

PHYSICO-CHEMICAL ANALYSIS OF WASTE WATER FROM ORIENT PAPER MILL AMLAI DISTT SHAHDOL (M.P.)

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ABSTRACT: Physico- Chemical Characteristics of Paper Industry Effluents located in Amlai is a census town of Shahdol And Anuppur districts combinedly in the state of (M.P.) were analyzed for the parameters such as pH, Turbidity, Total suspended solids, Total dissolved solids and Electrical conductivity for treated as well as untreated effluents. Of all parameters Turbidity and Total Suspended solids for both treated and untreated effluents were above the permissible limits.

KEYWORDS: Effluents, Orient Paper Mill ,Sone River pollution ,Total dissolved solids , Total suspended solids, pH, Turbidity.

INTRODUCTION

Man has been utilizing the natural assets since start of human civilization .The primitive man was absolutely depend upon common populace, the over abuse of the resources prompted its annihilation (Kuzhali,2012) . A significant number of the industries are totally relying upon common resources for their raw material. This over dependence is the reason for different natural issues, for example, contamination of land, water, and air. Pollution alludes to a undesirable changes in the physical, chemical or biological characteristic of our environment namely; air, water, and soil (Kuzhali,2012). Industrial wastes coming about because of all assembling industries are a noteworthy reason for air, water, and land contamination. Among the 17 most dirtying businesses recognized by MOEF (ministry of environment and forest) , paper industry is one among them. The pulp and paper industry is one of the most established industries in our nation. In any case, there has been a huge extension in this industry amid the most recent 25 years (Gupta., 2013) Paper mill is a great industrial sector using an large amount of ligno-cellulosic materials and water amid the assembling procedure, and discharge chlorinated lingo sulphonic acids, chlorinated resin acids, chlorinated phenols and chlorinated hydrocarbons in the effluents (Chopra and Kumar, 2011). The making of the paper requires vast volume of water which is utilized at different stages, for example, wood preparation, pulping, pulp washing, screening, washing, bleaching and coating operation.

Among these procedures, pulping particularly substance pulping produces a high quality of waste water. Such waste water having high COD and BOD value which exasperates the ecological balance of the environment, so paper making is water intensive process. India has 550 paper mills at present which utilize squander paper as a crude material. The need for the paper and paperboard by the year 2006-07 in India was 3.8 million tons/year and 4.9 million tons/year toward the finish of year 2010 references. The present recovery and usage of waste paper by paper processes in India is 3.0 million tons every year, which means a recovery of 27% of the aggregate paper and paper board expended. This recovery rate is low when contrasted with other created countries like Germany-73%, Sweden-69%, Japan-60%, Western Europe-56%, USA-49%, and Italy-45% same (Indian Paper Manufactures Associations (IPMA), 2010). Because of lacking accessibility of indigenus waste paper, India factories depend vigorously on imported waste paper to take care of the crude material demand. According to evaluation, the import of waste paper has expanded from 5.1 million USD in 1980 to one billion USD in 2011. India imports around 4.0 million tons of waste paper yearly which is around 57% of its prerequisites (Indian Paper Manufactures Associations (IPMA), 2010).

METHODOLOGY:-

1.1. DESCRIPTION OF STUDY AREA

Amlai is located 220 11' 21'' N 780 41' 25'' E in (M.P.). Amlai is a census town of Shahdol and Anuppur districts combined in the state of (M.P.) As of 2001 India census, Amlai had a population of 30292. Orient Paper Mill is located inside Amlai and biggest paper mill of Asia (Figure 1). OPM situated bank of Son river, while distance between paper mill and Son river is 2 km. Total discharge and waste water effluent directly flow into Son river. Son River originates from Amarkantak, just east of the headwater of the Narmada River and flows along with bank of OPM, Amlai. The layout of the study area are shown as 1, 2, 3, 4, 5 stand for sampling station code SS-01, SS-02, SS-03, SS-4, SS-05 respectively (Figure 2).

1.2. COLLECTION OF SAMPLE

Samples were collected in plastic containers that were previously cleaned by washing in non-ionic detergent, rinsed with tap water and later soaked in 10% HNO₃ for 24 hrs and finally rinsed with deionised water. Wastewaters were collected from the tunnel of effluent of OPM, Amlai and Son River water nearby village area during the month of November 2017-april 2018. The effluent samples were subjected for physico- chemical parameters by using standard methods (APHA 2005).



Figure 1: District Shahdol

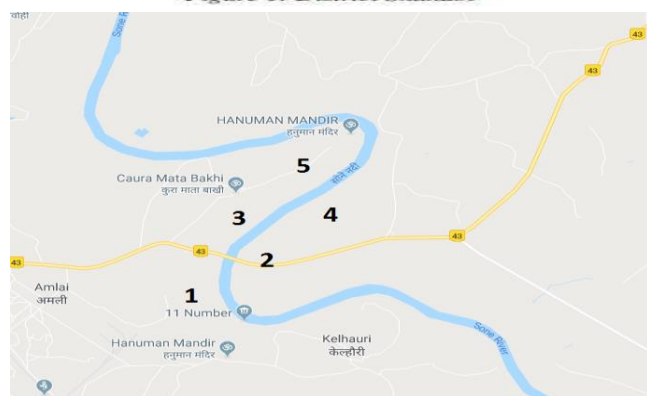


Figure 2: Sampling Stations



Figure 3: Orient Paper Mill

1.3. PHYSICO CHEMICAL ANALYSIS OF EFFLUENTS

The samples collected from the orient paper mill Amlai was brought for the physicochemical analysis in laboratory for the following parameters and analyzed using standard methods (APHA 2005) given in table 1.

Table-1. Analytical methods for physico-chemical parameters of Orient Paper Mill effluents.

S.NO.	Physico-chemical parameters	Method applied for laboratory analysis
1.	pH	pH meter
2.	Turbidity	Nephelometer
3.	Electrical conductivity	Potentiometry
4.	Total dissolved solids (TDS)	Gravimetric, oven drying at 105 ⁰ C
5.	Total suspended solids (TSS)	Gravimetric, residue drying 105 ⁰ C

RESULTS AND DISCUSSION:-

The paper mill produces different types of writing and printing paper utilizing waste-paper as raw material. The average production of paper in the mill is around 50,000 ton for each year to produce tremendous different types of paper. The wastewater generated from the paper mill consists of white water from stock preparation, paper machine and from the bleach section. The wastewater for analysis have been collected from the inlet which is more polluted and from the outlet, that after treatment. The results for the pH, turbidity, electrical conductivity, TDS (Total dissolved solids), TSS (Total suspended solids) have been analyzed before and after treatment and compared with the Indian standard value and have been uncovered in table 2

pH

The average pH values for treated effluents have been recorded as 6.6 and for untreated effluents value as 8.5. The acidic nature of treated effluents is due to the presence of acids which is used while treating them and alkaline nature of untreated effluent is due to the presence of chemicals such as hydrogen peroxide, caustic soda, and soap used while pulping the waste (Tripathi et al. 2013)

Turbidity

The average value for turbidity recorded for both treated as well as untreated effluents is 159 NTU and 297 NTU respectively which have been found to be higher than the BIS prescribed limit (Tripathi et al. 2013)

Electrical Conductivity

Electrical conductivity is a useful indicator to show the salinity or total salt content of the effluents. The average electrical conductivity value for the treated effluent have been recorded as 313.83 ppm and for untreated effluent as 350.83 ppm . The EC value of untreated effluent is higher than the BIS prescribed limit i.e., 1000µs. It is due to the presence of ions (Kuzhali et al. 2012).

Total Dissolved Solids

The average TDS values have been recorded as 1043mg/L for treated effluents and 1,233mg/L for untreated effluents. The TDS values for both the treated

as well as for untreated effluents were found to be lower than the BIS prescribed limit. (Kesalkar et al. 2012).

Total Suspended Solids

The TSS values have been recorded as 487 mg/L for treated and 683mg/L for untreated effluents which have been found to be higher than BIS prescribed limit. The higher mean value of tss is due to the addition of different chemicals during pulping and bleaching processes. (Kesalkar et al. 2012).

Table 2: Physico-Chemical Analysis of Paper Industry Effluents

S. No.	Parameters	Treated Effluent	Untreated Effluent	Indian Standards
1	pH	6.6±2 (4.6 - 8.6)	8.5±0.9 (7.6-9.4)	5-9
2	Turbidity	159±7 (152-166)	297±9 (288-306)	10
3	Electrical Conductivity	313.83±312 (1.83-625.83)	350.83±163 (187.83-513.83)	1000µs
4	Total Dissolved Solid	1043±243 (800-1286)	1233±376 (856-1609)	2100 mg/L
5	Total Suspended Solids	487	683	100 mg/L

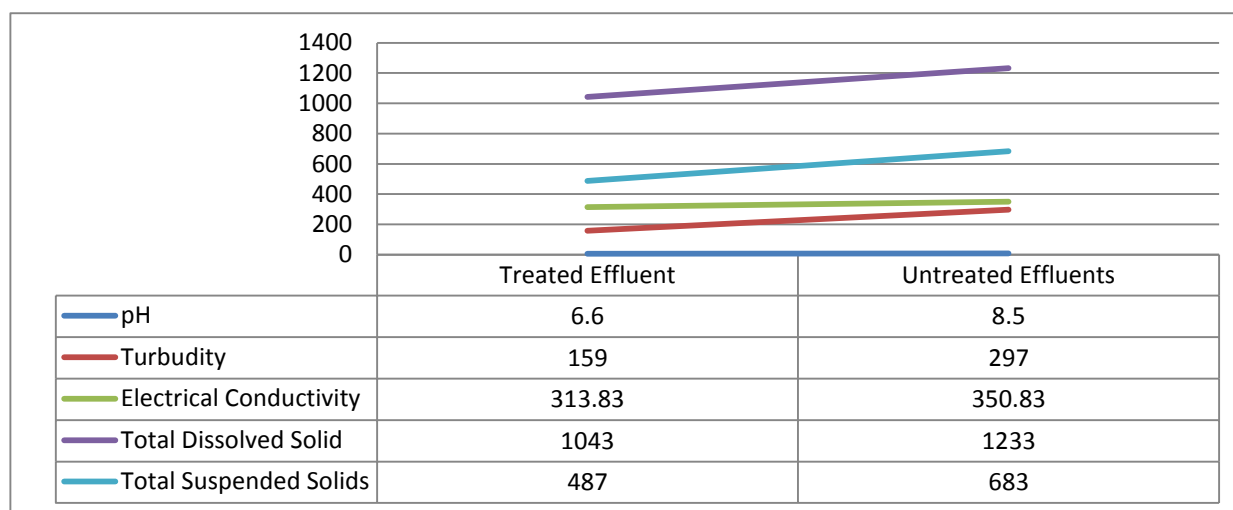


Fig 4: Showing the values of physico-chemical parameters for Treated and Untreated Effluents

STATEMENT OF SIGNIFICANCE:-

CONCLUSION:-

The paper mill is developing quickly and produces different varieties of paper. But on the other hand paper mill also contribute to pollution because of production of high amount of waste water amid the manufacturing of paper. Based on above discussion it is concluded that Turbidity and Total Suspended solids for both treated and untreated effluents were above the permissible limits as there was absence of sophisticated treatment plant which could reduce the TSS and Turbidity level. Hence proper strategies should be utilized to treat the effluents prior to its disposal to the environment.

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