عنوان مقاله:

Comparison of central composite design and artificial neural network approaches for modeling and optimization of 2-methylpropane-2-thiol removal from contaminated soil by ultrasound

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خلاصه مقاله:

In this article a comparative study for modeling and optimization of 2-methylpropane-2-thiol removal from contaminated soil by ultrasound is investigated. Central Composite Design (CCD) and artificial neural network (ANN) were utilized and compared to each other in order to obtain appropriate predicting model with respect to sonication power (w), sonication time (min) and water/reactor volume ratio (ml/ml). CCD was used based on Response Surface Model (RSM) and the ANN model was developed by the Levenberg–Marquardt feed forward back-propagation training algorithm and topology (3:8:1). Analysis of variance and Pareto analysis resulted from CCD demonstrate that sonication power is the most influential parameter on 2-methylpropane-2-thiol removal efficiency (sonication time and amount of added water in the next order respectively). This is confirmed by ANN model. Also interaction between water content and power, sonication time and power are effective interaction (P-values=0.025 and 0.007 respectively). Comparison between CCD and ANN methods demonstrate that ANN model has excellent predicting power compared to CCD model and both of them show good agreement with experimental values with high correlation coefficients (R2ANN=98.39%, R2CCD=96.34%). Optimized condition suggests that for maximum removal efficiency (82.83%), power and sonication time must be in highest level and water/reactor volume ratio must be in lowest level in the studied interval. Highlights Soil polluted with 2-methylpropane-2-thiol is remediated with sonication process. The effects of the sonication power (w), sonication time (min) and water/reactor volume ratio (ml/ml) are added to the batch reactor as the main factor and interaction between them are investigated. For preparing the best experimental .model CCD and ANN methods are used and compared to each other

کلمات کلیدی:

Central composite design, artificial neural network, Ultrasound, 2-methylpropane-2-thiol, Modeling, Optimization