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# Treatment of Kitchen Waste Water by Phyto-Remediation

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**Aim:** To treat the domestic waste water (Generated from Kitchen) by phyto-remediation system.

**Keywords:** Phyto-Remediation, Kitchen Waste Water Treatment, Macrophytes, Green Technology for Treatment of Kitchen Waste Water.

## I. PRINCIPLE

Phyto-remediation technology is a low energy, low maintenance and natural approach to treat domestic sewage. The process is a clean, economic and eco-friendly method used as an alternative to conventional systems. Phyto-remediation System uses ecological principles, which simulate the natural processes for treatment of wastewater. It is a live, self-cleaning biological filter. It removes disease organisms, nutrients, organic loads and a range of other polluting compounds. The breakdown of contaminants and the treatment of wastewater are achieved by the controlled seepage of the waterborne pollutants through a root-zone of plants. Organic pollutants are broken down as a food source for the extraordinary variety of microorganisms that are present in the soil and plants. Other contaminants like heavy metals are fixed in humic acid and cation exchange bonds in the soil or mineral substrate in which these plants are rooted. The complexity of microbial life forms and the powerful reaction in the Root zone of the plants result in cleansing capacity that adapts to change in a very dynamic way. Phyto-remediation treatment systems have self-contained engineered ecosystems that utilize particular combinations of plants, soil, bacterial and hydraulic flow systems to optimize the physical, chemical and micro-biological processes present within the root zone.

## II. APPRATUS AND METHODOLOGY

The Kitchen waste water has collected from the Kitchen outlet and the water is treated for various parameters such as pH, BOD (Biological Oxygen Demand), TDS (Total Dissolved Solids) and TSS (Total Suspended Solids). After testing the phyto-remediation bed is constructed using 02 tanks as shown in figure – 1. The tanks are interconnected with each other by inlet and outlet pipes. The pipes are fitted such that the water from one tank shall go to another with the help of gravity. The settleable particles from the collected kitchen waste water is firstly removed by the keeping the water in one sedimentation tank for 8-10 hours. After removing the settleable particles from the waste water, the waste water is filled in the 3rd tank where by gravity the water is flow in the first drum which is filled with the filter media like gravel. After passing from this media the water is again passed by the media where the macrophytes are grown as shown in figure. Macrophytes have a significant effect on soil as they slow down the water flow and trap the pollutants in the stem and roots. Some macrophytes absorb pollutants into their stems. From the outlet the treated water is collected and tested again for the parameters such as pH, BOD (Biological Oxygen Demand), TDS (Total Dissolved Solids) and TSS (Total Suspended Solids).

Figure – 1

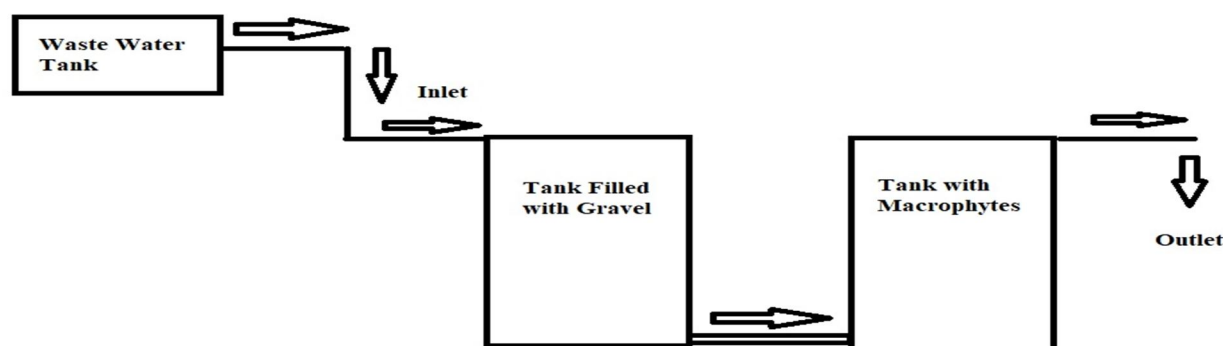


Figure Showing Arrangement for Phyto-Remediation of Kitchen Waste Water

### III. RESULT

Sample Collection Date – 02/09/2019			
S.No.	Parameters	Inlet Sample	Outlet Sample
1	pH (pH unit)	7.3	9.37
2	BOD (5 days 20 degree Celsius)	230 mg/l	61.45 mg/l
3	Total Dissolved Solids	1523 mg/l	1008.68 mg/l
4	Total Suspended Solids	1132 mg/l	687.46 mg/l

Sample Collection Date – 05/09/2019			
S.No.	Parameters	Inlet Sample	Outlet Sample
1	pH (pH unit)	5.2	7.9
2	BOD (5 days 20 degree Celsius)	180 mg/l	66.17 mg/l
3	Total Dissolved Solids	1763 mg/l	1290.51 mg/l
4	Total Suspended Solids	1215 mg/l	167.26 mg/l

Sample Collection Date – 13/10/2019			
S.No.	Parameters	Inlet Sample	Outlet Sample
1	pH (pH unit)	6.37	7.28
2	BOD (5 days 20 degree celsius)	440.39 mg/l	217.24 mg/l
3	Total Dissolved Solids	1649.34 mg/l	348.37 mg/l
4	Total Suspended Solids	867.58 mg/l	180.04 mg/l

### IV. CONCLUSION

The phytoremediation treats the kitchen waste water upto 40 – 50 percent. This is a low cost green technology of treatment. The TDS value will increase if there are milk or tea and coffee residues in the kitchen waste water. The waste water generated from the kitchens of restaurants and hotels can be treated with this method. The treatment efficiency for the different parameters of the waste water is approximately pH 20 to 30%, BOD 40 to 60%, TDS 30 to 70% and TSS 40 to 80%. The oil and grease or other waste has not been taken into consideration in this study.

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