

Environmental Hazards due to Polychlorinated Biphenyls

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Polychlorinated Biphenyls (PCBs) are frequently encountered as contaminants in soil environments, usually originating from electrical transformer leaks or improper disposal of PCB-containing wastes. PCBs have been used as dielectric fluids in capacitors, transformers, flame retardants, plasticizers and ink solvents. PCBs have been sold under trade names such as Aroclor (Monsanto, USA, Canada and UK), Clophen (Bayer, Germany), Phenoclor (Prodelec, France and Spain), Sovol and Sovtol (Orgsteklo, Orgsintez, and former Soviet Union) and Kanechlor (Kanegafuchi, Japan). More than 1.7 million tons of PCBs were produced worldwide, and an important amount of these compounds have been released into the environment. PCB exposure can cause chloracne (a severe, persistent acne-like rash), liver damage, respiratory disorders, thyroid gland disorders, muscle and joint pain, headaches, loss of appetite, nausea, vomiting, abdominal pain, cancer as it is a carcinogenic class 2 (probable human carcinogen), reproductive problems including increased spontaneous abortion rates, still births, underweight births and decreased post-natal survival. These problems are due to commercial mixtures which typically consist of 40-70 congeners. These congeners have been reported to cause cancer and serious effects on endocrine, immune, nervous and reproductive systems. The National Occupational Health and Safety Commission

(NOHSC) has determined short term exposure limit (STEL) for PCBs containing 42% chloride upto 2 mg/m³ and PCBs containing 54% chloride upto 1 mg/m³. In recent years, PCBs have been detected in aquatic systems in Central and Southern Chile.

Worldwide reduction and elimination of POP's discharge into the environment has been promoted by the Stockholm Convention in 2001. For this, bioremediation is an attractive technology to decontaminate the polluted sites. Microorganisms play a main role in the removal of POPs from the environment. Bacterial degradation of PCBs is an important bioremediation of these POPs. Bio-stimulation of the native micro-flora and bio-augmentation with selected microorganisms have been applied for the removal of PCBs from contaminated environments. Bioremediation of PCBs, specifically in soil or sediments, is limited by a number of factors including PCB availability, incomplete catabolic breakdown, low expression of catabolic genes, and toxicity of PCBs and their metabolic intermediates. A number of scientists are working for it and have good results as well. I wish some young scientists and researchers could bring forth better results for this increasing environmental pollution due to PCBs.

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