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PHYSICO-CHEMICAL AND BACTERIAL ANALYSIS OF TEXTILE EFFLUENTS FROM KANCHIPURAM, TAMILNADU

R. KOWSALYA[1], K. SUJATHA[2], KARTHIKEYANSEKAR[1], DEEPA NAGARAJ[1] AND SINDHU RAJESH[1]

[1]Depatment of IBT, [2]Department of Chemical Engineering, Dr. M.G.R Educational and Research Institute, University, Maduravoyal, Chennai, T.N., India

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ABSTRACT

Dyeing and printing of textile being a traditional industry of kanchipuram town, a good number of textile industries along with dyeing and printing clusters have come up in the area. An estimate shows that textiles account for 14% of India's industrial population and around 27% of its export earnings (Ministry of textiles, 2004). Textile effluent samples were collected for the period of 3 months at biweekly intervals. Analyses of Physico-chemical parameters like Total dissolved solids (mg/l), pH, chloride (mg/l), sulphate (mg/l), phosphate (mg/l) and chemical oxygen demand (mg/L) showed that they were not in confirmation with the prescribed limits of CPCB (1995). 16s rDNA amplification and nucleotide sequencing of the bacterial isolates from the textile effluent samples showed the presence of *Halomonas* sp of bacteria.

KEY WORDS : Textile effluents, Water pollution, Tamil Nadu

INTRODUCTION

Increasing urbanization and industrialization have led to a dramatic increase in the intensity of wastewater produced around the world. The discharge of toxic effluents from various industries adversely affects water resources, soil fertility, aquatic organisms and Ecosystem integrity. With the increased demand for textile products, the textile industry and its wastewater have been increasing proportionally, making it one of the main sources of severe pollution problems worldwide (Arun Prasad and Bhaskar Rao, 2010; Puvaneshwari *et al.*, 2006). Textile effluents are of concern because they colour the drains and ultimately the water bodies. They also diminish the water quality. (Olukanni *et al.*, 2006). More than 10,000 different textile dyes with an estimated annual production of $7X10^5$ metric tonnes are commercially available worldwide (Mc Mullan *et al.*, 2001). 2% of these dyes are directly discharged as aqueous effluents and 10% are subsequently lost during textile colouration process (Pearce *et al.*, 2003). Dye house effluents are therefore of serious environmental concern (Olukanni *et al*, 2009). Central pollution control board has listed the dye and dye intermediates industry as one of the heavily polluting industries (CPCB,1990), (Nupur Mathor, 2007). The objectives of the present study were physico-chemical characterization and bacterial analysis of the textile effluent.

MATERIALS AND METHODS

Kancheepuram town is located at a distance of 76 km from Chennai on the northern bank of the river Vegavathy, a tributary of the river Palar in Tamil Nadu, India. It is situated at 12 50′ north latitude and 7942′ east longitude. The effluent samples were collected from kanchipuram for a period of three months (July 10, Dec 10 and May 11). The effluent samples were subjected to physicochemical parameters (Total Suspended Solids, Total Dissolved Solids, Electrical Conductivity, pH, Free Ammonia, Chloride, Sulphate, Phosphate, Chemical oxygen demand and biochemical oxygen demand) were analyzed following the procedure of APHA(1995). The effluent samples were diluted with saline and spread plated on nutrient agar for isolation of

bacteria.Individual colonies of bacteria was taken and DNA was extracted. 16srDNA was performed (Bangalore Genei Pvt Ltd, Bangalore).

RESULTS AND DISCUSSION

The physico-chemical parameters recorded in the sampling sites are presented in Table 1. The total dissolved solids values ranged from 8900 mg/l and 20650 mg/l. The total dissolved solids were above the permissible limits prescribed by CPCB (1995). Maximum TDS values was observed during December 2010 and minimum during july 2010. The values of the total suspended solids ranged between 428 mg/l and 10958 mg/l. The total suspended solids was maximum during May 2011 and minimum during july 2010. During May 2011 the total suspended solids were above the permissible limits prescribed by CPCB 1995. The pH values ranged between 9.87 mg/l and 10.48 mg/l. The maximum pH value was recorded during may 2011 and the minimum pH during July 2010. These recorded values were above the permissible limits prescribed by CPCB (1995). The chloride values in sites ranged between 677mg/l and 3575 mg/l. The maximum was during December 2010 and minimum was during July 2010. Sulphate values ranged between 1200 mg/l and 6385 mg/l. The maximum values were observed during July 2010 and minimum values were observed during May 2011. The sulphate values were above the permissible limits prescribed by CPCB (1995). Phosphate values ranged between 1.64 mg/l and 15.69 mg/l. The maximum values were observed during December 2010 and was minimum during July 2010. In December 2010 the phosphate values were above the permissible limits prescribed by CPCB (1995). Chemical oxygen demand values ranged between 2659 mg/L and 9420 mg/l. The maximum value was recorded during July 2010 and minimum COD values during May 2011. The recorded COD values were above the permissible limits prescribed by CPCB (1995). PCR amplification of 16s rDNA gene of bacteria shows the presence of *Halomonas* sp. The bacteria has been proven has an effective degrading the phenolic compounds (Hinteregger *et al*., 1992). Hence the textile effluent should be treated or it should be diluted before disposing in to theenvironment.

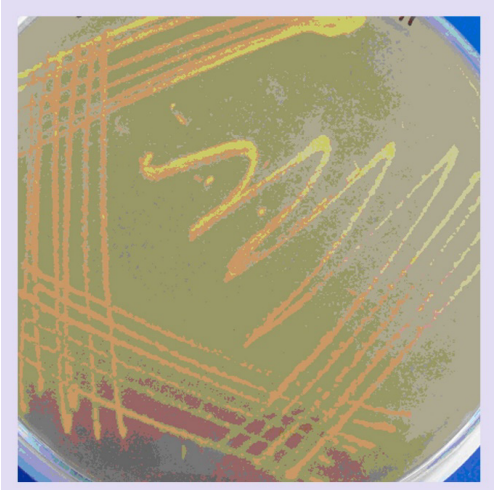

Fig. 1. Quadrant streaking of the Effluent sample on Nutrient Agar media

REFERENCES

APHA, 1995. *Standard Methods for the Examination of Water and Wastewater.* American public health association, Washington, DC. 17th ed.

Arun Prasad, A.S. and Bhaskara Rao, K.V. 2010. Physico chemical characterization of textile effluent and screening for Dye decolourizing Bacteria. *Global Journal of Biotechnology and Biochemistry.* 5 (2) : 80-86.

CPCB (central Pollution Control Board) Minimal National standards: Dye and dye intermediate industry. Comprehensive industry document series : COINDS/34/1990(1990). Wilfred Sugumar, R. and Sandhya Sadanandan (2010).

Hinteregger, C., Leitner, R., Loidi, M., Fersh, A. and Streichsbir, F. 1992. Degradation of phenol and

Table 1. Physico-chemical parameters observed in sampling site (Kanchipuram) during different sampling periods

S.No	Parameters	Jul-10	Dec-10	May-11	CPCB1995
1	Total Suspended Solids mg/L	428	562	10958	600
2	Total Dissolved Solids mg/L	8900	20650	10586	2100
3	pH	9.87	10.28	10.48	5.5-9.0
4	Chloridemg/L	677	3575	3234	1000
5	Sulphatemg/L	6385	4225	200	1000
6	Phosphate mg/L	1.64	15.69	2.14	5.0
7	COD mg/L	9420	6782	2659	250

phenolic compounds by *Pseudomonas putida* EKII. *Appl Microbiol. Biotechnol.* 37 : 252-259.

MC Mullan, G., Meehan, C., Conneely, A., Kirby, N., Robinson, T., Nigam, P., Banat, M. march ant. R Singth, W.F. 2001. Microbial decolourization and degradation of textile dyes. *Appl. Microbiol. Biotechnol.* 56 : 81-87.

Nupur Mathur and Pradeep Bhatnagar. 2007. Mutagenicity Assessment of textile dyes from Sanganer (Rajasthan). *Journal of Environmental Biology.* 28 (1) : 123-126

Olukanni, O.D., Osuntoki, A.A. and Gbenie, F.O. 2006. Textile effulent biodegradation potentials of textile effluent adapted and non-adapted bacteria. *Afr. J. Biotechnol.* 5(20):1980-1984.

Olukanni, O.D., Osuntoki, A.A. and Gbenle, G.O. 2009. Decolourization of azo dyes by a strain of Micrococcus isolated from a refuse dump soil. *Biotechnology.* 8(4) : 442-448.

Pearce, C.I., Lioyd, J.R. and Guthrie, J.T. 2003. The removal of colour from textile waste water using whole bacterial cells a review. *Dyes Pigments.* 58 : 179-196.

Puvaneshwari, N., Muthukrishna, J. and Gunasekaran, P. 2006. Toxicity assessment and microbial degradation of azo dyes. *Indian Journal of Experimental Biology* 44 : 618-626.