

Copper losses in sulfide concentrate smelting slag are dependent on slag composition

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Abstract

The silicate slag and copper matte that are the byproducts of smelting copper in a reverberatory furnace contain SiO_2 , FeO , Fe_3O_4 , CaO and Al_2O_3 , and Cu , Fe and S , respectively. These components influence the oxide (Cu_{ox}), sulfide (Cu_{sul}) and total (Cu_{total}) copper content lost in the waste slag. This paper uses multiple linear regression analysis (MLRA) to determine the degree of influence. The results of calculations obtained using MLRA were compared to actual measured results and found to have a large degree of correspondence, with the coefficient of determination $R^2 = 0.975$. These results indicate that slag composition and copper content in the matte influence the copper losses in the waste slag with a probability of above 97%. It was determined that, of the total copper content of the slag, 74% is in sulfide and 26% in oxide form, and that this ratio is not dependent on the slag or matte composition.

Key words: Smelting, Slag, Copper/ copper ores, Copper losses, Multiple linear regression analysis