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ENVIRONMENTAL REMEDIATION FULL-SCALE IMPLEMENTATION: BACK TO SIMPLE MICROBIAL MASSIVE CULTURE APPROACHES

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Abstract

Using bioaugmentation and biostimulation approach for contaminated soil bioremediation were investigated and implemented on field scale. We combine those approaches by culturing massively the petrophilic indigenous microorganisms from chronically contaminated soil enriched by mixed manure. Through these methods, bioremediation performance revealed promising results in removing the petroleum hydrocarbons comparatively using metabolite by product such as biosurfactant, specific enzymes and other extra-cellular product which are considered as a difficult task and will impact on cost increase.

Keywords: Bioremediation, environmental biotechnology, oil and gas industry

1. Introduction

Since early 1990s, waste biotreatment that contains the group of compounds known as petroleum hydrocarbons has been developed in Indonesia [1,2]. The negative effects of these compounds are well documented in terms of personal health and that of the environment. Bioremediation technology has enjoyed a growth in popularity over recent years, not least because it is the 'greenest' option for petrochemical waste disposal. Unlike chemical treatments, which produce their own waste bi-products, a bio-treatment involves microbes that simply die off once processing is complete. In addition to this, it requires a modest capital investment and low level energy input, is self sustaining and environmentally safe [3]. This paper describe over the time improvement basing on five platforms technology which have been commensurate for bioremediation research and development. To shed some light, we provided the highlighted of several full-scale implementation of the bioremediation conducted by our institutions.

2. Methode

Platforms Technology

Bioremediation agent. Bioremediation is the technology that utilizes the metabolic potential of microorganisms to clean up contaminated environment. This technologies share the advantages of *in situ* application and environmental acceptability compared with most physicochemical strategies. In this paper, we focus on bioremediation rather than other biological remediation techniques such as phytoremediation. Current targets include petroleum hydrocarbons products, especially for hazardous crude oil compounds such as BTEX (Benzene, Toluene, Ethylene dan Xylene) and PAHs (Polycyclic Aromatic Hydrocarbons). The technology enables detoxification of environmental areas where the bioremediatory organism is administered with a supplementary source of nutrients [4].

Bioproducts. Extra-cellular microbial product have been shown to play key roles in optimalization into the overall clean-up process a contaminated sites leading to cleaner, faster, cheaper by bioremediation efforts. By nowadays, we develop an *in situ* exploration and exploitation potential resources from many vulnerable ecosystem, notably for many microbial strains capable to reduce recalcitrant from petroleum hydrocarbons. We consider a deeper understanding of the regulation microbial extracellular production, fundamental relationship between biosurfactant, contaminant solubilization and biodegradation rates as our pillars strategy in integrated waste management technology.