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Central Composite Design for the Optimization of Fenton Process Parameters in Treatment of Hydrocarbon Contaminated Soil using Nanoscale Zero-Valent Iron

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Abstract : Soil contamination by petroleum hydrocarbon (PHC) is a major concern facing the oil and gas industry. Particularly, condensate liquids have been found to contaminate soil at gas production sites. The remediation of PHCs is a difficult challenge due to the complex interaction between contaminant and soil. A study has been conducted to enhance degradation of PHCs by Fenton oxidation and using Nanoscale Zero-Valent Iron as catalyst. The various operating conditions such as initial H2O2 concentration, nZVI dosage, reaction time, and initial contamination dose were investigated. Central composite design was employed to optimize and analyze the effect of operational parameters on the PHC removal efficiency. It was found that optimal molar ratio of H2O2/Fe0 was 58 with maximum TPH removal of 84% and 3hr reaction time and initial contaminant concentration was 15g oil /kg soil. Based on the results, combination of Nanoscale ZVI and Fenton has proved to be a promising remedy for contaminated soil.

Keywords : oil contaminated Soil, fenton oxidation, zero valent iron nano-particles
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