COMPARISON OF SORPTION BEHAVIOR OF URANIUM AND AMERICIUM ON POLYMINERAL AND BENTONITE CLAYS

Bomchuk A.Yu., Zharkova V.O.

A.N. Frumkin Institute of Physical Chemistry and Electrochemistry, RAS,
Leninskiy prospekt 31, 4, Moscow, 119071, Russia,
e-mail: bomchuk.a@gmail.com

Most concepts for safe disposal of radioactive waste involves application of clay materials in a construction of protective barriers.[1] The bentonite clay is usually applied at a final isolation of high-level waste and spent nuclear fuel.[2] In case of near surface disposal facilities for intermediate level and low-level waste the kaolinite-montmorillonite clay mix is used.[3] The montmorillonite(30–35%)-kaolinite(20–25%)-illite(10–15%) polymineral clay of the Biklyanskoe deposit is the analogue of widely used clay mixes. In the present work the sorption behavior of U-233 and Am-241 on this polymineral clay was studied and compared with the bentonite clay of the Dinozavrovoe deposit, containing about 80% of montmorillonite.

It was found that distribution coefficients (K_d) for ^{233}U in the pH range 4–9 on the clay of the Biklyanskoe deposit was several times higher than K_d values obtained on the bentonite. The highest extent of sorption (≤98%) was observed in the pH range 5–7 in case of both studied clays.

The distribution coefficient value for ^{233}U at pH 8 on the polymineral clay was an order of magnitude more than the one obtained on the bentonite when the both clay samples were pre-rinsed with a modeling water.

Americium sorption on the studied clay of the Biklyanskoe deposit was marginally lower than on bentonite clay of the Dinozavrovoe deposit. However, the both clays provide high americium uptake from liquid phase (≤98%) at pH values greater than 3. The values of sorption for ^{241}Am at pH 8 were the same for clay mix and bentonite clay when the clay samples were pre-rinsed with a modeling water.

References

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