the rivers of Uzbekistan were analyzed. The thermodynamic calculations for determination of being forms of heavy metals in river waters were carried out. Received results about forms of being HM and radionuclides can be the base for developing the technology of water preparation on water-pipe stations of researched rivers, and for effective clearing water from HM and radionuclides.

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## **ОЦЕНКА ПЕРЕНОСА ВОДОРАСТВОРИМЫХ СОЕДИНЕНИЙ В ГРУНТАХ СЕЗОННОГО ПРОМЕРЗАНИЯ**

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Оценка и последующее регулирование переноса техногенных загрязнителей в окружающей среде, противодействие морозному разрушению дорожных покрытий и деформации оснований инженерных сооружений должны проводиться на основе комплексного исследования и моделирования взаимосвязанных процессов переноса тепла, влаги, солей и пучения в мерзлых породах. Учитывая сложность этих процессов, а также технические трудности, связанные с проведением непосредственных исследований указанных объектов, одним из наиболее эффективных методов исследования этой проблемы является компьютерное моделирование, которое основывается на физико-математическом описании механизмов, обуславливающих эти процессы и оценке факторов, влияющих на их интенсивность.

В основу компьютерного моделирования положена математическая модель взаимосвязанных процессов тепло- и массопереноса и деформации скелета мерзлой породы в виде системы дифференциальных уравнений. Согласно этой модели плотность потока водорастворимых определяется двумя различными механизмами: кон-