

“STUDY ON TREATMENT OF MUNICIPAL WASTE WATER USING ROTATING BIOLOGICAL CONTACTOR”

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Abstract: - It's a well-known fact that the rotating disc contactors are a superior technology for wastewater treatment. The RDC increase owing to the rate of increase in degradation and power consumption, good settling characteristics, low maintenance. RDCs are able to handle wide flow range. Mostly, media used for the RDCs are made up of PVC and metal stripes having different dimensions and structures.

1. INTRODUCTION:

Water treatment be a procedure that can improves the water qualities and results it more acceptable for specific end-use. The end use may be domestic purpose or others. Industrial norms decay severe day by day. Industries become water pollution sources which further produced bad impact on environment. These pollution harms to the people. Facilities of industries use fresh water for carrying effluent waste water from industry into different natural water sources like ocean, river,lake. Domestic wastewater pollution being increasing tremendously. Untreated water from sewer in many areas dispenses without any water treatment, which can results with diseases. It contains wide ranges of dissolved and suspended pollutants, household waste, food and vegetable waste, etc.

In Asia or developing nation, sanitation problem raising heads due to uncontrolled no of population, which leads more generation of waste water and when it is untreated for last long then consider as pollution sources. And then in order to reduce pollutant up to some extend RBC reactor being used.

2. PROCEDURE:

Wastewater was fed into the batch reactor, some amount of culture is added within the reactor for enhanced the microorganism growth. The medium was aerated and agitated by the rotating action of discs. The generation cells into waste water, is nothing but biomass in formation. Which is saturated on disk. Also mass pushed on disk is because of rotating action of disk by axle rod. The rotating action was started, after 60 minutes we collected the first sample. In such a way that, we collected each sample after every 60 minutes. The collection of the sample was like for 0 minute, 60 minutes, 120 minutes, 180 minutes, 240 minutes, and 300 minutes. In the second phase, we treated sewage water without filtering we fed into the reactor. In this case, we used a thin metal sieve containing very fine wire mesh as a disc for the RDC reactor. The media used for this process was cotton clothes (manjarpath) are wrapped entirely on the disc surface. Similarly, by using the same procedure we took a run for 5 hrs. and collected 5 samples from the reactor. Instead of cotton clothes, we replaced the media with plastic scrubbers and performing the same operations. The sewage water we treated,

all are from different localities in Pune. Analysis of further samples of cow dung cakes, cotton clothes, and scrubber was made at regular intervals during the experiments.

2.1 Standardization of FAS:

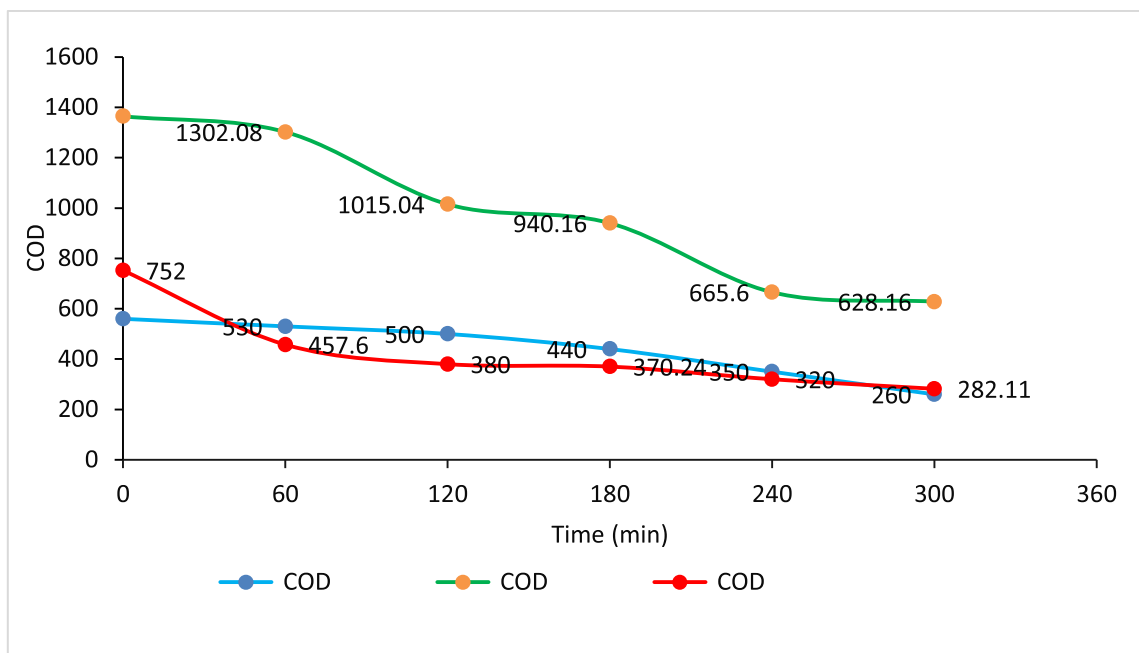
Potassium-dichromate & sulphuric-acid were titrated against by ferrous-ammonium-sulphate(FAS) by adding 3-4 drops of Ferro in indicator, for standardization of FAS. Similarly, COD samples conjointly measure with FAS.

2.2 COD Analysis procedure:

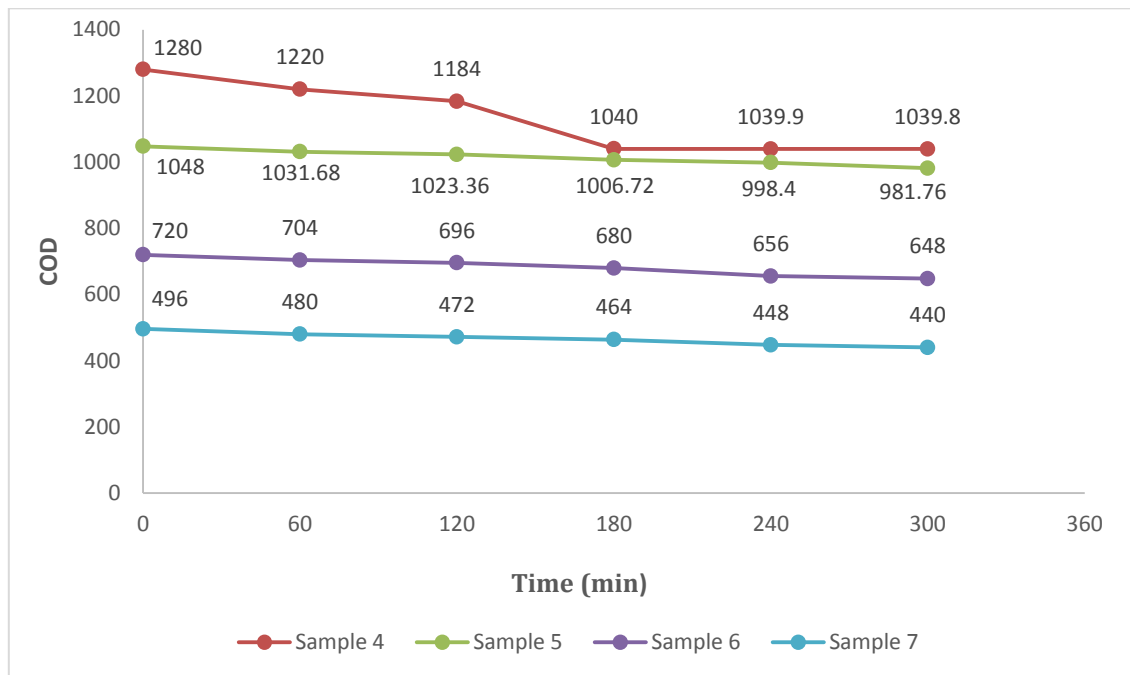
We used chemical oxygen demand (COD) digester made by META-LAB SCIENTIFIC INDUSTRIES, MUMBAI for analysis of wastewater sample collected from reactor, we following standard procedure for COD determination. Take associate degree quantity of water sample into the reflux flask and add mercuric sulphate to get rid of interference of chlorides, addition of concentration Sulphuric acid as a catalyst, and most important Potassium dichromate for oxidizes organic and inorganic matter within the sample. Cooled the reflux flask and place it into the COD digester for 2 hrs.

3. RESULTS:

COD REDUCTION OF SAMPLES WITH COTTON MATERIAL



REDUCTION OF SAMPLES WITH PLASTIC SCRUBBERS



4. CONCLUSION:

The results in this studies show that RDC is a superior technology for the aerobic oxidation process. Some researchers used various types of materials as a disc for wastewater treatment. As mentioned earlier, use of a cow dung cakes is not useful for the COD removal, because of COD level was increased. However, by means of the usage of the cotton clothes and plastic scrubbers gives high quality consequences for reduction of COD. Cotton clothes and scrubbers are used as good porous materials. The performance of this media gives better efficiencies than cakes. The removal rate of COD for cotton clothes are in the range of more than 50-60%, and for scrubbers the removal rate of COD are in between more than 6-18 %.

5. LITERATURE REVIEW:

1. Cortez et al. (2008) studied Rotating Biological Contactors (RBC) is a rectification technology used as a secondary effluent treatment. It is unique because of its features like simplicity of design and operation, short start-up, good subsiding characteristics, short contact periods, low operating expense, short retention time, low sludge production ,etc. This study is anticipated on the performance of things this can be useful for RBC design and, Parameters that have an effect on RBC is rotational speed, contact time, biofilm characteristics, staging, temperature, operation, submergences level. Dissolve oxygen level and operations. Comparison of RBC's with different effluent treatment for COD removal in differently. [5]Arrangements staging of RBC model accomplished by (a) baffles in a tank, (b) using a series of tanks, both with flow perpendicular to shaft.

3. Monaye et al. (2012) introduced a new variety of the self-rotating biological contactor (S-RBC) to become utilized within the contemporary look that becomes unfastened rotating disc. The Structural material and rotation of disc achieved due to hydraulic flow of water. Parameters like to flow rate (Q), diameter of the disc (ϕ), area of the disc (A_d), operating volume (V), area of the tank (A_t) and immersion issue, are affected on revolution per minute (rpm). So, Non-dimensional rpm formula used for estimation of on the top of parameters. The disc diameter was in range 100-230 mm, the number of disc 2-7, a spacing of disc within 15.18- 48.3 mm, and working volume is considered as 0.0068-0.0171 m³. Supported dimensional analysis by performing non-linear regression using 45 runs of experimental values. They used five reactors having a range in between 30% submergence in first set and 20-40% submergences in the second set and maintained flow rate 2-5.5 1/s. Experimentally KLa is found as in limit 0.987-0.97. KLa values achieved 0.177, 0.135, 0.11, 0.077, 0.06 min⁻¹ at flow rate 5.5 1/s. This model projected a decent and correlation for parameters, and reactor design. [6]



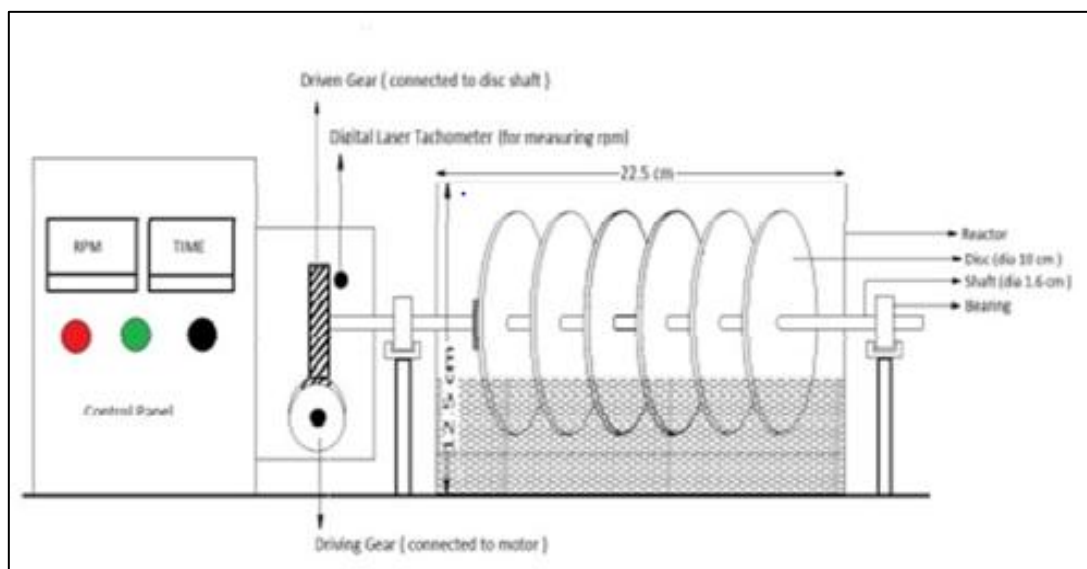
Installation of self -RBC discs on the channel

4. Bhargava et al. (2016) studied sewer treatment technologies for contaminated. Uses of water are enlarged day by day like, domestic, industrial, agriculture, etc. contaminated water from completely different sources containing chemicals, sewage, and industrial waste are directly disposed into groundwater. Municipal water carried wastewater, Then utilization of this water by physical and chemical treatment is once more reused. [7]

5. Tonde et al. (2017) targeted on parameters affecting on the performances, influent and effluent wastewater characteristics were studied. Biofilm created on the media and alter among the effluent characteristics for various parameters. Ten combination of disc were judge to analyze the feasibleness treatment of wastewater. Appraise the effectiveness of supplemental aeration for up rising the performance of RBC system. The performance of RBC reactor was

ascertained for 4 months beneath numerous conditions for pH, BOD, and COD parameters. RBC model was developed with PVC sheet material (diameter = 200mm. length = 1000mm). Acrylic sheets materials (2 mm thick and 150 mm in diameter.). Rotating acrylic disc are 40% immersed in water. Using various localities water they compared reduction of COD and BOD removal rate as higher 80%and 83%, medium 74% and 77% and lower 62% and 66%. [8]

6. Rana et al. (2018) studied the performance of the removal of phenol and its derivatives. They optimized parameters like mixed liquor suspended solids, hydraulic retention time, rotating speed, phenol removal efficiency. A small scale RBC was made up using acrylic sheets having 5 liters of operating volume. It consists of 6 discs having 10 cm diameter, 40% of disc submergence using 5-50 rpm by maintaining at room temperature approximately $\pm 30^\circ$. Under optimum in operation condition, 56% phenol was removed using rotating biological contactors achieved at 30-50rpm at HRT 14hr having an amount of phenol (1 g/l of glucose and 250 mg/l of phenol). [9]



Schematic Diagram of Rotating Biological Contactor (RBC)

7. Padhi et al. (2014) studied a rotating biological contactor is eco-friendly techniques to cut back the VOCs gases compared to physicochemical methods. Parameters like transfer of waste material, isolation and characterization of an organism, filter material, pollutant concentration, pH, pressure drop, etc. area unit influenced. The medium may encompass polyurethane mounted over a drum to support the biofilm. By comparing the researchers along with data regarding removal efficiency of VOCs gases and speed of rotation, rpm is to be maintained at 2-5 rpm and the removal efficiency is about 92-100 % by changing the temperature 11-15.5 $^\circ$ c. Amongst, RBC attributable to its many benefits over alternative techniques can be a good various for the treatment of gaseous VOCs. [13]

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