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Soil remediation from waste lubricating oil

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Abstract

Soil remediation was investigated from waste oil contamination. Contamination of different soil particle diameters was prepared with different dosage of waste oil contamination. Solvent extraction technique was employed for remediation using batch process. The contaminated soil was treated with many solvents and different solvents to oil ratios. The solvent was recovered and reused. The soil and waste oil were analyzed before and after remediation process to study the performance of soil remediation process. A mathematical model for remediation process was constructed. The performance of different solvents for soil remediation is as follow:

LPG Condensate > Dichloromethane > Trichloromethane > MEK > Stabilized Condensate > Hexane > Heptane > 1-butanol > toluene > ethyl acetate > 2-propanol

Physical properties of recovered waste oil showed lower carbon residue, ash content, and asphaltene content due to the adsorption of heavy molecular weight hydrocarbons inside the pores of the soil after extraction process. The treated soil may need further regeneration process to recover it from the entire heavy molecules. Two stages extraction process was performed to remove all the heavy constituents from the pores of the contaminated soil.

Key words: soil remediation; waste lubricating oil, solvent extraction, regeneration process

1. Introduction

With the growing interest in environmental remediation of soil from oil contamination, authors have proposed various approaches for soil remediation. Soil extraction has been proposed as a promising innovative remediation technology due to its potential for treating not only oils contaminated soils but also those contaminated by heavy metals [1]. It has less time compared with other methods such as bioremediation and phytoremediation, which are largely affected by climatic factors.

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