

**MIXED WASTE: THE TREATMENT OF ORGANIC RADIOACTIVE WASTE  
BY MEANS OF ADSORBENTS**

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The work described in this paper has been carried in the radioactive waste treatment facilities of the Nuclear Research Center Lo Aguirre, CEN LA, which are operated by Radioactive Waste Management Unit, UGDR. This last, centralizes its activities in order to manage all radioactive waste generated in the country due to the nuclear development.

Features of danger and risks presented by organic radioactive liquid waste, make the need to develop a practicable alternative for its treatment and to allow the conditioning towards a suitable final disposal

The raw material for this work, is an organic liquid waste arising from scintillation techniques, contaminated with Tritium. This mixed waste has to be treated and then conditioned in a solid form within a 200 l container, according with actual acceptance criteria for our temporary store for radioactive waste.

The best formulation which allows to immobilize the liquid waste was determined. The first step consists in the adsorption treatment that waste is humbled. From the available adsorbents, two types were studied: adsorption granulat and diatomaceous earth. From the waste management standpoint, results with diatomaceous earth present physical characteristics better than the other. Following, the second stage is the immobilization, which is achieved in a cement matrix made with puzzolanic cement (Polpaico 400) made in Chile.

Later, due to cost and availability in the country, the diatomaceous earth is selected for the study, in the form of celite which is comparatively economic. The best mixture, with regard to physical feature, has the following composition: a 0.35 (w/w) water/cement ratio, which represents the needed quantity to obtain workability in the mixture, and it is the minimum amount of water to hydrating the cement; a waste/adsorbent ratio of 0.5 (v/v), in which the organic liquid is completely adsorbed and it is incorporated into the crystalline system of the solid form; and an adsorbed waste/cement ratio of 0.8 (w/w). In this mixture, quantity of cement is the minimum required to obtain a solid product with the due mechanical feature which stands the compression resistance desired.

Setting time is about 8 hours. Samples are tested, at 7, 14, 21 and 28 days since they were prepared to evaluate compression resistance, obtaining the minimum desired at 14 days aged with

a 52 kg/cm<sup>2</sup>, which increase to 28 days. Weight composition of the final mixture is a 22.9% organic waste, 46.5 % cement, 14.3 % celite, and a 16.3 % water. A real scale (200 l standard drum) was prepared to study features in Plant, also.

As a conclusion, it is shown that it is possible to treat the radioactive organic liquid, to obtain a solid product that complies with qualitative and quantitative physical parameters required to disposed of. Performance at real scale is simple and results are better than those in lab scal, reaching at 14 days aged a compression resistance upper than 100 kg/ cm<sup>2</sup>. Research is followed to determine the leach test, the radiation effect and thermal cycle stability in samples.