Development of a thermochemistry-based process model for lead smelting through the TSL process

J. Rezende[1], R. F. van Schalkwyk[2], M. to Baben[1], M. A. Reuter[2]
(1) GTT Technologies
(2) Helmholtz Institute Freiberg for Resource Technology

The Ausmelt top-submerged lance process (TSL) offers unique possibilities for both the production of lead from its ore and for lead recycling. Although this process has been installed in many plants for the processing of lead, copper and zinc ores around the globe, there are few initiatives dedicated to the modelling of this process. In this work, we develop and present a themochemistry-based process model based on the connected local equilibrium reactors method for the smelting stage of the TSL process and apply it to the extraction of lead from a lead concentrate. The model inputs correspond to real plant data for lead smelting and after its calibration, the model is able to reproduce the expected formation of the slag and bullion phases from the concentrate. Starting from a basis simulation, we optimize then the model outputs by varying systematically the amount of oxidizing gas blown into the system. In a second step, we show how the model can be used to optimize the process for the case of a concentrate which is poorer in PbS content.