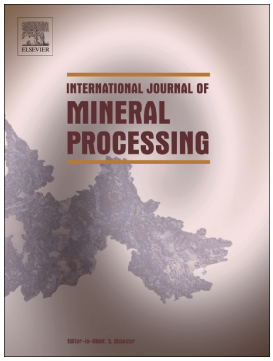

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Modeling and optimization of coal oil agglomeration using response surface methodology and artificial neural network approaches

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Abstract

In this study, Response Surface Methodology (RSM) and Artificial Neural Network (ANN) were used to develop an approach to analyze the behavior of different process variables such as pulp density, oil dosage, agglomeration time, and particle size, which affects the coal oil agglomeration process using Linseed oil as a bridging liquid. The investigation was done using Box-Behnken design (BBD) of response surface methodology, the same design of experimental data was used in training with the artificial neural network, and the results obtained from the two methodologies were compared. The ANN model predicted responses with better accuracy with coefficient of determination (R^2) 0.97 and 0.95 for % ash rejection and % organic matter recovery respectively in comparison to RSM-BBD R^2 of 0.97 and 0.92 for % ash rejection and % organic matter recovery respectively. The optimal condition established for the high %ash rejection and %organic matter recovery were pulp density (3.002%), oil dosage (15%), agglomeration time (15 min), particle size (0.168 mm) with predicted % ash rejection and % organic matter recovery as 68.00 % and 95.24% respectively, with the desirability of 96.90%.