



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 Issue: VI Month of publication: June 2021

DOI:

www.ijraset.com

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Experiment on Treatment of Bio-Medical Waste Water by Ozonation

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Abstract: The scarcity of fresh water is one of the major issues at different places in India. The natural resources of water are becoming insufficient to satisfy people's day to day demand. By treating waste water to safe treated water and reusing it will help us to survive in many ways. Sewage water (waste water) recycling is the process of removing contaminants from that water, primarily from house hold waste water. It includes physical, chemical and biological process to remove contaminants like bacteria, fungi and other dirt particles and produce environmentally safe treated water. The by-products of sewage treatment process is usually a semi-solid waste or slurry. That must be undergone further treatment before disposal or land filling is done. The treated water can be reused for gardening, irrigation, washing, bathing and also for drinking after a suitable treatment. In this study we are going to make an experiment on converting waste water in to pure water (agricultural, drinking purposes) using ozonation as main process and some primary treatments are done.

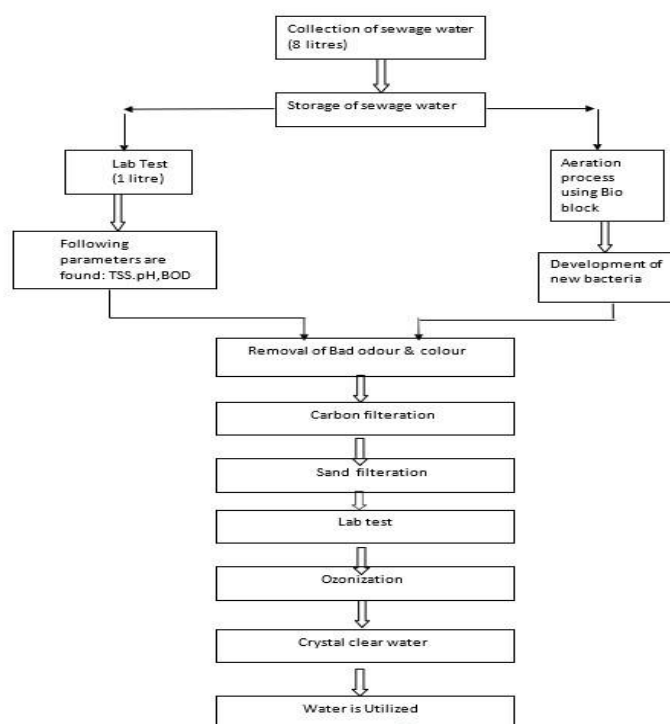
Keywords: Sewage water, water treatment, ozonation, filtration.

I. INTRODUCTION

Sewage recycling is the process of removing contaminants from wastewater, primarily from household sewage. It includes physical, chemical, and biological processes to remove these contaminants and produce environmentally safe treated wastewater (or treated effluent). A by-product of sewage treatment is usually a semi-solid waste or slurry, called sewage sludge, that has to undergo further treatment before being suitable for disposal or land application. Sewage treatment may also be referred to as wastewater treatment, although the latter is a broader term which can also be applied to purely industrial wastewater. For most cities, the sewer system will also carry a proportion of industrial effluent to the sewage treatment plant which has usually received pre treatment at the factories themselves to reduce the pollutant load.

If the sewer system is a combined sewer then it will also carry urban runoff (stormwater) to the sewage treatment plant.

II. METHOD USAGE



A novel agitation method using ozone was applied to removing BOD₅, COD_{Mn}, color, and NH₄-N in organic waste water filled in a cylindrical vessel. The organic waste water was agitated by injecting the same organic waste water into the bath through a centered bottom nozzle. Its flow rate was adjusted to form a jet above the nozzle. A pump was used for draining the organic waste water through four nozzles settled on the bottom of the vessel and circulating it until the aforementioned four quantities were sufficiently decreased. The swirl motion of the jet appeared under certain injection conditions. The bath was strongly agitated in the presence of the swirl motion. An ozone and air mixture therefore was supplied into the nozzle and then introduced into the bath with the jet. The rate constants of BOD₅, COD_{Mn}, color, and NH₄-N were highly enhanced by this method compared to the conventional method using aeration of an ozone-air mixture supplied through a perforated plate. Wastes from industrial works, farms, and so on are increasing year by year. Many efforts have been devoted for a long time to removing undesirable components, materials and inclusions from them to decrease damages to the environment as well as to recycling them. A variety of biological and physicochemical processes have been proposed depending on the properties of the wastes. Rapid and efficient processing of refractory organic waste water, however, is left unsolved.

III. RESULT AND DISCUSSION

In the collected waste water, the parameters such as Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), and pH at 27°C are found out as per Indian Standards IS 3025 (P-44) 1993 (RA 2003), (P-17) 1984 (RA-2002), (P-11) 1983 (RA-2003). The pH, TSS and BOD are thoroughly removed and the water is made suitable for drinking, even this water can be used for agriculture, irrigation, gardening and for industrial usage. pH > 7 is said to be basicity or alkalinity, pH < 7 is said to acidity and pH = 7 is said to be neutral and the water is suitable for drinking as Indian standards 3025-1983. As per Indian Standards for Drinking Water Specification (IS 10500:1991). BOD and TSS for drinking water should be nil. Wastewater discharge limits are given by CPCB Effluent Discharge Standards, which mention permissible limits for disposal into inland surface water, on land for agriculture, into public sewers and for marine disposal. BOD < 20 mg/L and TSS < 30 mg/L for inland surface water disposal as per CPCB standards.

| SL.NO | PARAMETERS | Method | Unit | Result | Limits |
|-------|------------|---------------------------------|------|--------|----------|
| 1 | BOD@27°C | IS 3025(P-44) 1993 (RA-2003) | mg/L | 347 | 20 |
| 2 | TSS | IS 3025(P-17) 1984 (RA-2002) | mg/L | 5.37 | 30 |
| 3 | pH @ 27°C | IS 3025(P-14) 1983 (RA-2002) | - | 6.85 | 5.50-9.0 |

Table:1 water characteristic before treatment.

| SL.NO | PARAMETERS | Method | Unit | Result | Limits |
|-------|------------|---------------------------------|------|--------|----------|
| 1 | BOD@27°C | IS 3025(P-44) 1993 (RA-2003) | mg/L | 1336 | 20 |
| 2 | TSS | IS 3025(P-17) 1984 (RA-2002) | mg/L | 1.47 | 30 |
| 3 | pH @ 27°C | IS 3025(P-14) 1983 (RA-2002) | - | 7.33 | 5.50-9.0 |

Table 2 biologically aerated water.

| SL.NO | PARAMETERS | Method | Unit | Result | Limits |
|-------|------------|---------------------------------|------|--------|----------|
| 1 | BOD@27°C | IS 3025(P-44) 1993 (RA-2003) | mg/L | NIL | 20 |
| 2 | TSS | IS 3025(P-17) 1984 (RA-2002) | mg/L | NIL | 30 |
| 3 | pH @ 27°C | IS 3025(P-14) 1983 (RA-2002) | - | 7.31 | 5.50-9.0 |

Table 3 : results after ozonation and filtration.

| SL.NO | PARAMETERS | Method | Unit | Result | Limits |
|-------|------------|---------------------------------|------|--------|----------|
| 1 | BOD@27°C | IS 3025(P-44) 1993 (RA-2003) | mg/L | 8 | 20 |
| 2 | TSS | IS 3025(P-17) 1984 (RA-2002) | mg/L | NIL | 30 |
| 3 | pH @ 27°C | IS 3025(P-11) 1983 (RA-2002) | - | 7.29 | 5.50-9.0 |

Table: 4 results after treatment.

IV. CONCLUSION

As there is water Scarcity in India, waste water (sewage) treatment is very helpful. There may be several different types of sewage treatment techniques, but Ozonation is the most effective method and medicated where the ozonized water can cure skin diseases, cancer, respiratory, urinary problems, brain stroke, hair fall, Artism and many more. In order to protect our future generation from scarcity of water recycling of water is much needed. Hence, water recycling is very helpful in the areas where water crisis often occurs.

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CODE REFERENCE

- ✓ IS 10500-2001 for Drinking water specification
- ✓ IS 3025(P-44)1993,(P-17) 1984,(P-11)1983 for methods of sampling and Test for water and waste water.



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