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IN-CAN INCINERATION AND VITRIFICATION PROCESS: GLASS FORMULATION AND GLASS MELT/LIQUID METAL INTERACTIONS

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The PIVIC project was dedicated for the management of solid technological waste, mainly made up of metals, organic matter (plastics), and silica-based fiber bags. The project aims at developing a sequential single process that thermally treat this technological waste and then condition in metallic containers the resulting Intermediate-Level Long-Lived radioactive waste.

During the high temperature conditioning step ($\approx 1400^{\circ}\text{C}$), the liquid metal phase strongly interacts with the molten glass: redox reactions, crystallization and dissolution mechanisms occur which has an impact on both glass melt viscosity, glass composition and final microstructure. The process environment is highly reducing. Furthermore, due to the coexistence of both metal and glass liquid phases, aluminum from the metal phase can be oxidized, leading to an increase of glass alumina content. Lastly, in the configuration where the waste is introduced in silica-based fiber bags, the silica content of the glass phase will increase, which has to be taken into account when evaluating candidates for glass formulation. It is important to remember that silica, alumina and alkaline contents play a key role on the glass melt viscosity.

In order to reach good process reliability and to master the final conditioning material, such reactions have to be controlled along with a good knowledge of both phases behavior and glass melt viscosity. Furthermore actinides surrogates localization is also required.

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This poster presents the impact of metal-glass composition, temperature and actinides surrogates on the viscosity of glass melt and on final conditioning matrix.

