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Commentary

Microbial Technology in Waste Water Management

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DESCRIPTION

The major challenge of water pollution is becoming increasingly significant as human socialization improves and the frequency of social and economic activity increases, with water contamination being particularly prominent. Water pollution is mostly caused by industrial effluent and home sewage discharge. Water contamination is becoming a major hurdle to human health, economics, and sustainable development, posing a serious threat to human existence and safety. Microbial Wastewater Treatment is concerned with the employment of microbes as disinfecting agents in the treatment of dirty wastewater, which is a global challenge.

Microbiologically techniques are being hailed as a viable technology for dealing with the growing problem of dirty wastewater. Aerobic bacteria are most commonly used in aerated environments in modern treatment facilities. This bacterium uses free oxygen in the water to break down contaminants in the wastewater before converting the energy into energy it can use to grow and reproduce. Gravity separation and skimming, Dissolved Air Flotation (DAF), de-emulsification, coagulation, and flocculation have all been used in the past to treat oily wastewater. Free oil can be removed from industrial wastewater using gravity separation followed by skimming. Biological wastewater treatment aims to produce an environment where microorganisms consume as much organic substrate as feasible while providing clear effluent water. In order to accomplish this, microorganisms must transform soluble organic contaminants (Biological oxygen demand) into insoluble biomass (microorganisms) that may be isolated.

Biological wastewater treatment technology is the most effective treatment method. 'Biodegradation' is a term that could be used to describe biological wastewater treatment technique. Biodegradation is the breakdown of organic substances by microorganisms such as bacteria, fungi, and micro fauna, resulting in the creation of carbon dioxide, water, and methane. There are just a few waste water treatment options available. Aerobic wastewater treatment is a biological method that breaks down organic impurities and other pollutants such as nitrogen and phosphorus using oxygen. In electrolysis including biological contact oxidation process for the treatment wastewater containing alkylbenzene sulfonate, oxygen is continually mixed with the wastewater or sewage by a mechanical aeration device, such as an air blower or compressor.

Biosurfactants are derived biologically from the components of bacterial or yeast cell membranes; they are low in toxicity and biodegradable due to their ability to reduce interfacial tension, surface tension, and critical micelle concentration. These biocompunds can also endure a wide range of temperature and pH conditions, as well as alter surfaces to some extent. Furthermore, biosurfactants are more suitable in petrochemical and environmental applications than synthetic and conventionally created chemical surfactants since they contain naturally occurring macromolecules such as glycolipids, fatty acids, and lipoproteins. This pond is regarded a fermentation process in anaerobic treatment, and it is particularly efficient and cost-effective for removing high BOD and COD concentrations, especially biodegradable organic compounds from solution. Biogas containing methane and carbon dioxide will be created during the anaerobic digestion process. When the redox potential is low and organic material is accessible, this reaction can occur. In the treatment of wastewater, both anaerobic and aerobic systems are used.

The fundamental issue associated with global warming is that CO_2 emissions from diverse sources have resulted in significant changes in the climate. Microalgae, like other CO_2 removal technologies, may remove CO_2 efficiently by rapidly growing algal biomass. Furthermore, microalgae have the potential to be employed in the treatment of wastewater. Algae remediate wastewater by absorbing nitrogen, phosphorus, and dissolved organic carbon. These conditions destabilize harmful bacteria while generating more energy-rich biomass than current treatment approaches. Several studies have shown that several microalgae species, including *Chlorella, Scenedesmus, Phormidium, Botryococcus, Chlamydomonas*, and *Arthrospira*, may be successfully cultured for wastewater treatment, and the efficacy of this method is promising.

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CONCLUSION

Wastewater treatment is becoming an integral aspect of circular sustainability development, as it combines energy production and resource recovery with the production of clean water. Microbial biotechnology, along with other technologies, is critical to this progress, with exciting possibilities for improving existing systems and developing new ones.