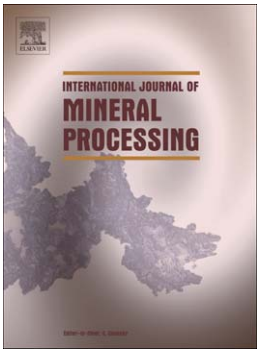

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Copper Recovery from Reverberatory Furnace Flue Dust

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Abstract

In this study, leaching of reverberatory furnace dust at Sarcheshmeh was investigated in H_2SO_4-O_3 medium. Response surface methodology based on central composite face-centered design (RSM-CCF) was applied to optimize the operating parameters. The optimal conditions to achieve the principle objectives of maximizing copper dissolution and minimizing iron dissolution from dust were identified to be a temperature of 30 ˚C, a leaching time of 3 hr, an initial pH of 0.5, a pulp density of 20%, and an ozone flow rate of 1 g/h. Under the optimum conditions, the copper and iron concentrations in the leaching solution were found to be 27.11 and 0.90 g/L, respectively. The results showed that selective copper extraction from the dust could be achieved using sulfuric acid and ozone.
Keywords: copper, selective leaching, optimization, dust, ozone.

1. Introduction

The antiquated reverberatory furnace technology had been the most widely used method for producing copper matte until the 1970s, until it began to be phased out, and is virtually ususued today. The greatest problem faced with reverberatory smelting has been the production of large volumes of dusts and gases containing SO_2 at low concentrations. Indeed, as SO_2 is difficult and expensive to be removed from these gases, effluent control problems have resulted in the replacement of many reverberatory furnaces by electric, flash, or continuous copper-making processes (Biswas and Davenport 2013). Many of these newer technologies continue to suffer from poor dust control, and may eventually come under the same environmental (and legislative) pressures as the reverberatory smelters in a previous generation.

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