

Comparison of three different sorbents for uranium retention from a source water.

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A source water from Suceava County with a total salt concentration of 493.5 mg/L was analysed, mainly because of the high content of uranium ($5.6 \text{ mg/L UO}_2^{2+}$) in the geological formations where it is coming from. In order to reduce the uranium concentration down to 0.1 mg/L, a natural Callovo-Oxfordian clay, a nano-ETS-10 synthetic titanosilicate and *Azolla caroliniana* Willd. (Pteridophyta) bioaccumulator.

All investigated sorbents were able to decrease the uranium concentration down to the accepted limit. Nevertheless, the price of the sorbents themselves is variable, as well as the price of the considered technological approach. It can be observed that after only 15 min in the sorption system ETS-10 - source water, the final concentration decrease down to the accepted standard for health. For the natural clay, the depollution performance was better, but only after 30 min contact time. For both inorganic ion exchangers the process is temperature independent, the optimum pH is slightly acid and the necessary amount of sorbent of about 1-1.2 mg/mL. This is a disadvantage in the case of the synthetic titanosilicate, which is relatively expensive.

Even if the required contact time in the case of the used biosorption process is of one hour, the performance of the biosorption is the best one and the optimal weight of sorbent is only 0.25 mg/mL water. The process is slightly temperature dependent, proving the endothermic nature of the biosorption process. A thermodynamic evaluation of the data shows an endothermic heat of sorption and negative free energy values, indicating that the uranyl ions are preferred in the biosorbent solid phase.