

Ability of Sugar based Glucoside Surfactants to Remove Petroleum Contaminants

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Abstract

A study is carried out to evaluate the efficiency of synthesized sugar based alkyl polyglucosides (APG₁₀, APG₁₂, APG₁₄) for washing petroleum oil contaminants from soil in the shallow perched aquifers. Their efficiencies were compared with other commercially important non-ionic surfactants. viz. Tween-20, Tween-40 and Brij-58. The APG₁₀ was synthesized from anhydrous glucose and decyl alcohol in the presence of an acid catalyst in a cost effective manner. The spectroscopic tools viz, FTIR, NMR, thin layer and mass chromatographic techniques were used for structural elucidation of APG₁₀. Based on the measurement of critical micelle concentration, the preferred concentrations of aqueous surfactant solutions for soil washing are determined. The batch washing experiments have shown that the oil removal efficiencies decrease in the following order APG₁₄>Brij-58>APG₁₂>APG₁₀>Tween-40>Tween-20. Biodegradability test of the APG₁₀ have been carried out by modified OECD (Organization for Economic Cooperation & Development) screening method to evaluate its environmental compatibility. More than 90% surfactants are found to degrade within one week period in river water.

Keywords: Alkyl Polyglucosides, Petroleum Contaminants, Washing from soil