IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 8, April 2024

Utilization of Dolochar for Lead Removal from Industrial Waste Water

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Abstract: *This study investigates the efficacy of utilizing dolochar, a waste byproduct from iron factories, for the removal of lead from polluted water. Through a comprehensive analysis, the composition of dolochar was examined using diverse analytical techniques. Various kinetic models were compared to elucidate the rate at which dolochar captures lead. The findings highlight that lead adsorption adheres to a specific kinetic pattern, particularly the pseudo-second-order model, demonstrating exceptional precision (R^2 = 0.999). The research delves into how three key variables—dolochar quantity, initial lead concentration, and water pH—affect lead removal efficiency. A series of experiments, totaling 15, were conducted to identify the optimal conditions for lead removal employing dolochar. A predictive model was developed to estimate lead removal based on these parameters, yielding highly accurate results (R^2 = 0.999). The study reveals that under optimal conditions, characterized by a specific dolochar quantity and near-neutral pH, dolochar can effectively eliminate a substantial portion (92.8%) of lead from water, even in scenarios mimicking highly contaminated water sources such as mining sites. These findings underscore the promising potential of dolochar as a cost-effective and efficient solution for mitigating lead contamination in water sources.*

Keywords: Adsorption, Box-Behnken experimental design, Dolochar, Lead removal, Response surface methodology

ISSN 2581-9429 IJARSCT