# Leachate Treatment Using Phytorid Technology

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**Abstract—When water flows through improperly disposed waste and percolates to the ground, contaminating the groundwater, sometimes with toxic substances drawn from the waste it passes through called leachate. The leachate then pollutes the water with these substances, making nearby water sources unusable for consumption. Health effects could be from an acute/short exposure or long term chronic exposure to leachates from landfills. Residents living close to landfills run the risk of contracting several health problems if local authorities do not take adequate measures to line landfills, or drain off leachates. Since each landfill has its own constituents, the liquid that passes through the solid waste takes on its own unique properties. Leachate quality also changes over time, so a treatment system must be sized according to individual parameters and should be flexible enough to treat a varied influent stream. Leachate treatment technologies fall into two basic types: biological and physical/chemical process. Though there are many technologies ,the very successful and efficient phytorid technology comprises of all physical, chemical and biological process. In this paper we have made a comparative study with other technologies to insist the efficient of phytorid technology for the treatment of leachate from municipal solid waste landfill.**

***Index Terms—Leachate, phytorid technology, municipal solid waste landfill***

## I. INTRODUCTION

Landfills generally contain a highly inhomogeneous mixture of materials, which include both a very high organic component as well as soluble mineral substances. Some of the organic substances decompose naturally in the landfill body.Untreated leachate is a hazard to the environment if it is allowed to enter a body of water. Municipal wastewater treatment plants are often not capable of processing the high organic and nitrogen loads in the leachate. It is often sufficient to treat the leachate to the extent that it can be passed off to the next municipal wastewater treatment plant for further processing. If this is not possible, then it is necessary to treat the leachate up to a quality meeting the requirements for direct discharge. In this case, the remaining contaminant load is so low that the treated water may be released into a river, stream or lake

## II. PROPERTIES OF LANDFILL LEACHATE

Due to these exothermal processes inside the landfill, the temperature of the leachate is usually higher than typical groundwater in the area. Landfill leachate is usually quite turbid, has a very strong odour and a brownish colour.The composition of leachates differs depending on the type of waste stored, the weather and the holding time in the landfill body. As the landfill holding time increases, so too does the degree of persistent organic pollutants.After two to five years, the initially aerobic decomposition processes give way to anaerobic processes. Initially, anaerobic decomposition consumes only short-chain fatty acids, and the organic compounds entering the leachate are still reasonably biodegradable. As the landfill holding time increases, anaerobic decomposition progresses to methane production. In addition to a range of soluble nitrogen and sulphur compounds, sulphates and chlorides, the leachate then contains a high degree of persistent organic pollutants.

## III. EXISTING TREATMENT TECHNOLOGIES

Technologies are available for the treatment of landfill leachate, proven in many diverse cases. These include, for example, biological processes for wastewater treatment such as MBBR, TFR, activated sludge processes, an ammox and loop reactors as well as reverse osmosis. Biological leachate treatment is a proven technology for organics and ammonia removal in young and mature leachate. The anoxic/aerobic processes achieve nitrification and denitrification and reduce the oxygen demand for landfill leachate treatment [1].

## IV. IMPORTANCE OF PHYTORID TECHNOLOGY

The main purpose of leachate treatment is to provide a simple, feasible, practically sound, eco-friendly, maintenance free and cost effective technology, which can handle the leachate treatment leading to reuse of treated water for purposes like gardening. Treatment efficiencies for the removal of faecal colliforms, BOD,COD , Nutrients are up to 95 percent which is greater than traditional chemical methods. It is very cost effective technology compared with the traditional waste water treatment method, since it utilizes the natural vegetation and rhizosphere, microorganism; it is eco-friendly method of treating sewage. The quality of treated water is comparable to irrigation standards [3].

Earlier, this technology has been tested and used to treat the lakes, nallahs, domestic wastewater, industrial effluents but has not been tested for its application in leachate from kodungaiyur landfill.

## V. STUDY AREA

The Kodungaiyur dumping yard located at the northen part of Chennai city is in operation since 1980. Initially the leachate generated from the Chennai city has been dumped in Kodungaiyur dumpsite. Due to urbanization, increase in population, changes in lifestyle and consumption pattern, the problem of water waste management in Chennai has been increased. In this study Kodungaiyur dump site is taken as a study area. It lies between 13’06.75 ” N latitude and 80o 14’ 06.34” E longitudes.Open dumping and leveling by bulldozer is the method of waste disposal. The dumping site covered about 30 ha in 1995.3 and increased to 54.75 ha in 2002.4 which is twice that of the area in 1995. The dumping area is estimated to be 117 ha in 2009 which is again twice as that of in 2002. Kodungaiyur sewage water treatment plant located

adjacent to the dumpsite discharges the sewage water near to the dumpsite. The waste at the site mixes with the sewage water and contaminates it further. The dumpsite lies at 1.5 to 2.0 km from the western side of Buckingham canal and 3 km west of Bay of Bengal coastline. It is situated within a low lying IOC marsh which extends for a length of approximately 10 km from north to south and for a width of 3 to 4 km from west to east that makes the dumpsite always surrounded by water courses [4].

## VI. QUALITY AND CHARACTERISTICS OF LEACHATE

*1)* The high value of Total Hardness (820 mg/l) and the minimum value of (290 mg/l) was recorded. The Calcium and Magnesium was in the range of 36 to 160 mg/l and 32 to 135 mg/l.. The calcium values of all the samples are below the permissible limit of BIS. The concentration of Chloride in the study area has the maximum value of 638 mg/l. The concentration of EC, TDS, TH, Cl- ,SO4 2- and NO3 - was high in the sampling site near to the dumping yard. The leachate and ground water samples were tested for various physiochemical parameters and heavy metals. The heavy metals tested in the Leachate are Cd, Cr, Cu, Fe, Pb and Zn. The result of the analysis shows that there is a high concentration of EC, Cl-, TDS, NH4+ and SO42- present in ground water. The high concentration of these parameters shows that there is a ground water contamination from leachate percolation in the study area.

## VII. CONCLUSION

The concentration of the heavy metals Cr, Cd, Cu and Iron in the ground water samples are beyond the permissible limit. This reveals the truth of high level contamination of leachate. Though many treatment methods have made research analysis over the leachate from kodungaiyur, the attempt of using phytorid technology will be used and the concentrations of pollutants are further expected to get reduced.

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