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OPTIMIZATION OF CADMIUM DISSOLUTION FROM A HAZARDOUS WASTE BY STATISTICAL DESIGN OF EXPERIMENTS

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Abstract

Cadmium leaching experiments from hazardous waste containing 16.5 wt% CdO were conducted using H₂SO₄. Dominant experimental and process parameters were determined by factorial design. Six controlling factors were considered, i.e. solid-liquid ratio, acid concentration, reaction time, particle size, stirring speed and temperature. Analysis of variance (ANOVA) was used to identify main effects and their interactions. An empirical model, based upon experimental results, was developed to optimize the cadmium extraction by the process. The optimisation study showed that leaching time, solid-liquid ratio and acid concentration were the main factors affecting cadmium extraction. It was found that 91% of cadmium could be extracted under the optimum conditions. Verification experiments showed that the predicted values were in good agreement with the experimental values.

Key words: cadmium, factorial designed experiments, hazardous waste, leaching, optimization

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