

# Physico – Chemical Analysis of Paper Industry Effluents in Jammu city (J&K)

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**Abstract-** Physico- Chemical Characteristics of Paper Industry Effluents located in Bari Bramana, District Samba, Jammu and Kashmir, 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.

**Index Terms-** Effluents, Pulp and Paper mills, Total dissolved solids, Total suspended solids.

## I. INTRODUCTION

Man has been using the natural resources since beginning of civilization. The primitive man was totally depend on natural resources for his existence. With the increase in population, the over exploitation of the resources led to its destruction (Kuzhali, 2012). Many of the industries are totally depend on natural resources for their raw material. This over dependence is the cause of various environmental problems such as pollution of land, water, and air.

Pollution refers to an undesirable changes in the physical, chemical or biological characteristics of our environment namely; air, water, and soil (Kuzhali, 2012). Industrial waste resulting from all manufacturing industries are a major cause of air, water, and land pollution.

Among the 17 most polluting industries identified by MOEF (ministry of environment and forests), paper industry is one amongst them. The pulp and paper industry is one of the oldest industries in our country. But there has been a tremendous expansion in this industry during the last 25 years (Gupta., 2013)

Paper mill is a major industrial sector utilizing a huge amount of ligno- cellulosic materials and water during the manufacturing process, and release 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 large amount of water which is used at various stages such as wood preparation,

pulping, pulp washing, screening, washing, bleaching and coating operations. Among these processes, pulping especially chemical pulping generates a high strength of waste water. Such waste water having high COD and BOD values which disturbs the ecological balance of the environment, so paper making is water intensive process.

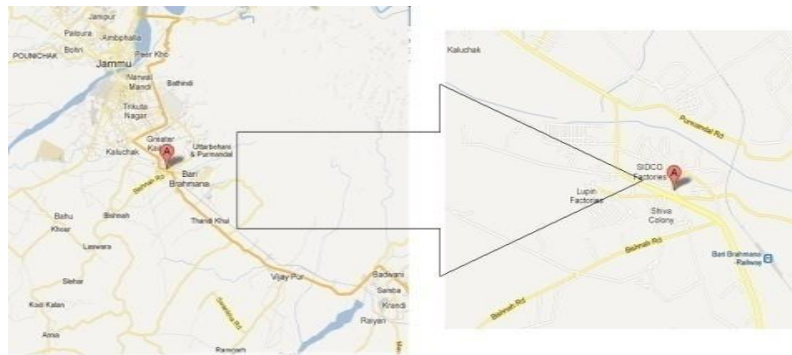
India has 550 paper mills currently which use waste paper as a raw material. The demand for the paper and paperboard by the year 2006-07 in India was 3.8 million tons/year and 4.9 million tons/year at the end of year 2010 references.

The present recovery and utilization of waste paper by paper mills in India is 3.0 million tonnes annually, which translates to a recovery of 27% of the total paper and paper board consumed. This recovery rate is very low as compared to other developed nations like Germany-73%, Sweden-69%, Japan-60%, Western Europe-56%, USA-49%, and Italy-45% same (Indian Paper Manufactures Associations (IPMA), 2010). Due to inadequate availability of indigenous waste paper, India mills rely heavily on imported waste paper to meet the raw material demand. According to an estimate, the import of waste paper has increased from 5.1 million USD in 1980 to one billion USD in 2011. India imports around 4.0 million tonnes of waste paper annually which is about 57% of its requirements (Indian Paper Manufactures Associations (IPMA), 2010),

## II. METHODOLOGY

### 2.1 collection of samples

The effluents was collected in previously cleaned plastic containers. These effluents was collected from Jammu paper mills located in Bari Brahmana sector (SIDCO complex), district Jammu, India, at a distance of about 5 km from central university of Jammu. Bari Brahmana (SIDCO complex) is located at 32°38'38.5"N and 74°54'19.5"E (fig.1) the sampling was carried for APRIL month, 2014. The collected samples was analyzed for physico-chemical characteristics by using the standard methods.



**Fig 1. showing the location of Sidco complex Bari Brahmana , J&K**

**2.2 PHYSICO CHEMICAL ANALYSIS OF EFFLUENTS**

The samples collected from the paper mill was brought for the physicochemical analysis in laboratory for the following parameters and analysed using standard methods given in table 1

**Table-1. Analytical methods for physico-chemical parameters of pulp and 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°C
5.	Total suspended solids (TSS)	Gravimetric, residue drying 105°C

**III. RESULTS AND DISCUSSION**

The paper mill produces variety of writing and printing paper using waste-paper as raw material. The average production of paper in the mill is around 50,000 tonne per year to produce huge different varieties 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 revealed in table 2

**3.1 pH**

The average pH value for treated effluents have been recorded as 6.7 and for untreated effluents value as 7.5 . 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)

**3.2 Turbidity**

The average value for turbidity recorded for both treated as well as untreated effluents is 161 NTU and 299NTU respectively which have been found to be higher than the BIS prescribed limit (Tripathi et al. 2013)

**3.3 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 195.9ppm and for untreated effluent as 196.95 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).

**3.4 Total Dissolved Solids**

The average TDS value have been recorded as 1,244mg/L for treated effluents and 1,049mg/L for untreated effluents. The TDS value for both the treated as well as for untreated effluents were found to be lower than the BIS prescribed limit.(Kesalkar et al. 2012)

**3.5 Total Suspended Solids**

The TSS value have been recorded as 476mg/L for treated and 665mg/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)

**Table2. Physico-Chemical Analysis of Paper Industry Effluents**

S.NO.	PARAMETERS	TREATED SAMPLE	UNTREATED SAMPLE	INDIAN STANDARDS (BIS)
1	pH	6.7± 2	7.5±0.8	5-9

		(6.5-6.9)	(6.7-8.4)	
2	Turbidity(NT U)	161± 8 (153-169)	299±10 (309-289)	10
3	Electrical Conductivity(μ s)	311.93±314 (291.6-544)	300.83±159 (272.8-508.7)	1000μs
4	Total Dissolved Solids(mg/L)	1244±244 (1488-1000)	1049±374 (1423-675)	2,100mg/L
5	Total Suspended Solids(mg/L)	476	665	100mg/L

#### IV. CONCLUSION

The paper mill is growing fast and produces different varieties of paper. But on the other hand paper mill also contribute to pollution because of production of high quantity of waste water during the manufacturing of paper. On the basis of 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 used to treat the effluents prior to its disposal to the environment.

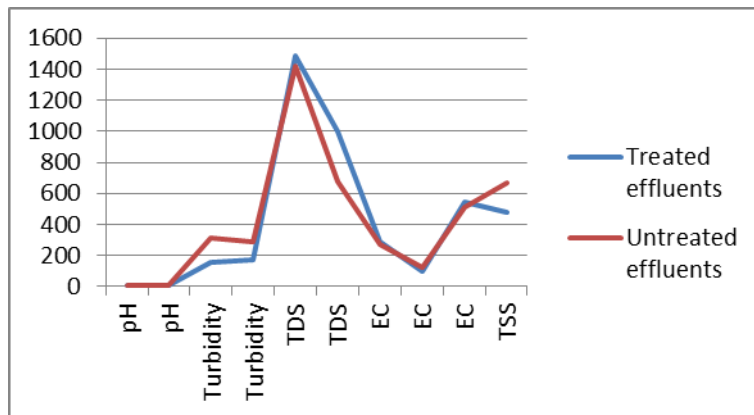


Fig 2. Showing the values of physico-chemical parameters for Treated and Untreated Effluents

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