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MASTER

A LABORATORY SCALE GLASS MELTER FOR TESTING DEFENSE WASTE GLASS

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ABSTRACT

A one-litre joule heated glass melter was built to test the applicability of continuous melting to simulated high-level calcined defense waste. Inconel 690 electrodes and K-3 refractory brick were chosen for their corrosion resistance to fluoride glass. The melter maintained a full melt at 1100°C using 3 kW. After approximately 2 months of operation the melter was dismantled for metallurgical examination. The Inconel 690 electrodes were heavily corroded. A second melter is now in operation to verify the findings of the first melter run.

INTRODUCTION

The Idaho Chemical Processing Plant (ICPP) located at the Idaho National Engineering Laboratory (INEL) reprocesses defense type nuclear fuel using a solvent extraction process.[1] The resulting high-level waste solution is calcined (dried) in a fluidized-bed process into a mixture of granules and powder known as calcine.[2] Zirconia calcine, which is about 50 wt% CaF_2 was the type used in the glass melting work presented in this paper. Calcine is currently stored on site,[3] however, regulatory and environmental considerations may require an alternative form for disposal of high-level waste. One alternative being evaluated is a leach resistant glass containing 25-40 wt% calcine.[4] To test the applicability of continuous

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