Treatment of Crude Oil Spills in Water Resources by Using Biological Method

Abstract - Biological treatment has definite to be an effective and excellent method for the removal of aquatic oil spills. It is competent of being used as the best treatment method for cleanup of oil spills. Being a potential technology, significant work needs to be done to improve the capabilities of bioremediation for oil contaminated-aquatic environment. Novel application of combined solvent extraction and two-phase biodegradation processes using Two-Liquid Phase Partitioning Bioreactor (TLPPB) technique was proposed and developed to enhance the cleanup of high concentration of crude oil from aqueous phase using acclimated mixed consortiums in an anaerobic environment. Silicone oil was used as the organic extractive phase for being a water-immiscible, biocompatible and non-biodegradable. An application of one phase bioreactor was used, then “TLPPB” two-liquid phase partitioning bioreactor was sophisticated to decay hydrocarbons “crude oil” in this study) at concentration reach to 6000 mg/L. As the organic phase, Silicon oil was selected in TLPPB technique to hold the delivery of hydrocarbons in a liquid layer by absorbing method and after that transforming the pollution to the biological microorganisms. Based on TLPPB technique, the effectiveness of the organic layer “silicon oil” has been contrasted to the one-phase biological reactor. Then the result is completely treated of hydrocarbons pollutant to 100% was accomplished in the two-liquid phase partitioning bioreactor “TLPPB” contrasted to 69-78% treated efficiency of crude oil in the one-phase traditional biological reactor. Thus, the interpretation of “TLPPB” technique for crude oil treatment was estimated in terms of the salinity influence by using Tigris river water, and sea water samples. The rising rate of salinity in liquid layer causing reduction the microorganisms-activity and prohibit the amount of crude oil decay. Thus, this research mentions the possibility of TLPPB technique for consolidate transmission and the biodegradation of immiscible crude oil.

Keywords - Crude oil, Biological degradation, Two-phase bioreactor, Salinity, Silicone Oil.

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