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EFFECT OF ROTATIONAL SPEED OF DISC FOR TREATING PHARMACEUTICAL AND DOMESTIC WASTE STREAMS IN ROTATING BIOLOGICAL CONTACTORS

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ABSTRACT

Rotating Biological contactors (RBC) is the only aerobic treatment process that has both attached growth biomass and suspended growth microbial systems. The pilot plant study was conducted on RBC unit of 18m3 effective volume has two stages; each having 69 number of discs. The treatment performance was studied for treating combined (Pharmaceutical and domestic) waste streams under varying influent flowrates (m3/hr) ,COD (mg/l) and rotational speed of the discs(rpm). It is found that the 2rpm of rotational speed of discs enabled to offer the maximum COD removal at 90.06% .

INTRODUCTION

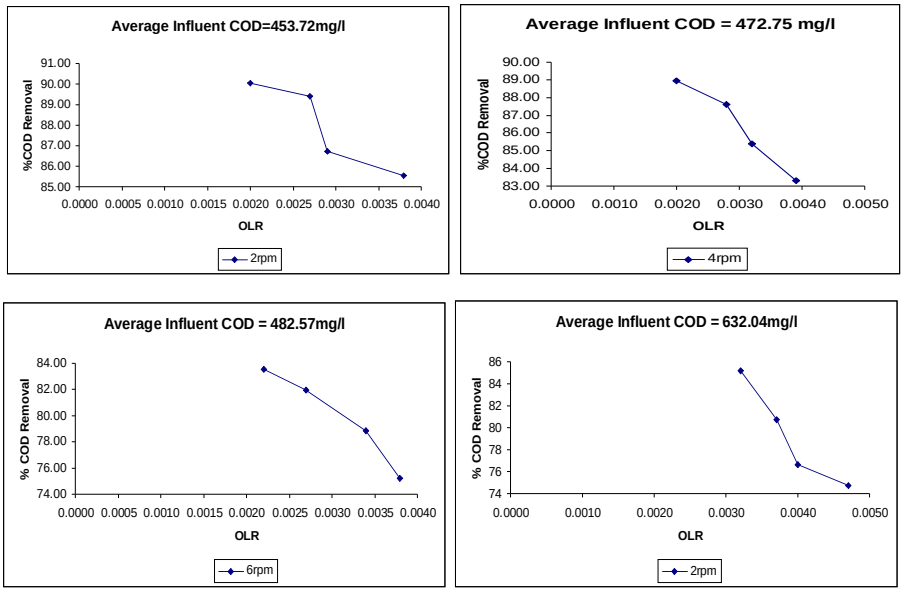
Rotating Biological Contractors are more engineered, aerobic biochemical treatment plant. They are proven to be more feasible and economic in domestic waste water treatment, as they can also accomplish the removal of nitrogen, in addition to COD at more than 90%. RBC is unique in its style with both the attached growth and suspended growth systems of micro organisms in their oxidative pathway. RBC plant can be modified and provided with better engineered systems to provide the competency to handle high COD industrial waste streams. The effect of organic loading rate in the performance of RBC for treating pharmaceutical and domestic waste streams are evaluated with an elaborate pilot plant study.

EXPERIMENTAL METHODOLOGY

The study was conducted on a two staged Rotating biological contactor of capacity of 18m3 was used in this study. The total number of rotating discs are 138 nos having a total surface area of 435m2.The diameter of the discs is 2m and it is made up of polystyrene. The maximum flow rate for RBC in the plant is 100KLD. The characterization of effluent samples from TTK – LIG Ltd Thiruvandar koil, Puducherry shown COD in the range of 412.00mg/l to 660.50mg/l.

The experiment was conducted for three different conditions, influent flowrate, varying influent COD,and varying rotational speed of the discs. The experiment was conducted for COD loading of 412mg/l and 660.50mg/l for the flow rate of 2.1, 2.5, 2.9, 3.3m3/hr. The corresponding organic loading rates are 0.002,0.003,0.0046,KgCOD/m2/hr. The different flow rate of feed ensured 8.57, 7.2, 6.21, 5.45 hrs as respective hydraulic retention time during the experiment. It was repeated for different rotational speed of the discs 2, 4, 6 rpm.

EFFECT OF ROTATIONAL SPEED OF THE DISCS



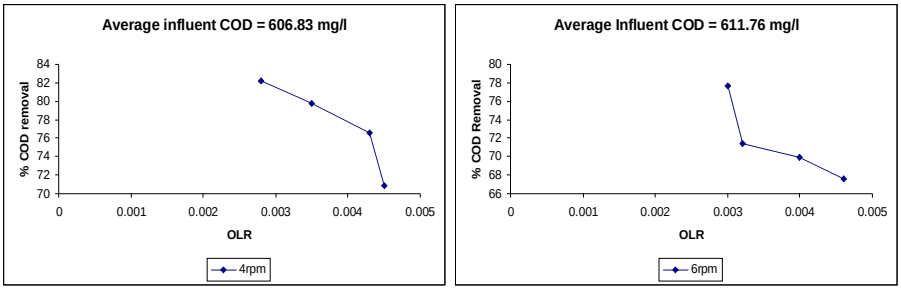


Fig.1 %COD Removal efficiency vs OLR,for varying rotating speed of the discs

RESULTS AND DISCUSSION

The % COD removal efficiency for treating combined(pharmaceutical and domestic) effluent under varying organic loading rates for different rotational speed of the discs are presented in Fig1. The COD removal efficiency is observed for 67.56% to 90.065% was observed for an organic loading rate of 0.002 KgCOD/m^2/hr to 0.0046 KgCOD/m^2/hr when the disc rotates at a speed of 2,4,6rpm. The maximum COD removal efficiency of 90.065% is observed for an organic loading rate of 0.0020 KgCOD/m^2/hr when the disc rotates at a speed of 2 rpm. The minimum COD removal efficiency of 67.56% is observed for an organic loading rate of 0.00246 KgCOD/m^2/hr when the disc rotates at a speed of 6 rpm.

CONCLUSION

The RBC is found to offer the maximum COD removal for an organic loading rate of 0.0020 KgCOD/m^2/hr while the rotating speed of the discs is at 2rpm, for treating combined (pharmaceutical and domestic) effluent. The rotational speed of the discs is found to influence the % COD removal efficiency and 2 rpm is found to offer the maximum performance. Any increase in Rotational speed is found to decrease the performance of the unit.

REFERENCES

1. Alemzadeh, Phenol Biodegradation by rotating biological contactor. Biochemical Engineering Journal, Volume.11, Pp. 19.23.2002.
2. Banerjee, G., Treatment of phenolic wastewater in RBC reactor. Water Research, Volume 31(4) Pp. 705 – 15, 1997.
3. Enayahullah, Performance of a Rotating Drum Filter in the Treatment of Waste water in Tropics, M.E., Thesis – 825, Asian Institute of Technology, Bankok, Thailand, 1975.
4. Khan, Treatment of Waste Water by Biological Discs, Indian Journal of Environmental Health, Volume 14, 1972.
5. Watanabe Y, Pilot plant study of an upgraded Rotating Biological contactor, water and science technology, volume 28,Pp.361-368,1993.