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Application of microwave heating to study the radioactive waste immobilization by using bitumen/rubber polymeric matrices

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The purpose of the present paper is to show the immobilization feasibility of low and intermediate level radioactive waste, by using asphaltic/elastomeric matrices compounded by bitumen and rubber processed by microwave energy. During that process, the electromagnetic spectrum energy is evenly dispersed throughout all areas of the sample and its molecules oscillate generating heat. In this work the bitumen was reinforced with production leftovers of ethylene vinyl acetate (EVA) for incorporation of radioactive waste such as spent ion exchange resins. The samples of bitumen and rubber (EVA) were irradiated at IPEN-CNEN/SP in a microwave device (2450MHz/1000W). In order to get the most homogenous matrix formulation, the following process parameters were analyzed: irradiation time (1min up to 15min); microwave power supply (5% up to 100%); temperature during the process (controlled by using a thermocouple). All those samples were characterized with penetration, fire and flash point tests (according to ABNT-NBR standards). The obtained results indicate that the immobilization was successfully achieved by converting the waste into forms that are leach resistant and physically and chemically stable for disposal.