Title: **Bioremediation of Phenol and Phenolic compounds using mixed microbial culture in a bioreactor**

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Phenol (C_6H_5OH) is an aromatic, hazardous hydrocarbon, which is released from many industries such as steel plants, petroleum refineries, industries related with disinfectants & also some pharmaceutical industries in varying amounts. It also comes out from tannery, leather, aluminium, resins, plastics, fibres, adhesives and rubber industries. Its occurrence has also been determined in cigarette smokes and motor vehicle emissions (Howard, 1990; HSDB, 1991).

This aromatic hydrocarbon (i.e. Phenol) is released not only as its pure form but also as several compounds from the above mentioned industries. Some Phenolic compounds are Chlorophenol (C_6H_4OHCl), Bromophenol (C_6H_4OHBr), Nitrophenol ($C_6H_4NO_2OH$), Tri-Nitrophenol or Picric acid ($C_6H_2(NO_2)_3OH$) etc.

All these Phenolic compounds including its pure form have many hazardous effects on the human health as well as on the environment. Some of its hazardous and toxic activities are as follows-

1. It may cause cardio-vascular abnormalities.
2. Phenol and its compounds cause skin and gastro-intestinal damage severely.
3. Irritation of respiratory tract.
4. Long term contact with phenol Phenolic compounds lead to severe damage of kidney and heart, even to death.
5. Being corrosive in nature, Phenolic compounds may cause blisters on skin in case of many animals.

Bioremediation refers to the biological procedure by which toxins or hazardous wastes are captured from nature by some microorganisms (i.e. bacteria, algae etc) and used in their physiological and cellular processes without causing any harmful effects to them. In short, it is a remedy to reduce the wastes from the nature involving the biological mechanism. It may be categorized in several types such as Phycoremediation, Phytoremediation and microbial remediation (based on the biotic factors involved into it) and/or Biodegradation, Biosorption etc (on the basis of techniques).

It has some advantages over the Physical and chemical treatments such as-

1. It is not so expensive.
2. It has no side effects onto the nature and ecosystem.
3. It is an eco-friendly process

Based on the review of available literature, the objective of the present research includes isolation & identification of predominant bacterial species from Phenolic substance enriched soil media and to explore the kinetic data for design and performance of a bioreactor for Phenolic compounds bioremediation either as single substrate (i.e. Phenol, Chloro Phenol & Tri Nitro Phenol) or bi-substrate mixture(i.e. Phenol+ Chloro Phenol, Phenol+ Tri Nitro Phenol, Chloro Phenol+ Tri Nitro Phenol etc).

In the subsequent phase of the research, the experimental results to be obtained have been used to validate various mathematical and statistical model such as Artificial Neural Network (ANN) & Response Surface Method (RSM) by using process parameters.