

# Analysis of Industrial Effluent for Physical Parameters

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**Abstract**—Dyeing industry is the main source of colour pollution in the water body in which this waste water are discharged as different chemical and physical process involved in the dyeing industry consist of use of colouring agent which increases the colour pollution and also affects the pH, temperature and conductance of water. Generating the pollutant by all these processes are very harmful. This all disturb the normal functioning of living organisms in the water. Few physicochemical characteristics are determined in the waste water effluent of two dyeing industry in Bhiwandi city.

**Keywords:** Dyeing Industry Effluent, Pollution, Physicochemical characteristics.

## 1. INTRODUCTION

In dye industry “dye application” is very significant and it has become a massive industry today. However, due to the toxic nature and adverse effect of synthetic dyes on all forms of life the interest in natural dyes has revived throughout the world. Nevertheless even the natural dyes have rarely low-impact, due to certain mordants that have to be used with them. Mordants, are substances, used to “fix” color onto the fabric. They may be very toxic and may have a high impact on the wastewater quality. Natural dyestuffs require large quantities of water for dyeing. (Almost equal to or double that of the fiber's own weight). About 80 percent of the dyestuffs stay on the fabric, while the rest go down as a drain. Consequently natural dyes prepared from wild plants and lichens can have a very high impact on the environment [7].

Contamination and discharge of chemical pollutant in the water causes toxic effect to the hydra organisms. The organic and inorganic chemicals also have harmful effect on living aquatic organisms. The agricultural water sources consist of fertilizer and pesticides and effluents from the activities of industries and runoff along with industrial effluents, chelating agent, anions, chemicals and high weight elements[4].

Colouring matters are harmful and toxic to animal and human being at elevated level. This colours and particles through the ground water get mixed with the water reservoir which may or may not be the source of drinking water. Human activities are responsible for increasing the colour and solid particles in the water. This activities also make the water more

acidic or basic which is not good for human health and also for aquatic animals. In this manner level of acidity, basicity and temperature get increased in the ponds, lakes, river and ocean. These all change in the pH have a very bad effect when this water entered in the human body through the food chain, disturbing the food chain via the aquatic animals. As the food chain get disturbed, the entire aquatic ecosystem get destroyed[2].

Health and welfare of humans are affected by factors like industrialization. Industrial factories with several production processes and usage of raw and synthetic materials produce other unwanted harmful and toxic byproducts like waste water, solid waste and pollutant gases[9].

Water is very precious to all forms of life on the earth. Therefore it is necessary to have a good quality of water, because due to use of contaminated drinking water, human population suffers from various water borne diseases. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life.

Our environment has witnessed a continuous and rapid deterioration due to pollution in all its abiotic and biotic components. Nowadays, water pollution is a burning issue all over the world. Like other developing countries water pollution in India has created an alarming situation. Water is essential for life on earth. Water is a unique liquid without which, life as we know is impossible. Water, due to its great solvent power, is constantly threatened and gets polluted easily. The requirement of water in all forms of lives, from micro-organisms to man, is a serious problem today because all water resources have reached a point of crisis due to urbanization and industrialization . **Water pollution** is the contamination of natural water bodies by chemical and physical substances.

Pollution of water due to discharge of industrial and domestic effluents are creating a serious threatens to the human populations. This research problem is taken to study the pH , temperature , colour and conductance of two different dyeing effluent in Bhiwandi city.

### 1. 1 Temperature:

Discharge of unutilized heat in to cool water causes stratification potentiating the processes of absorption and degradation of organic matter. Temperature is significant parameters of water analysis. Since water body is a living body, most of the living organism survive in water body because of its temperature. Even the chemical analysis and reactions in the water is affected by temperature. Thermometer is used for measurement of temperature[1, 2].

### 1. 2. pH :

pH indicates the acidity, alkalinity and neutrality of water body and it also determine the acidic, caustic and corrosive nature of the water. Low value of pH indicates higher acidity and high value of pH indicates low corrosive nature. pH from 1 to 6 reveals acidic water, pH value from 7 to 14 indicates alkaline water and pH 7 indicates the neutral water. There are many factors responsible for increasing and decreasing the pH of water and making it acidic or alkaline. Conductivity and alkalinity positively correlated with the pH of water . High amount of acidic effluents discharged from the chemical industries, increases the acidity and decreases the value of pH. Discharge of alkaline effluents may be carbonates, bicarbonates, carbon dioxide, increases the alkalinity of water with increase in the pH value. The change in the pH value of water get affected by the change in the physical and chemical characteristic of water[6].

Ionic Product of water= $K_w$

= $1.01 \times 10^{-14}$  at  $25^\circ\text{C}$

Concentration of hydrogen and hydroxyl ions are

= $1.005 \times 10^{-7}$

$[\text{H}^+]$ = hydrogen ions activity, in M /lit

$[\text{OH}^-]$ = hydroxyl ion activity, in M /lit

$K_w$  = ionic product of water

pH is a decimal log of the reciprocal of the activity of hydrogen ion in a solution.

$\text{pH} = -\log[\text{H}^+] = -\log a_{\text{H}^+}$

When pH increases, correspondingly pOH decreases and vice versa.

### 1. 3. Conductance:

Conductance is the current carrying capacity and movement of the ions under the influence of electric current. Conductance is given by symbol L and has units of milli mhos. It is given by the formula

$L \propto 1/R$

Where R = Resistance in ohm

Conductance was measured by standardizing the instruments with 0. 1N KCl solution in which platinum electrode was immersed. Then the electrode was washed with distilled water and placed in the water sample and conductance for each sample were measured in m Mhos/cm[6].

## 2. MATERIAL AND METHOD

This study carried out on two different dyeing industry of Bhiwandi city, District Thane, Maharashtra. The study carried out by doing a survey of industry several time. Samples were collected in the afternoon period between 12. 0pm to 1. 0pm.

Dyeing industrial effluent is collected in a one liter capacity container. The container is washed with distilled water then with 3. 0% nitric acid solution. Again container is rinsed with distilled water and then kept for complete drying in an oven at  $30-35^\circ\text{C}$ . Sampling is done in the afternoon at the dyeing industry only. Sample brought to the laboratory immediately and then analysed for some physicochemical parameters on the same day of sampling. Parameters for water quality were measured by following method[3].

Appearance of water sample was estimated by visual response.

Colour of the dyeing mill water samples were determined by visual comparison with double distilled water.

Odour was determined by sensory response of nose.

Temperature was determined using Thermometer.

pH was determined using digital equiptronic pH meter with magnetic stirrer. Conductance was determined using digital equiptronic conductometer [1, 5, 8].

## 3. RESULT AND DISCUSSION

Following physicochemical parameters were determined in two different industrial effluents.

**Table 3. 1: Analysis of Industrial Effluent I**

Sr. No.	Parameters	Values
1	Colour	Light Milky White
2	Appearance	Turbid with white Particles
3	Odour	Very Bad Odour (Foul Oduor)
4	Temperature	320C
5	pH	6. 81
6	Conductance	1. 53 mMhos 1. 53x10-3 Mhos

**Table 3. 2: Analysis of Industrial Effluent II**

Sr. No.	Parameters	Values
1	Colour	Very Light Milky White
2	Appearance	Light Cloudy
3	Odour	Bad Odour
4	Temperature	310C
5	pH	6. 79
6	Conductance	1. 46 mMhos 1. 46x10-3 Mhos

Temperature and pH are within the range provided by the standard body.

**Table 3. 3: Quality of Industrial Effluent and the Techniques used with the Standard Limits and Guidelines.**

Sr. No	Parameters	Technique used	PCD Standards
1	Temperature	Thermometer	Not more than 40°C
2	Colour	Visual	Not objectionable
3	Odour	Physiological sense	Not objectionable
4	pH	pH meter with combined glass electrode	5. 5-9. 0
5	Electrical Conductivity	Conductivity meter with Platinum electrode	-----

**Table 3. 4: Quality of Industrial Effluent with the Standard Limits and Guidelines**

Sr. No.	Quality	Central Government , Environment Protection Rule 1986, for Dye Industry			
		DSW	DMW	OFI	PS
1	Temp	Shall not exceed 50C above the receiving water			
2	pH	6. 0-8. 5	5. 5-9. 0	5. 5-9. 0	5. 5-9. 0

Disposal in surface water : DSW

Disposal in Marine water : DMW

On Land for Irrigation:OFI

Public Sewer:PS

#### 4. CONCLUSION

Color is the main attraction of any fabric. No matter how excellent its constitution, if unsuitably colored it is bound to be a failure as a commercial fabric. Manufacture and use of synthetic dyes for fabric dyeing has therefore become a massive industry today. In fact the art of applying color to fabric has been known to mankind since 3500 BC. WH Perkins in 1856 discovered the use of synthetic dyes. Synthetic dyes have provided a wide range of colorfast, bright hues. However their toxic nature has become a cause of grave concern to environmentalists.

It is essential to find the physical and chemical parameters of industrial effluents as increase or decrease in the temperature, pH , colour and conductance leads to destruction of aquatic flora and fauna which in turn leads to damage of health of human being who survive on this flora and fauna or who eat this aquatic animal as food.

Conductance values are high which is 1. 53 m Mhos for industrial effluent I and 1. 46 m Mhos for industrial effluent II.

High values of conductance indicate more number of current carrying ions present in the water which is not required when this effluent water is directly or indirectly discharged in to the water reservoirs which may or may not be the source of drinking water.

It was found that effluent water sample collected from Dyeing industry in Bhiwandi city was contaminated with respect to different ions or particles present. Industrial activities deteriorated the aqua quality rendering water not fit for the use by human being, when it is discharged in to the water basin. These Industrial activities cannot be stopped completely but awareness could be generated regarding reduction in pollution. Both the dyeing effluent water shows the normal values of pH and temperature. With respect to pH and temperature both industrial effluent water are safe for irrigation purpose. But high value of conductance indicate the increase in conductance of water reservoirs in which this waste water get mixed. Turbid water also indicate high concentration of solids which get accumulated on the body parts of aquatic animal and plants which in turn through the food chain enters in the human body and disturb the human metabolism and causes several diseases.

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