
Research Tools and Methodology for Waste Vitrification Process Development

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Abstract

Since the 1960s, the French Alternative Energies and Atomic Energy Commission (CEA) carried out R&D to develop vitrification processes for high-level and long-lived intermediate-level wastes conditioning. These Researches have led to promote and push forward the French industrial vitrification technologies (increasing of waste loading, production rates and process robustness). Within the CEA, the main goals of the Vitrification Process Development Laboratory (LDPV) are to develop vitrification technologies and processes, to qualify equipments and processes and to support industrial vitrification plant. To achieve these objectives, LDPV has been developing several prototypes at different scale and different TRL (Technology Readiness Level) supported by 3D magneto-thermal-hydraulic models. In this paper, the approach of LDPV needed to develop technologies and processes as well as associated R&D tools is presented. Illustrations of small test rigs used to support the conception of new processes and to describe physico-chemical mechanisms will be showed. Moreover, full scale non-radioactive prototypes allow to qualify technological innovations and to support industrial facilities will be described. Then, numerical simulation of fluid flow, heat transfer and electromagnetic of glass melting used to design furnace prototype and to support industrial vitrification activities will be presented.

Keywords: Vitrification, prototype, modeling

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