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MULTIPLE STAGE CROSS-CURRENT EXTRACTION USING VEGETABLE OIL IN THE REMEDIATION OF POLYCYCLIC AROMATIC HYDROCARBONS-CONTAMINATED SOIL

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Abstract

The present study aims to compare the efficiency of a single extraction and a 3-stage cross-current extraction of PAHs from both lowly contaminated (LC) and highly contaminated (HC) sands using palm kernel and soybean oils (PKO, SO). It is observed that 3-stage cross-current extractions increase the total efficiencies compared to single extractions by 18.7–22.7% and 27.2–30.6% for LC and HC sands, respectively. Maximum efficiencies of 94.3% and 98.4% are obtained for phenanthrene (PHEN) and fluoranthene (FLT), respectively using PKO at 70°C in the 3-stage cross-current extraction. In HC soil, these efficiencies reduce by 11.6% and 9.2% for PHEN and FLT, respectively. An oil flotation process as a post treatment step for soil/oil slurry is demonstrated to successfully remove 88.8–90.0 % residue oil from treated sand and 70.5–75.7 % residue oil from treated soil. Finally, a conceptual process of the extraction of PAHs from contaminated soil using vegetable oil is proposed.

Keywords: extraction, polycyclic aromatic hydrocarbons (PAHs), remediation, soil, vegetable oil

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