

## Bioremediation of Petroleum Hydrocarbons

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### Introduction

The process of bioremediation, defined as the use of microorganisms to detoxify or remove pollutants owing to their diverse metabolic capabilities is an evolving method for the removal and degradation of many environmental pollutants including the products of petroleum industry. In addition, bioremediation technology is believed to be noninvasive and relatively cost-effective. Biodegradation by natural populations of microorganisms represents one of the primary mechanisms by which petroleum and other hydrocarbon pollutants can be removed from the environment and is cheaper than other remediation technologies.

Bioremediation along with other processes have been used to remediate petroleum hydrocarbon contaminants in soil in past. The major constituents of most crude oils are biodegradable, so bioremediation has proven to be cheap and efficient than others techniques. Different organisms are employed using various technique of bioremediation according to hydrocarbon present in the contaminated soil. Bioremediation is simpler, less labor intensive and public attitude toward bioremediation are generally favorable, the lack of knowledge about microorganisms and their natural role in the environment could affect the acceptability of their use. However, bioremediation can be considered one of the best technologies to deal with petroleum product contaminated soil.

With the sharp increase in population and modernization of society, environmental pollution resulting from petroleum hydrocarbons has

increased, resulting in an urgent need for remediation. Petroleum hydrocarbon-degrading bacteria are ubiquitous in nature and can utilize these compounds as sources of carbon and energy. Bacteria displaying such capabilities are often exploited for the bioremediation of petroleum oil-contaminated environments. Recently, microbial remediation technology has developed rapidly and achieved major gains.

### Microbial Degradation: Petroleum Hydrocarbons

Microbial degradation is the major and ultimate natural mechanism by which one can clean up the petroleum hydrocarbon pollutants from the environment. Bacterial strains such as *Pseudomonas fluorescens*, *P. aeruginosa*, *Bacillus subtilis* were isolated from the polluted stream which could degrade crude oil. Hydrocarbons in the environment are biodegraded primarily by bacteria, yeast, and fungi. Bacteria are the most active agents in petroleum degradation, and they work as primary degraders of spilled oil in environment. Several bacteria are even known to feed exclusively on hydrocarbons.

### Conclusion

Microbial degradation process aids the elimination of spilled oil from the environment after critical removal of large amounts of the oil by various physical and chemical methods. This is possible because microorganisms have enzyme systems to degrade and utilize different hydrocarbons as a source of carbon and energy.