Experimental investigation of solid by-product as sensible heat storage material: Characterization and corrosion study

Iñigo Ortega-Fernández¹, Abdessamad Faik¹,a), Karthik Mani¹, Javier Rodriguez-Aseguinolaza¹ and Bruno D’Aguanno¹

¹ CIC Energigune, Albert Einstein 48, 01510, Miñano (Álava), Spain . Phone: +34 945297108

a) Corresponding author: afai@sicenergigune.com

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The experimental investigation of water cooled electrical arc furnace (EAF) slag used as filler material in the storage tank for sensible heat storage application was demonstrated in this study. The physicochemical and thermal properties of the tested slags were characterized by using X-ray diffraction, scanning electron microscopy, Fourier transform infrared spectroscopy, Raman spectroscopy and laser flash analysis, respectively. In addition, the chemical compatibility between slags and molten nitrate salt (60 wt. % NaNO₃ and 40 wt. % KNO₃) was investigated at 565 °C for 500 hrs. The obtained results were clearly demonstrated that the slags showed a good corrosion resistance in direct contact with molten salt at elevated temperature. The present study was clearly indicated that a low-cost filler material used in the storage tank can significantly reduce the overall required quantities of the relatively higher cost molten salt and consequently reduce the overall cost of the electricity production.

Key Topics

- Corrosion
- Molten salts
- Fourier analysis
- Fourier transform infrared spectroscopy
- Furnaces