CHAPTER 1

INTRODUCTION

1.1 GENERAL

In the present India population boom is extraordinarily high, out of those living in urban areas, more than 50% live in the so called metropolitan cities. Considered low priority area, leachate from the solid waste was never taken up seriously, either by public or by the concerned agencies and authorities. Sanitary landfills are the primary method currently used for municipal solid waste disposal in many countries. As a result, there is lack of development of leachate neutralization in its proper perspective and now the piled-up waste is threatening our health, environment and well being.

Landfill leachates are defined as those aqueous streams generated as a consequence of rain water percolation through wastes, biochemical processes in waste's cells and the inherent water content of wastes themselves. The generation of municipal solid waste grows exponentially in urban society as a consequence of population growth, concentration of population in urban centers and new patterns of consumption. One of the main problems generated by this common practice is the production of leachate. It is a very complex wastewater containing different heavy metals, organic and inorganic compounds, some of them refractory and toxic, that possesses colour and odour. There is lack of development of leachate neutralization in its proper perspective and now the piled-up waste is threatening our health, environment and well being.

There is great concern about the contamination caused by landfill leachate, mainly because it is particularly difficult to treat. Thus, it is very important to apply reliable and effective treatment technology. Conventional treatments (biological or physical-chemical) are not sufficient to reach the level of purification needed to eliminate the negative impact of landfill leachate on the environment. Membrane processes have proved to be a good solution to achieve full purification. However, these processes are restricted by treatment costs and membrane fouling. Due to their effectiveness and ease in operation, electrochemical methods have recently received significant attention for wastewater treatment and several studies have reported the application of these methods in wastewater treatment.

The municipal landfill leachate has been one of the major problems for environment. In the operation, leachate treatment is a very difficult and expensive process. Although, young leachate can be treated easily by biological treatment, COD removal efficiency are usually low the leachate that arises from landfill sites contains components which preclude its direct discharge onto land or into rivers, or, in some instances, even into a sewage treatment works.

Organic compounds and ammonia are examples of these contaminants, whose concentration may vary significantly from site to site, dependent on the nature of the waste contained in the site and the age of the site. Toxic compounds, such as chlorinated hydrocarbons, may also be present in the organic fraction. A typical young leachate may have a chemical oxygen demand (COD) 36 times higher than raw sewage, whereas a mature leachate may be equal in COD to raw sewage but containing much more recalcitrant organic constituents than domestic sewage. Untreated leachates can permeate ground water or mix with surface waters and contribute to the pollution of soil, ground water and surface water. Additionally, leachate may cause malodors and aerosols though these effects tend to be temporary and local. In extreme cases, landfill leachates may contain COD (coefficient of oxygen demand) levels as high as 10,000 ppm, and an ammonia content of 2000 ppm.

At present, at some landfill sites, many of these effluents have to be tankered to be treated either by conventional sewage processing routes, or by evaporation and subsequent landfill disposal. Conventional sewage treatment is not suitable for waste streams containing toxic organic chemicals. Clearly, a treatment method which could be applied on-site would be beneficial, removing the need to transfer large quantities of leachate significant distances by tanker.

The Leachate if not properly disposed in the landfill (with liners) might enter the ground water table and contaminate the water. The human population near the landfill, using the water for drinking and other activities were admitted with less health related issues and this lead to government to take initiative in setting an integrated solid waste management for fewer dumpsites. The Leachate which has high concentration of organics, which is very harmful for human and child life.

Leachate from a landfill varies widely in composition depending on the age of the landfill and the type of waste that it contains. It can usually contain both dissolved and suspended material. The generation of leachate is caused principally by precipitation percolating through waste deposited in a landfill. Once in contact with decomposing solid waste, the percolating water becomes contaminated and if it then flows out of the waste material it is termed leachate. Additional leachate volume is produced during this decomposition of carbonaceous material producing a wide range of other material including methane, carbondioxide and aldehydes, alcohols and simple sugars. The risks of leachate generation can be avoided by properly designed and engineered landfill sites, such as sites that are constructed on geologically impermeable materials or sites that use impermeable liners made of geomembranes or engineered clay.

The use of linings is now mandatory except where the waste is deemed inert. In addition, most toxic and difficult materials are now specifically excluded from land filling. However despite much stricter statutory controls leachates from modern sites are found to contain a range of contaminants that may either be associated with some level of illegal activity or may reflect the ubiquitous use of a range of difficult materials in household and domestic products which enter the waste stream legally.