Contribution ID: **71** Type: **Poster**

METHOD OF LIQUID RADIOACTIVE WASTE AND CONCENTRATES PURIFICATION FROM ORGANIC IMPURITIES BY MEANS OF ACTIVATED PYROLUSITE

Thursday 26 May 2016 15:00 (3 hours)

The final stage of any method of liquid radioactive waste and concentrates conditioning is always recycled waste curing. Currently, the most commonly used methods of waste curing are: cementation, vitrification, and creation of ceramic-concrete matrices [1]. It is important to remove water from the cured product. However, it is impossible to completely remove water from the cement and ceramic matrices. Water contained in the concrete can be either in bound or free state. Free water contained in the concrete pores and interstices evaporates relatively quickly with temperature increase and concrete aging.

As a result of hydrolysis of bound water, embrittlement of cement matrix occurs [2].

In case of a sealed container with a cement compound, gaseous products of radiolysis are accumulated and pressure increases. Cases of the container depressurization and destruction of the cement stone due to the excessive pressure of gaseous products (H2, H2O2) were observed [3].

Due to the damaging effects of radiolysis on cemented and vitrified waste, the new methods of waste solidification are currently developed. Russian researchers and their foreign colleagues are developing new ceramic-concrete matrices [4].

The use of magnesium-potassium phosphate matrix (MPP) requires maximum initial waste dewatering. As opposed to chemically bound water, which can be driven off to some extent by heating of the compound, the organic impurities in the waste cannot be distilled this way. Therefore, their preliminary chemical decomposition is necessary.

Alternatively to the above methods, the use of activated pyrolusite as inorganic sorbent is considered in this paper. Activation means creation of Mn6+ surface layer from MnO2. Method proposed by the authors is the sorption of organic impurities from the liquid radioactive concentrate by activated pyrolusite followed by evaporation of the resulting slurry to dryness.

The studies showed that soaps (sodium oleates, stearate, and palmitates) were most effectively adsorbed by activated pyrolusite from the anionic surfactants. It should be noted that in the experiments with a series of detergent solutions, catalytic decomposition of anionic surfactants by activated pyrolusite to oxides constituting the organic molecule elements, namely: SO2, CO2, and H2O, was recorded [5].

The following conclusions can be drawn from the obtained data:

-method of liquid radioactive waste and concentrates purification from organic impurities by means of activated pyrolusite was proposed;

-the method is applicable for the immobilization of liquid radioactive waste and concentrates with 60 - 150 g / L or higher concentration of organic impurities;

-when heated, activated pyrolusite acts as a catalyst for decomposition of organic impurities to the oxides of the constituent elements (CO2, SO2, and H2O). In this regard, sorbent separation from the solution is not needed, this greatly simplifying the process of liquid radioactive waste purification;

-the method doesn‘t require to include into the flow sheet filtering materials and components that need further processing;

-the use of the activated pyrolusite allows to immobilize waste sorbent with salt slurry in any matrix for the long-term storage of solidified radioactive waste.

Country or International Organization

Russia

Type ”YES” to confirm submission of required
 Forms A and B via the official channels

Yes

Author: Ms LEGKIKH, Christina (JSC "SSC RF –IPPE")

Co-author: Mr SMYKOV, Vladimir (JSC "SSC RF –IPPE")

Presenter: Ms LEGKIKH, Christina (JSC "SSC RF –IPPE")

Session Classification: Young Professional Session - Poster

Track Classification: Young Generation