

Preliminary Assessment of Elastomer and Bitumen Processing Assisted by Microwave Energy for Immobilization of Radioactive Waste

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The present work shows the preliminary study of the EVA (production leftovers) and bitumen processing assisted by microwave device (2450MHz, by IPEN-CNEN/SP), to manufacture matrices for future embedding of radioactive waste. The purpose was to improve their chemical and physical properties and then reduce any possible dispersion of the waste in the environment during the stages of intermediate storage, transportation and final disposal. Bitumen and EVA (figure 1), 30g up to 110g; blend of bitumen/EVA 50wt% up to 85wt% of bitumen and 15wt% up to 50wt% of EVA.

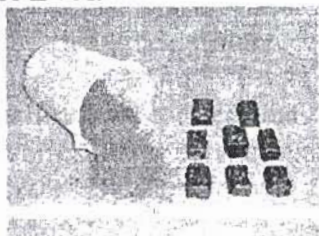


Figure 1 - Samples of EVA and bitumen, no irradiated.

The irradiation of the samples (50g up to 110g of each compound and a blend of bitumen/EVA) were carried out for 1min up to 10min, with 1kW, 2kW and 3kW (temperature monitoring by using a thermocouple). Then they were collected and conformed in small cans (figure 2).

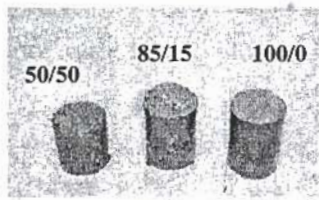


Figure 2 - Bitumen wt%/EVA wt% matrices, after irradiation.

This is a safe method for processing this kind of blend, because the flash point of bitumen is about 300°C and this value was not reached for these samples. Concerning the homogeneity (tests carried out without the radioactive waste, that will be added in the best matrix composition next stage), the best results obtained were for the composition of 85wt% bitumen/15wt% EVA by using 3000W microwave power for 5min. The possibility of incorporating the radioactive waste in the matrix processing assisted by microwave for its immobilization will be analyzed as well as the characterization results. This technology provides a rapid and selective heating and environmentally clean process with low pollutant emission.

[1] M.F.R. Guzella; T.V. Silva, in Proceedings of WM'01 Conference, Tucson, 2001.

[2] D.E. Clark; D.C. Folz; J.K. West. Materials Science and Engineering A. 287(2) (2000) 153.

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