Flotation of zinc oxide minerals from low-grade tailings by oxine and dithizone using the Taguchi approach

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Abstract
The main purpose of this study was to find the optimum values for factors affecting the Zn recovery rate using oxine or dithizone as a chelating agent collector during flotation in a Hallimond tube. Eight control factors, including four levels of pH, oxine/dithizone, corn starch, sodium thiosulfate, sodium citrate, sodium silicate, conditioning and floating durations were considered in a Taguchi experimental design technique. An L_{32} orthogonal array was applied to determine the signal-to-noise (S/N) ratio. Analysis of variance (ANOVA) was used to determine the optimum conditions and the most significant parameters affecting the reaction rate. Analysis of the experiments using the Taguchi approach indicated that pH had the highest contribution to the recovery rate of zinc oxide particles. The results showed that the recovery rate of zinc increased by 43.4 ± 3.0% and 24.9 ± 3.2% using oxine and dithizone, respectively, under optimum conditions with a confidence level of 90%.

Key words: Tailing, Zinc oxide, Flotation, Oxine, Dithizone, pH