TITANIUM WASTEWATER SLUDGE PROCESSING

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Industrial titanium wastewater sludge are formed by manufacturing processing methods of raw materials and titanium etching and alloys. These sludges can be processed and produced marketable products. It is showed to receive the technology of titanium sludge processing.

At present titanium details for Boeing and Airbus, components of aircraft engines [1], satellite communications, intercontinental missiles and submarines, elements of race cars "Formula One", implants and others are produced in the Urals.

Almost all manufacturing processing methods of raw materials (carnallite, loparite, pyrochlore and other minerals), are accompanied by the chlorine, hydrogen chloride, phosgene, carbon monoxide, carbon dioxide and other harmful contaminations emissions into the environment. One of the major gases purification stage is conducted in bubbling washer using liquid water or lime milk suspension scrubbing.

The dissolution of chlorine gas forming hypochloric and hydrochloric acids results from water gas stream flow irrigation. Absorption of contaminations occurs with the formation of hypochlorite and chlorite calcium and calcium chlorate, when liquid lime milk suspension scrubbing is used.

In order to maintain high sorption properties of the liquid scrubbing, part of it is replaced by a proper amount of fresh water or lime milk. It results in industrial sewage containing hydrochloric acid, suspended solids, and metals.

The solutions based on sulfuric acid or sulfuric and fluohydric acids or fluohydric acid salts are used for titanium etching and alloys. When etching titanium half-blank, waste etching solutions (WES) and waste alkaline melts (WAM) are formed.

Discharging a large number of WES in reservoirs and exporting of WAM in the city landfill site is materially prejudicial to natural environment, causing poisonous reservoirs, increased salinity in surface and groundwater, salinization and alkalization of soils adjacent to water bodies.

The industrial sewage sludge from one of the Urals plants was studied in the research.

Studies conducted at the Department of Water Resources and Technology UrFU showed that the total content of titanium in the sludge solid phase is 7%. Sludge is the secondary material resource.

The aim of the research is to develop a science-based technology for processing titanium sewage sludge into marketable products that could prevent landfilling and reduce the negative impact of titanium plants on the environment.

Scientific novelty is supposed to receive the following:

1) Regularity of titanium sludge dewatering.

2) Regularity of thermal and chemical sludge treatment.

3) The technology of titanium sludge processing in marketable coagulate.

Sludge treatment technology includes dewatering stages and special chemical treatment. Dewatering sludge process is needed to reduce energy costs in their subsequent chemical treatment.

When conducting research it is planned to test experimentally gravity thickening, pressure filtration, vacuum and centrifugation techniques for sludge dewatering.

Burning techniques for dewatered sludge followed by specific treatment of the resulting products are expected to be employed for marketable products.

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СИНТЕЗ ОБРАЗЦОВ СРАВНЕНИЯ ОКСИДА СКАНДИЯ МЕТОДОМ ВЫСОКОТЕМПЕРАТУРНОГО СПЛАВЛЕНИЯ С ЛИТИЙ-БОРАТНЫМ ФЛЮСОМ

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DEVELOPMENT OF SCANDIUM OXIDE REFERENCE MATERIALS BY HIGH-TEMPRETURE MELTING WITH LITHIUM-BORATE FLUX

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To develop homogeneous reference materials (RMs) the conditions of analytes melting with lithium-borate flux were found. Interim concentrated powder mixtures of analytes were prepared from glass beads. The set of RMs for XRF scandium oxide analysis was synthesized using an electric fluxer.

Сырьем для получения металлического скандия является его оксид, он же определяет чистоту конечного продукта. Ввиду перехода примесных компонентов в ходе технологического процесса в чистый металл особенно важно производить контроль состава оксида скандия, содержание примесей в котором составляет от $3\cdot10^{-4}$ до $5\cdot10^{-2}$ мас. %.

Химический анализ оксида скандия решено проводить методом волнодисперсионной рентгенофлуоресцентной спектрометрии, выбор которого обусловлен его экспрессностью, простотой исполнения и высокой точностью анализа. Образцы сравнения для корректного анализа оксида скандия методом РФА должны обладать высокой гомогенностью. По этой причине в качестве способа