

# Physio-Chemical Analysis of Effluent of Bhoramdeo Sugar Mill, Kawardha, Chhattisgarh

<sup>[1]</sup> Geetesh Lahare, <sup>[2]</sup> Prof. Madhumati Yadav

<sup>[1][2]</sup> Department of Civil Engineering, Bhilai Institute of Technology, Durg, Chhattisgarh

**Abstract:** As we know that the industrialization of any country always increases the economy of that country and sometimes that increases the foreign exchange earnings also, but it always degrades the environment. The cumulative effect of all the countries of world raises the global environmental issues.



In India the sugar factories play an important role in raising the economy. So as a result the environment seriously affects means the basically the water bodies, soil and air near the sugar factory. The result of that is serious health problem raises in rural and semi – urban areas near that factory, because it's a common practice in India to dispose the effluent in near agriculture land. Sugar mill effluent have high number of suspended solids, dissolved solids, BOD, COD, chlorides, Mg, S, Ca, N. The aim of this paper is to analyse the impact of Bhoramdeo sugar factory effluent in water stream and if that will dispose into the land, what will be the impact on soil.

**Keywords:** pH, BOD, COD, DO, sugar factory, BIS, Physiochemical Characteristics, ETP.

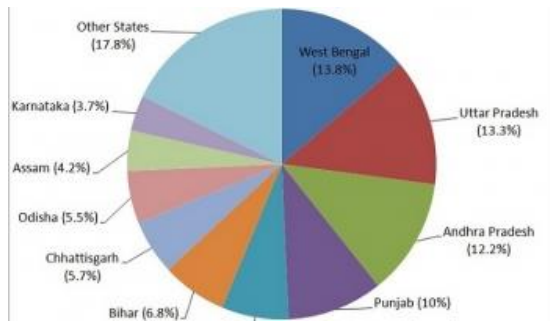
## I. INTRODUCTION

Sugar is essential for today life for human life and significant substance for present time. The country which begins the manufacture of sugar by extracting juice from sugar cane and made sugar after the boiling process of that juice, and get sugar crystal is India. Sugar factory is one of the most important agriculture-based industry, in which the rural economy depends. Manufacturing of sugar in Bhoramdeo Sugar Factory is a seasonal operation, commonly from the month of November to March, the production of sugar is done. So that the sugar industry creates peculiar problems for pollution control in that particular time.



A huge amount of polluted wastewater generates in that time, which having suspended solids, bagasse, air pollutants, organic matters etc. Mostly, several types of chemicals are used in the manufacturing process of sugar crystals for the coagulation of impurities and refining of end products. Bhoramdeo sugar factory effluent having high Biochemical Oxygen Demand, Chemical Oxygen

Demand and Total Dissolved Solids. If that polluted water discharges into nearby stream without proper treatment, it will cause very serious problems for aquatic and terrestrial ecosystems, and it also having unpleasant smell. In pie chart we can easily see the contribution of sugar production of various states in India.



**MATERIALS AND METHODS  
STUDY AREA**

For the analysis of all the characteristics of waste water,

**datas of effluent of bhoramdeo sugar factory**

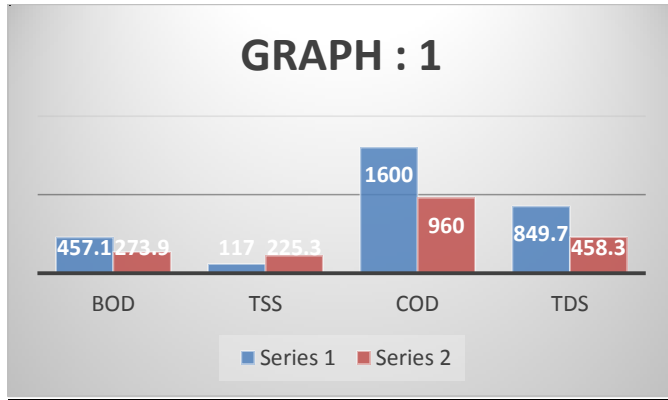
S. NO.	PARAMETER	UNIT	BEFORE ETP	AFTER ETP
1.	BOD	mg/L	457.1	273.9
2.	COD	mg/L	1600	960
3.	TSS	mg/L	117	225.3
4.	TDS	mg/L	849.7	458.3
5.	COLOR	Hazen	5.5	<1
6.	pH	-	4.66	6.14
7.	TURBIDITY	NTU	287.3	169.0
8.	CHLORIDE	mg/L	164.9	29.99
9.	CALCIUM	mg/L	128.2	112.2
10.	MAGNESIUM	mg/L	38.8	14.58
11.	NITRATE	mg/L	12.5	3.1
12.	SODIUM	mg/L	63.5	25.3
13.	POTASSIUM	mg/L	4.23	6.74
14.	DO	mg/L	Nil	Nil
15.	CONDUCTIVITY	µS/Cm	1405	763.4
16.	PHOSPHATE	mg/L	37.3	6.4
17.	PHOSPHOROUS	mg/L	0.84	3.60
18.	HCO3	mg/L	480	340

sample are taken from two points. First from the point source, which is prior to Effluent Treatment Plant (ETP), and second one is from the point source, which is the exit point from Effluent Treatment Plant (ETP). Both the sample is taken in 5 litre jelly cane separately. For the analysis of various Physio-Chemical characteristics, a standard procedure follows as given by APHA.

1. The value of pH is measured by the method of pH meter.
2. Electrical Conductivity is measured by the method of Electrical Conductivity meter.
3. Temperature is measured by the method of Thermometer.
4. Nitrate, Iron, Sulphate are analysed by Spectrophotometer.
5. BOD value is measured by the titration method.
6. COD value of water present in water is determined by means of chemical reactions of oxidizing substances such as potassium dichromate and potassium permanganate.

**RESULT AND ANALYSIS**

**ANALYSIS**



1. **Color:** Color of the effluent is brown. As we know that the color of stream is important for the proper photosynthesis process because dark color makes problem for entrance of sun rays. Dark color reduces the rate of photosynthesis, which ultimately affects the BOD, COD etc. of water.

2. **Temperature:** It plays an important role in various chemical and biological process, takes place in water, which affects the aquatic life. Generally, the water which discharges from the industries having high temperature. In this study the temperature of effluent is 70°C and the temperature of the treated effluent is 34°C. The treated effluent temperature should not be greater than 35°C.

3. **Odor:** The sugar mill effluent smell is very unpleasant.

4. **pH:** pH is the value of negative logarithm of hydrogen ion concentration, it having the range between 0 to 14. Value 7 shows that the neutral value, less than 7 shows acidic nature and greater than 7 shows alkaline nature. Variation in pH value affects the biological reaction and endurance of several microorganisms. This type of polluted water if used for agriculture, sometime after it affects dangerously the growth of crops. According to BIS, the range of effluent should be from 6.5 to 8.0. The use of phosphoric acid and sulfur dioxide will lower the value of effluent.

5. **Dissolved oxygen:** It is also an important parameter for analysis of water, because it is an indicator of various process in water like physical and biological. Basically physical, chemical and biological activities define the level of dissolved oxygen in waterbody. Determination of

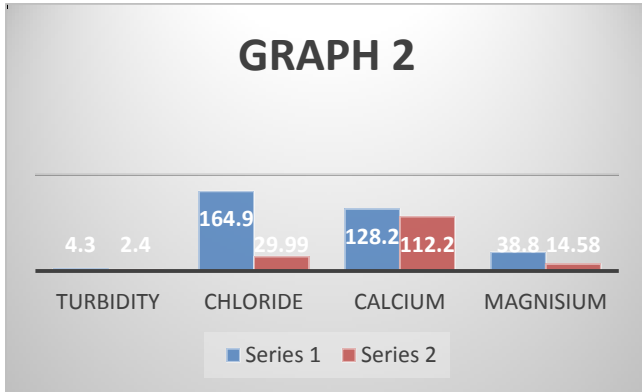
this parameter plays an important role in determination of pollution in water. Dissolved oxygen plays an important role for the growth of aquatic life and various microorganisms in water. According to the BIS standard, range of 4 to 6 mg/ liter should be in the wastewater.

**6.Total Suspended solids:** The term solid refers to the substances which may be either filterable or nonfilterable in nature. In water, composition of Ca, Mg, Na, K, Mn's carbonates, bicarbonates, nitrates, sulphates, chlorides basically generate the suspended solids, dissolved solids and also the organic matter silts also pollute the water.

**7. Total Dissolved Solids :** Concentration of total solids varies according to the season i.e. in the rainy and winter season concentration will be low, but in summer it will become high. The reason for the variation of values of total solids and values of dissolved solids are due to the collision of colliding particles in water. The collision rate varies according to the pH value also.

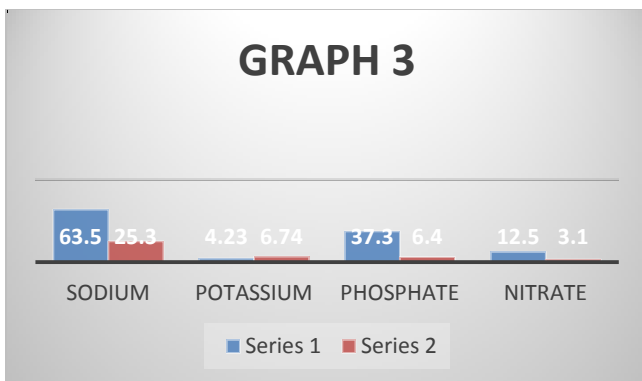
**8. Biochemical Oxygen Demand:** It is the quantity of oxygen needed to biologically degrades the organic matter by the microorganisms in water under aerobic condition. It is very slow process, during these oxidating organic pollutants are oxidized by microorganisms into CO<sub>2</sub> and H<sub>2</sub>O. Dissolved oxygen is related to BOD, it shows the level of pollution involved in water.

**9. The Chemical Oxygen Demand :** This test basically determines the oxygen needed for chemical oxidation of organic substances with chemical oxidant. This experiment is used for the evaluation of pollution level in domestic and industrial wastes. The waste is determined in terms of quantity of oxygen needed for oxidation of organic matter and produces CO<sub>2</sub> and H<sub>2</sub>O. With the addition of BOD test and COD test, we can find out the toxic conditions.



**10. Chlorides:** Generally natural having some amount of chloride. The presence of chloride in natural water is because of the dissolution of salt deposits. In industrial waste water this chloride comes because of the use of various chemicals, sewage discharges, initiation drainages and sea water in coastal areas.

**11. Sulphate:** Sulphate comes from the leaching of sedimentary rocks, and it comes into the natural water through weathering. Some industries waste waters are also the source of sulphates into streams. Sulphate never been a preventing factor in water, always the level of sulphates in higher side than the required value of plants for their need. Sulphate is frequently used for the disintegration of organic matters. SO<sub>4</sub> produces the bad smell of rotten egg.



**CONCLUSION**

From the above study, we can come into the conclusion that the Boramdeo sugar factory effluent having high number of COD, BOD, TSS, TDS and low content of DO,

which is very harmful for the aquatic life and for the property of soil also so that it may not be used for irrigation purpose. Proper treatment of that effluent having proper balance of various parameters, so it may easily dilute with fresh water.

But industries must be taken into the practice that the reuse of effluent for their various activities, so that it may reduce the use of fresh water. It is economically also beneficial and the water pollution quantity will also reduce. At that moment the Boramdeo sugar mill reuses their wastewater after proper treatment so the pollution percentage is lesser than previous.

**REFERENCES**

1. Baraniya.C<sup>1</sup>, Dr.Jodhi.C<sup>2</sup>, A STUDY ON THE PHYSICO-CHEMICAL CHARACTERISTICS OF SUGAR MILL EFFLUENTS, International Journal of Advance Engineering and Research Development, e-ISSN (O): 2348-4470, p-ISSN (P): 2348-6406
2. Chhaya Bhatt<sup>1</sup>, Dr. Rashmi Verma<sup>2</sup>, Physico-Chemical Analysis of Sugar Mill Effluent of Kabirdham (C.G.), International Journal of Scientific Engineering and Research (IJSER) ,www.ijser.inISSN (Online): 2347-3878, Impact Factor (2015): 3.791.
3. Suresh B., Abraham K. and Damodharam T.\*, Effect of sugar industry effluent on changes of growth and biochemical contents of Capsicum annum. L, Advances in Applied Science Research, 2014, 5(5):305-309.
4. Saurabh Saini<sup>1</sup> and Shailja Pant<sup>2</sup>, Physico-chemical analysis of Sugar mill Effluent and their Impact on Changes of Growth of Wheat (*Triticum aestivum*) and Maize (*Zea mays* L.), e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 8, Issue 4 Ver. I (Apr. 2014), PP 57-61