

[BIO10]

Treatment of Tapis A crude oil-contaminated sediment by using a dual-stage biodegradation

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Oily sediment creates a difficult situation in the environment since it cannot be disposed easily. Present treatments of the oil contaminated sediment are either destructive or too costly for implementation. Up to date, there is no sufficient treatment for the oil-contaminated sediment. Biodegradation is the natural pathway for degrading oil in the environment. However, biological treatment is restricted by its relatively slower degradation rate and unpredictable output. Hence, this study aims to report a dual-stage treatment which could improve biodegradation of oil in the aquatic sediment. The dual stage treatment is actually a combination of two conventional treatments. It is believed that, lower oil degradation of the conventional treatment may be due to the changes in chemistry of the oil contaminated sediment, draw-back enzymatic reaction and presence of some toxic compounds or some nutrients became limiting during the biodegradation. Repeatedly treatment technique is able to overcome the limitation and thus improved biodegradation. Efficiency of the dual stage treatment was assessed on sediment which contaminated by 1500 mg.kg⁻¹ Tapis A crude oil. A consortium of oil-degrading bacteria was inoculated into the sediment to stimulate the oil-treatment. Comparison studies on conventional, dual-stage and three-stage treatment show that, dual-stage treatment is demonstrating an improvement of 34.5 % of crude oil degradation in the aquatic sediment. Three-stage treatment was attempted to remove remaining oil in the sediment, however there is no significant reduction of oil in the sediment ($p > 0.05$). Dual-stage treatment was able to remove some of the recalcitrant hydrocarbons that left over from the conventional treatment in the sediment such as, phenanthrene, benzo(a) pyrene and benzo(a) anthracene. Oil residue left behind after the dual stage treatment is the tar-like substances, which are resistant to biodegradation. The dual-stage treatment is probably overcomes the bottle-neck of the conventional method. Success of the technique indicates feasibility to in-cooperate it into other biological treatment for combating pollution.