

Assessment of Physico-Chemical Characteristics of Paper Mill Industry Effluent From Pugalur, Karur, Tamil Nadu

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Abstract- The enormous amount of water is employed for the production of paper and consequently the immense quantity of effluents area unit being generated, meet encompassing environments with or while not correct treatment. Throughout gift investigation, a trial was created to assess the physicochemical properties of effluents discharged by pugalur factory Industries restricted set at pugalur Karur District, Tamilnadu, and to judge its ecological impact on the aquatic organism. The effluent from the paper trade is characterized by color, extreme quantities of COD, BOD, pH, TDS, and SS The samples were collected from the body of water and outlet of the effluent treatment plant of factory the samples were analyzed and compared with the Indian standards of effluent discharge. The effluent contains hydrogen ion concentration of 8.6-8.4., Total Dissolved Solids of 1073mg/l, build and COD varies 64.00mg/l and 1620.00 mg/l severally. Result shows that the hydrogen ion concentration and TDS is within the permissible limits and COD, BOD, SS doesn't meet the permissible standards after treatment. The mill doesn't meet the Standards set by Central Pollution panel, India.

Keywords- Paper mill effluent, Water Pollution, Industrial Effluent, BOD, COD, Oil and Grease, Total Solid Content, TDS, TSS,

I. INTRODUCTION

The manufacturing plant effluent characteristically contains colour, terribly high level of organic chemistry chemical element Demand (BOD), Chemical element Demand(COD), because of presence of polymer and its derivatives from the raw plastic materials, chlorinated compounds, suspended solids (mainly fibres), fatty acids, tannins, organic compound acids, sulphur and sulphur compounds, etc forty-three The dark colour of the effluent exhibits the nephrotoxic effects on the accumulation and inhibits the chemical action activity by reducing the sunlight⁴. Most of those industries discharged their insufficiently treated waste into the rivers or streams, that makes major problem to aquatic life and flora-fauna. Thus, it's necessary to develop economical answer on the effluent discharged. The most

objective of the paper is to investigate the physicochemical characteristics of the effluent of the manufacturing plant. The planet demand for paper has full-grown apace and was around 5-6% p.a. an Asian country, the full production 60-70% is from hardwood and bamboo fiber, agro-waste and alternative 30-40% is from the recycled material Industrial pollution issues area unit the foremost dangerous threatening to human, animal yet as plants. With speedy industry, the matter is being additional accentuated. The majority of industries discharge their effluents into lakes, rivers, and canals or drains while not correct treatment or untreated The volume of the commercial waste effluents is increasing many times as quick as that of a waste matter because of the results of growing per capita output product and therefore the increasing degree of process per unit products. The impure effluents of the industries square measure anxious through the drains or by surface flow... within the developing countries, the pollution of air, water, and soil are predicated on the character of raw materials and strategies of the process employed in the trade. The vegetation getting ready for discharging drains is adversely stricken by the commercial effluents. Several of the staff has represented the injury to vegetation caused by the commercial waste effluents [1], [3], [4], [5], [8]. Water plants are significantly affected [6], [7], [10], [11] had been researched. These wastes usually contain a good vary of contaminants akin to fossil fuel hydrocarbons, chlorinated hydrocarbons and serious metals, varied acids, alkalis, dyes and alternative chemicals that greatly modify the physicochemical properties of water. The waste additionally includes detergents that make a mass of white foam within the watercourse waters. Of these chemicals square measure quite harmful or perhaps fatally venomous to fish [1-3]. Alternative aquatic populations [4]. It is found that simple fraction of the entire pollution in Bharat comes within the kind of industrial effluent discharge, solid wastes, and alternative venturous wastes. The effluent volume and composition depends on the scale of the plant and producing processes adopted and therefore the extent of utilizing of water used in the plant. In India, concerning 288 Pulp and paper mills manufacture twenty-seven.5x10⁵ tones of paper annually (Gokhale et al., 1992), producing of paper yield giant quantities of colored and extremely waste material

water. it's been calculable that the discharge of effluent from Pulp and paper industries, per ton of paper, made ranges from forty-seven to eighty,000 gallons (Nemerow, 1978). Such wastewater has ceaselessly free within the water bodies or ashore for irrigation functions. the continual unharnessed of wastewater into the water bodies not solely cause aesthetic pollution however conjointly has been reported to be venturous for aquatic flora and fauna (Nampothary and Sashidharan, 1976, Roald, 1977; Mc-Leay, 1979 Singh et., 1996). Land application of factory effluent for growing form of crops has been reported from many elements of the world (Subramanian, 1990). However, its irrigation cause injury to the plant growth and conjointly alters physicochemical properties of the effluent irrigated soils. It's so, been thought-about worthy to analyze the strength of metal ions and a few physicochemical characteristics of Pudumjee Pulp and Paper Mill's effluent.

II. MATERIALS AND METHODS

Study area for the present investigation, of the paper mill effluents sample was collected from the paper mill, situated at pugalur, which is situated twenty kilometers away from Karur.

III. SAMPLING

The effluents sample was collected in plastic containers that were antecedently clean by laundry in non-ionic detergent, rinsed with water and later soaked in ten HNO₃ for twenty-four hrs and eventually rinsed with deionized water [4] and therefore the effluent samples were subjected for physical, chemical and biological parameters by victimization in normal ways [5].

IV. RESULT AND DISCUSSION

S.NO	I. Physical Examination	Standard limits	Analyzed value
1.	Appearance	-	Clear
2.	Colour	5	Brownish
3.	Odour	Agreeable	Effluent bad smell
4.	Turbidity NT Units	1	2
5.	Total Dissolved Solids mg/l	500	1073
6.	Electical Conductivity Micro mho/cm	-	1533
II. Chemical Examination			
7.	pH	6.5-8.5	8.06
8.	Ph. Alkalinity as CaCO ₃ mg/L	-	0
9.	Total alkalinity. as CaCO ₃ mg/L	200	132
10.	Total Hardness as CaCO ₃ mg/L	200	392
11.	Calcium as Ca as mg/L	75	94
12.	Magnesium as mg/L	30	37
13.	Sodium as Na mg/L	-	184
14.	Potassium as K mg/L	-	32
15.	Iron as Fe mg/L	0.3	0.98
16.	Manganese mg/L	0.1	0
17.	Free Ammonia as NH ₃ mg/L	0.5	0.05
18.	Nitrite as NO ₂ mg/L	-	0.14
19.	Nitrate as NO ₃ mg/L	45	32
20.	Chloride as Cl mg/L	250	430
21.	Fluoride as F mg/L	1.0	0.0
22.	Sulphate as SO ₄	200	71
23.	Phosphate as PO ₄	-	0.99
24.	Tidys Test 4 hrs as O ₂	-	0.40
25.	C.O.D as O ₂	-	1620.00
26.	B.O.D mg/hr	50	64.00
27.	Chromium mg/L	0.05	0.0320
28.	Zinc mg/L	15	3.24
29.	Copper mg/L	1.5	0.0012

The color is sometimes the primary contamination to be recognized in wastewater that affects the aesthetics, water transparency and gas solubility of water bodies[6] These samples recorded the hydrogen ion concentration price of 8.03 ± 0.3 that slightly base-forming as rumored by [7]. But United Nations agency pointers the tolerance limit of hydrogen ion concentration as 6-9[4]. The hydrogen ion concentration price of the paper business effluent as half dozen to nine rumored by [8]. The discharge of wastewater into water bodies might cause a drop or increase in their hydrogen ion concentration thanks to the dimensions and activities of the microbial population. Temperature is that the primarily vital issue for its impact on different properties of wastewater. The average temperature of paper effluent was recorded as 30.33 ± 1.52 °C Electrical conduction is associate degree helpful indicator to indicate the salinity or total salt content of the effluents. The world organization price of effluent samples was recorded as 1533 ± 26.0 mho/cm This is higher than that value of WHO guidelines(ie) 1000 μ s. EC value of the paper mill effluent as 6020 μ s reported by [9]. Increase in world organization values indicates the presence of upper concentration of ions [7]. The average of total dissolved solids(TDS) was 1073 ± 58.0 mg/l. The values obtained for TDS is where quite United Nations agency customary of 2000mg/. for the discharge of effluent into surface water. The TDS might increase the salinity of the water and so might render it unfits for irrigation and drinking functions.

Consumption of water with high concentrations of total dissolved solids has been rumored to cause disorders of the digestive tube, system respiratory, system nervous, coronary system besides, causing miscarriage and cancer [10]. Dissolved gas is that life of the degree of pollution by organic matter the destruction of organic substances moreover because of the self purification capability of the water body. The DO worth of the paper effluent sample was recorded as 7.43 ± 0.76 mg/lr. Biological gas Demand is that life of the gas needed by microorganisms while breaking down organic matter. Within the gift study, BOD of the effluent was $380 + 36.05$ mg/lr. while WHO tips of some worth were 50 mg/lr. BOD worth of the mill effluent as 425 to 360 mg/lr reported by [11] and [12]. The high soma levels square measure indications of the pollution strength of the waste waters. The high soma and low gas content of effluent can have an effect on survival of gill respiratory animals of the receiving water body [13]. Chemical gas Demand are that the life of the quantity of gas needed to break down each organic and inorganic matters. The COD worth of the sample was recorded as 1620.00 ± 61.85 mg/lr. This sample worth was beyond that of WHO tips worth of a thousand mg/lr. [14] The COD of paper effluent as 1620 mg/lr. High COD levels indicate the venomous state of the waste water at the side of the presence of biologically resistant organic substances [15]. Trace amounts of minerals love metallic element, Ca, and Mg were bestowed higher than WHO suggested level within the vary of 260.99 ± 7.06 ; $299.66 + 19.09$; $184 + 12.48$ severally. The presence of varied trace components within the pulp and mill effluents reported by [16] and [17]. The presence of the metallic element, Ca and Mg in excess makes water unfit for irrigation since its application increase issues of soils salinity and its porosity determination to crop plants [18].

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