USING OF COMPOSITE NANOSCALE MATERIALS BASED ON ALUMINUM OXIDE FOR WASTEWATER TREATMENT OF URANIUM

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All present environmental pollution by radioactive ions derived from the processing of uranium or leakage of nuclear reactors, represent a serious threat to health man. Radioactive substances can leach into groundwater and contaminate drinking-water supplies areas of high population density. Key approach in the development of technologies for the removal of radioactive ions from the environment - mainly from wastewater and their subsequent safe liquidation - is the invention of materials which can absorb radioactive ions from wastewater, and to do so selectively irrecoverable efficiently and in large. Key approach in the development of technologies for the removal of radioactive ions from the environment - mainly from wastewater and their subsequent safe liquidation - is the invention of materials which can absorb radioactive ions from wastewater, and to do so selectively irrecoverable efficiently and in large quantities. Are widely used sorption methods of water purification from transuranic elements quantities. Are widely used sorption methods of water purification from transuranic elements. This methods allow you to clean waste water to the desired level of activity. Enormity of the task at elimination of the effects of pollution and prevent further contamination requires adequate efforts to develop sorbent materials and technologies for their use. In specifically, sorbents should be cheap and mass, and compact residue containing radionuclides, should be comfortable for long-term storage, treatment or disposal. In recent years in many developing countries is widely research to develop a new class of sorbents, consisting of biogenic substances (biosorbents). For example, they are produced from microbial mass or fungi, which are waste microbiological industry [3]. Furthermore, it is known titanium oxide nanoparticles are good sorbents uranium from aqueous solutions [1]. But titanium is quite expensive metal, which complicates the use of sorbents based on it on a massive scale.

In this work, the goal was set: the development and study of composite material based onmolds and aluminum oxide nanoparticles for industrial wastewater from radioactive contaminants. As sorbents nanoparticles alumina (AlOOH) have been chosen. Furthermore, it is known that fungi have the ability to absorb and accumulate intracellularly and radioactive heavy metals that provide additional adsorption of radioactive materials from contaminated media. In biosorbent was selected as mold fungi Aspergillus niger [2]. The study of the sorption of uranium was performed under static conditions at room temperature. Measuring the mass concentration of uranium in solution before and during the sorption were performed luminescence method for fluid analyzer "Fluorat-02-2M", according PNDF 14.1:2:4.38 - 95 [5]. Studies have shown the benefit of using composite materials based on fungi and alumina nanoparticles.

Table

Sorption characteristics of materials

Sorbent	The initial concentration of uranium, mkg/l	The final concentration of uranium, mkg/l	Sorption degree, %
TiO2	1200		62 [1]
Aspergillus niger	2325	1152	50
A. niger@AlOOH	2325	420	80

The Table shows that the degree of adsorption of composite materials is 80%. This material significantly outperforms the sorptive capacity of titanium oxide nanoparticles (62%) [1]. moreover nanopowder alumina cheap, easy to make. As a conclusion it can be noted that the obtained composite material based on molds and aluminum oxide nanoparticles is a promising sorbent for water purification from radioactive contamination.

References

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