

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 10, October 2019

## Influence of Customized Iron Electrode in Electrocoagulation Process

Biradar Vaibhav A.<sup>1</sup>, Gawande Sagar M.<sup>2</sup>

M.E, Department of Civil Environmental Engineering, APCOER, Pune, India<sup>1</sup>

H.O.D., Department of Civil Environmental Engineering, APCOER, Pune, India<sup>2</sup>

**ABSTRACT:** To create a healthy atmosphere, every time the higher level technology is not necessary. To create a healthy atmosphere sometimes budget level technology can be a good solution. But there is another solution for better results is to customize the costly and higher level technology into budget and as necessary technology. Electrocoagulation comes under the costly treatment method of water, wastewater and considering leachate. In this paper we tried to reduce this costly method and customized into budgetary small scale treatment method. Concentrating on BOD, COD and Heavy metal treatment check we used leachate as a sample. At the end of few experiments a customized process that is modifying the electrode shape and size. When it comes to budgetary thing, iron as a electrode is less costlier than aluminium electrode, Also iron is easily available in scrap mountain as Mild steel. At the end of the experiments there was change in parameters of leachate sample. Some of them are BOD, COD, pH, Magnesium concentration.

**KEYWORDS:** - Leachate, Electrocoagulation, Electrode

### I. INTRODUCTION

Treating leachate by Electrocoagulation process, there may be chance of change in properties of leachate like ph, heavy metals concentrations mostly. This method is used as trial and error method in batch wise process. In this project, using different adjustment with process like duration, electrode distances, changes in electrodes, number of electrodes, conductivity, ph, temperature. This process can change in efficiency also overall economic conditions of leachate treatment. The source of leachate originating from the nearby dumping area. Such contamination of groundwater results in a substantial risk to local groundwater resource user and to the natural environment. The impact of landfill leachate on the surface and groundwater has given rise to a number of studies in recent years and gained major importance due to drastic increase in population. Various physicochemical parameters including heavy metals were analyzed in the leachate and in groundwater samples to understand the possible link of groundwater contamination. The extent of contamination level of groundwater quality due to leachate percolation depends upon a number of factors like chemical composition of leachate, rainfall, depth and distance of the well from the pollution source (the landfill site in the present case).

Leachate is dark colored mostly toxic liquid which is generated due to the percolation of water through the waste. When runoff occurred due to rain slow down percolation takes place due to the voids present in the water occupies these void spaces and reacts with surrounding toxic, heavy metals, organic waste and inorganic waste generates leachate as byproduct, this is about rainy season. When there is no rain water percolation in (winter and summer season) landfill site then water is generated as byproduct due to degradation of organic waste.

Electrocoagulation: Although electrocoagulation is not that new method in waste water treatment but also it is effective in leachate treatment. Most of the treatment methods are less effective in removal of heavy metals from wastewater as

# International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 10, October 2019

well as leachate. Electrocoagulation is combined technology of electrolysis and coagulation technology, it works with phenomenon of particle atom collision and bonding.

### Effect Of Leachate

As the dumping is easiest way of waste disposal results Leachate is one of biggest issue in waste management if there is segregation and disposal of waste carried out then effect of leachate on surrounding environment is reduced also when the landfill is not designed as per sanitary landfill then leachate collection, treatment, disposal becomes tedious. When not well managed landfill site generates the leachate its percolation continues till ground water. Once leachate enters in groundwater then it quickly contaminates the ground water of nearby area. Consumption of this type of ground water causes water born diseases. Also it affects other parameters of ground water quality. Similar with surface water, leachate has heavy toxic content in it that affects the aquatic life present in water and also consumer. As leachate consist heavy metal, it is difficult to separate these heavy metals from water. one of well known landfill site in pune is uruli devachi.

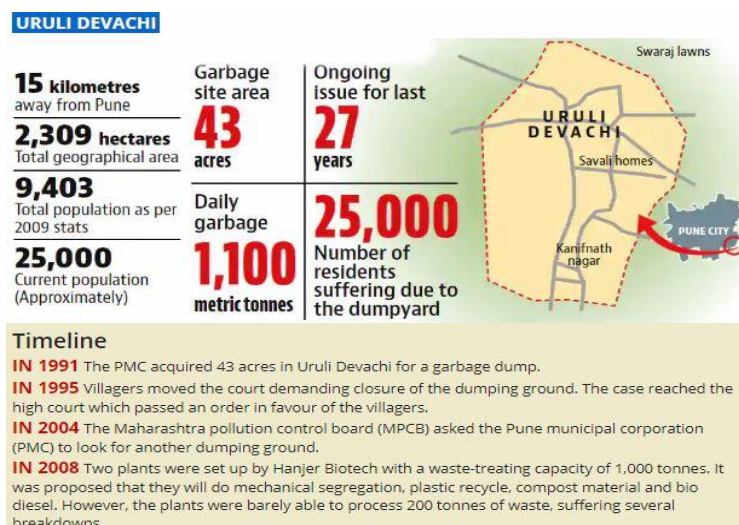


Figure1. Showing Case Of One Of Landfill Site Of Pune (Uruli-Devachi)

## II. THEORY

### Electrocoagulation Process

Electrocoagulation is combination of electrolysis and coagulation. This process is very effective in case of wastewater treatment however it is costly technology in compare with other waste water and leachate treatment. But, Electrocoagulation is more faster, effective, efficient technology in current scenario. Considering electrocoagulation batch process, electrodes are connected to DC supply ranges from 5 v to 50 v with respect current in Ampere when current passes from electrodes electrons starts flowing through the circuit which spontaneously creates chemical reaction in leachate and oxides are generated and flow towards surface of leachate and metal ions colloids suspended particle present in leachate and creates heavy particle and settles down. Interesting thing in electrocoagulation process is it also reduces the concentrations of heavy metals present in the leachate and controls the other parameters like BOD COD etc.<sup>1</sup>

## International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 10, October 2019



**Figure2. Showing The Laboratory Level Leachate Treatment By Electrocoagulation Process.**

As this process works on chemical reactions it effectively works to reduce heavy metals and COD but also it reduces the BOD because of relation between COD and BOD. Once electrons starts flowing though the electrodes separation between water molecule and other particles take place. The separation takes place due to oxides and dioxides produced by electrodes. Usually this process accelerated by change in electric connection pattern like parallel and series connection between electrodes. Depending upon the voltage precipitation takes place. Considering the usual standard output of the DC supply is 24 volts then the precipitation takes place spontaneously and completes the process within 2 hrs.

### III. RESULTS AND CONCLUSION

Using proper analysis the leachate concentration can be reduced and can be used in agricultural land. Water born dieses are major problem created by leachate and therefore ground water as well as surface water is needed to be treated at least before co. When it comes to economy and time criteria, need to dilute the leachate sample. Leachate sample is diluted with potable water having ratio of 1:3 respectively. For the removal of TDS from the output is in future scope it can be removed by various methods present in the wastewater treatment. Anyhow the TDS is important when it comes to potable water; the treated leachate by electrocoagulation process can be used in secondary purposes like gardening, washing, flushing etc.

**Table.1 showing the results of leachate sample without dilution**

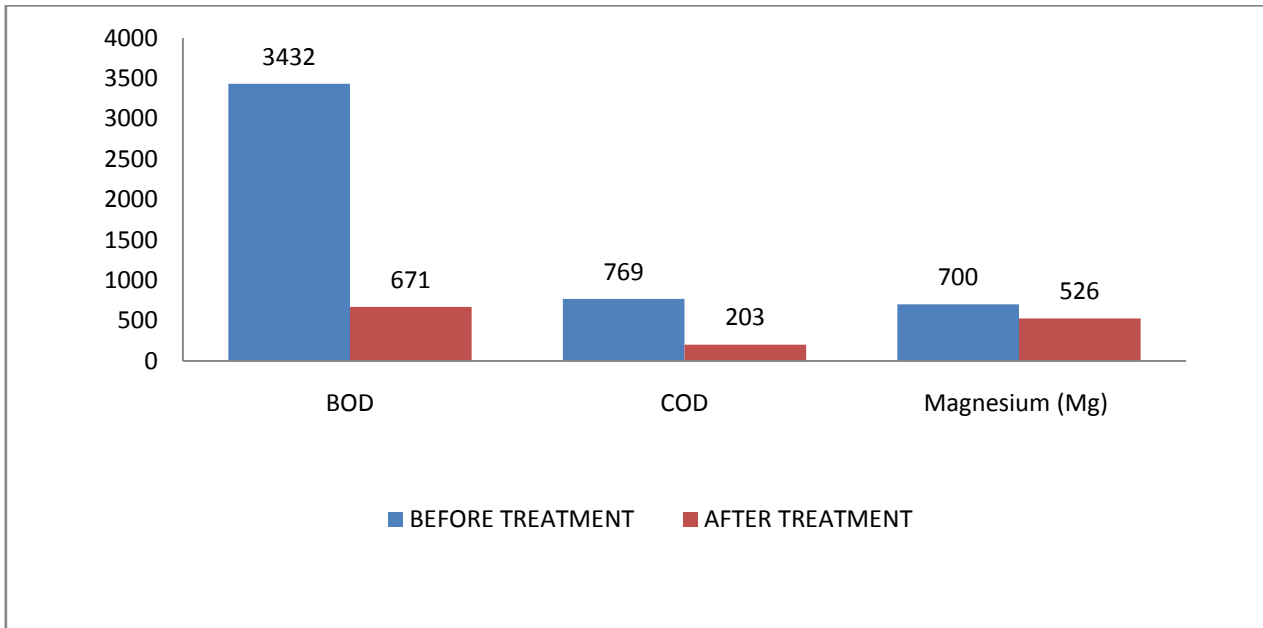
Sr NO.	PARAMETERS	BEFORE TREATMENT	AFTER TREATMENT	PERCENTAGE DECREASE
1	BOD	3432	671	81.5
2	COD	769	203	73.6
3	Magnesium (Mg)	700	526	25
4	pH	8.05	8.5	
5	Temperature	27	32	
6	TDS	1000+	1000+	

## International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 10, October 2019



**Graph.1: showing the decrease in parameters of leachate sample without dilution.**

**Table.2 showing the results of leachate sample without dilution**

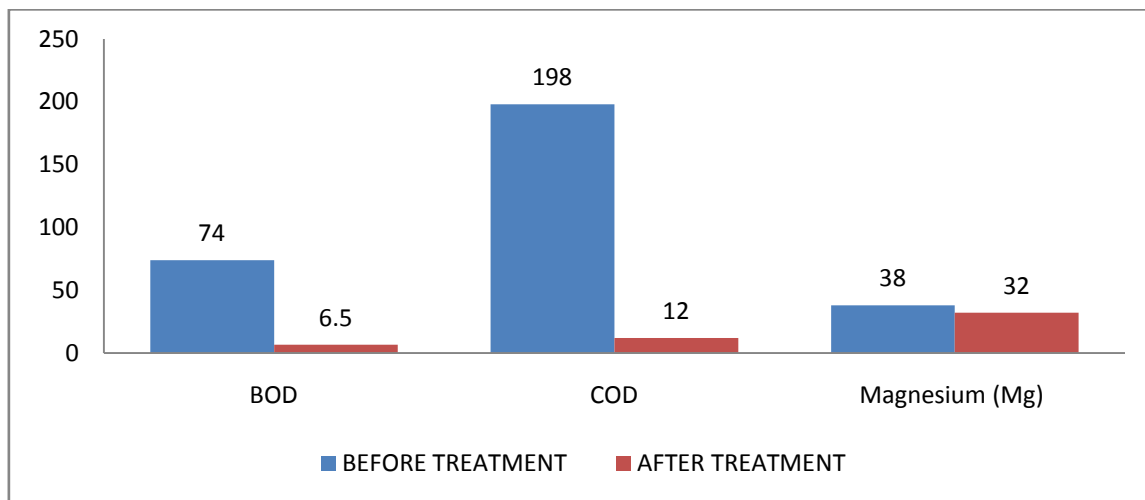
Sr NO.	PARAMETERS	BEFORE TREATMENT	AFTER TREATMENT	PERCENTAGE DECREASE
1	BOD	74	6.5	91.2
2	COD	198	12	96.8
3	Magnesium (Mg)	38	32	18.7
4	pH	8.23	7.3	
6	Temperature	26	31	
5	TDS	1000+	1000+	

## International Journal of Innovative Research in Science, Engineering and Technology

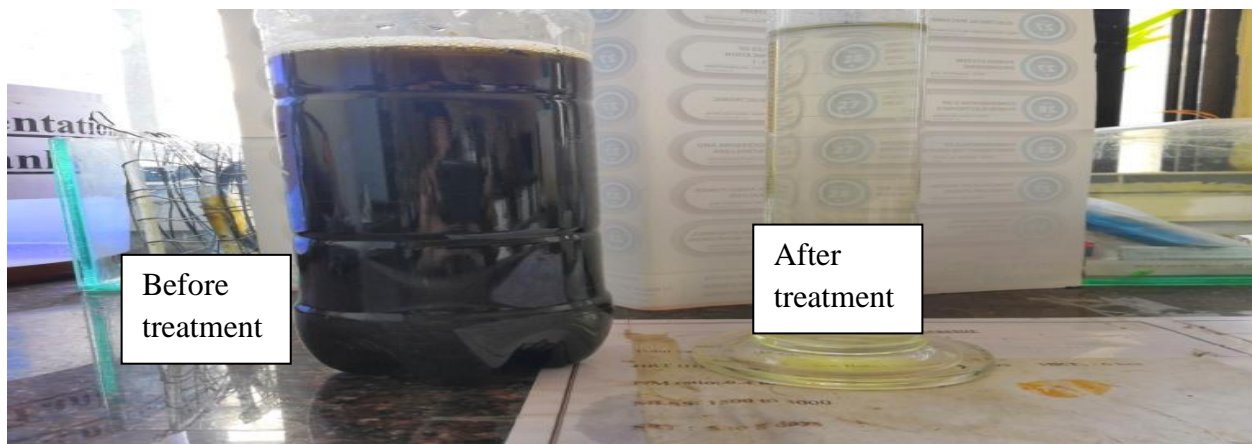
(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: [www.ijirset.com](http://www.ijirset.com)

Vol. 8, Issue 10, October 2019



**Graph.2: showing the decrease in parameters of leachate sample with dilution.**



**Figure3. Showing Difference Between Leachate Appearance Before And After Treatment By Using Electrocoagulation Process.**

### REFERENCES

- 1) C.J. Nawarkar, V.D. Salkar 2019, Solar powered Electrocoagulation system for municipal wastewater
- 2) Inoussa zongo, belkacem merzouk, kalifa palm 2012, Study of an electrocoagulation (EC) unit for the treatment of industrial effluent of Ouagadougou
- 3) N.S. Graça, A.M. Ribeiro, A.E. Rodrigues (2019), Modeling the electrocoagulation process for the treatment of contaminated water, Chemical Engineering Science: 10-20
- 4) Shital rupanawar 2015, Study of water pollutants from dumping leachate by using chitosan and water hyacinth in uruli devachi
- 5) Vinita Khandegar, Data on treatment of sewage wastewater by electrocoagulation using punched aluminum electrode and characterization of generated sludge
- 6) Xiangdong Li, Junke Song, Jiandong Guo, Zhichao Wang, Qiyan Feng. 2011, Landfill leachate treatment using electrocoagulation