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METHODS FOR RECYCLING OF SOLID PRECIPITATE

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Silt (pulp) is dense, water-insoluble component, which is deposited on the bottom of the tank and forms a thick layer with variable consistency. Exactly pulp is the most complex substance for recycling and disposal. The complexity is that it is difficult to dissolve because it consists from Al and SiO_2 .The pulp recycling is necessary for the safe liquid high-level radioactive waste storage.
There are three kinds of pulp layer: the upper movable layer; intermediate layer of an inactive (plastic) the pulp. Hydroaluminate solid precipitate is a key pulp's component. There are some kinds of the pulp's recycling: traditional method and method which is based on the cavitation-activated water.
The first is traditional pulp recycling method.

This includes three experimens. At the end of each experiment, the residue of the solid phase was dissolved in concentrated nitric acid. Acid contained 10 g/l of ammonium fluoride and 10 g/l of hydrogen peroxide at a temperature of 95 C. Then the solution was intensively mixed with the compressed air. The experiments were carried out alternately: at the conclusion of the first experiment there immediately was started the next one. Such experiments sequence was allowed to do the correct pulp's processing modes in the subsequent experiments.

In the first experiment the pulp was processed with a concentrated nitric acid solution. Acid contained 10 g/l of ammonium fluoride and 10 g/l of hydrogen peroxide.

In the second experiment the pulp was processed with the solution, which contained 200 g/l of sodium hydroxide.

In the third experiment for the destruction of the structure of the porous layer of the solid phase and its dissolution it was alternatingly processed with a solution,

which contained 100 g/l of sodium hydroxide and the solution containing 40 g/l of nitric acid and 20 % of the caprolactam waste production.

The first experiment results has shown that the concentrated solution of nitric acid can effectively destroy the structure of hydroaluminate solid precipitate.

The second experiment has shown that the solution, which contained 200 g/l sodium hydroxide and concentrated nitric acid, can destroy a structure of pulp at a temperature of 80-90 C.

On the basis of the laboratory research the pulp was undergoing the intensive stirring procedure for at least 24 hours, first at a temperature of 80-90 C with the solution 80-100 g/l sodium hydroxide, and then with the solution, that contained 40 g/l nitric acid and 20 % of caprolactam waste production .

It is proved that completely dissolve the pulp's hard soluble layer is impossible, because the application of hot concentrated solutions of sodium hydroxide and nitric acid is inadmissible in containers-storage.

Solid phase solutions extraction and dissolution based on the cavitation-activated water.

An alternative solution of the above mentioned problem, which is connected with the solids processing is the use of cavitation effects- cavitation technology. Cavitation pressure pulses due to the collapse of bubbles in the spherical shock waves form cause an irregular chaotic microparticles movement which precedes their destruction. The intensity of the dispersion is determined by the intensity of the cavitation pulse pressure, the microexplosions in the process of microparticles bubble cavitation collapse. The smaller particles leave the microparticles external surface. This adds to their initial asymmetry and accelerates the process of destruction: there are formed new free surfaces. Loose particles are also subject to destruction in accordance with the described mechanism. The degree of grinding is determined by the value of energy which is released during the bubbles collapse. Solid precipitation mixture (Hydroaluminate solid precipitate+ SiO_2) was used for the experiment. There were taken two volume parts of about 3 ml.. The first was diluted with 50 ml of pure water, the second with -50 ml of cavitation-activated water. The pulp was treated without heating (t = 22 °C) with vigorous stirring using compressed air for 6 h followed by pulp's standing for 18 h.

Comparison

The first experiment has shown the following - there were dissolved in the nitric acid solution 51.1% mass of aluminium and only 1.1 % of the silicon dioxide mass.

The second experiment has shown the following - 69.6% mass of aluminum and 30.1 % silicon dioxide were dissolved.

In the third experiment there are the results: 35,2% mass of aluminium and 34,4 % of the silicon dioxide mass.

The last experiment shows the results: 56,03 % of Al and 60,72 % of SiO_2

The experiments have shown that the cavitation-activated water application for the pulp's solid phase erosion and dissolution can improve the efficiency of processing high-level waste and release of containers for storage of accumulated precipi-

tation without an increase in concentrations of chemical reagents and temperature rise, which in its turn reduces the corrosion load.

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DEVELOPMENT OF SOLAR PHOTOVOLTAIC ENERGETICS IN RUSSIA

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The paper considers the photovoltaics system (PV) that covers the conversion of light into electricity using semiconducting materials which exhibit the photovoltaic effect. A typical photovoltaic system employs solar panels, each comprising a number of solar cells, which generate electrical power. Some Russian regions have the number of sunny hours per year more than 2000. It's a great result in terms of solar energy.

The main advantage of non-traditional renewable energy resources (RES) before other energy sources is their revolving nature and ecological purity. Renewable energy sources constantly exist or periodically arise in the environment energy flows. RES can be classified by types of energy:

1. Mechanical energy (wind and hydro streams energy);
2. Thermal and radiation energy (solar rays energy and Earth heat energy);
3. Chemical energy (biomass energy).

Solar radiation – is the corpuscular and electromagnetic radiation of the Sun. Solar energy is the most famous sphere of the development of alternative energy. There is a simple explanation: on the one hand-the inexhaustible solar energy, on another – almost complete security to the environment, because we do not use gas of coal like in thermal power or damage to the hydrosphere like in hydropower electric which is also an important reason. Solar energy is impressive: there are thermonuclear reactions on the Sun which convert 400 billion kg hydrogen into helium. This conversion gives energy which is radiating by the Sun into space in the form of electromagnetic waves of various lengths. A year on Earth $1.05 \cdot 10^{18}$ kW·h of solar energy comes to. Without prejudice to the environment, we can use used 1.5% of the total coming on the ground solar energy, that mean $1.62 \cdot 10^{16}$ kW·h every year. For ex-