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Waste Water Management in Bhoramdeo Sugar Mill Factory

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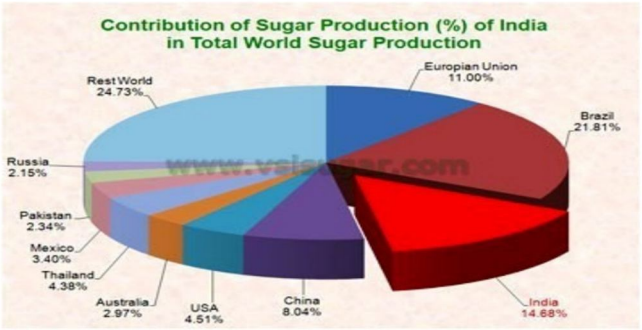
***Abstract:** As we know that the industrialization is the basic component for the growth of any developing country. It helps to raise the government economy and employment opportunities. Industrialization not only develop the human being life style but give any country an opportunity to relate with world also. India is also in a list of developing country as well as now it become in the 5th position in top economy race. Sugar factory is one of the major agriculture-based industry which makes the rural and semi urban life better in every aspect. But all these faces on a coin, it has another dark face because it destroyed our environmental badly.*

In India sugar industries basically located in north India, like U.P., Bihar etc. According to the data, India is in the second position in world in the production of sugar. It is the rapid growing industry in India, but it is seasonal in nature. Wastewater from the sugar factory is organic, so biodegradable in nature. Waste water released from the sugar mill having high BOD, nearly neutral pH value, some metallic contents, sulphates etc. The main aim of the present work is to study the wastewater management of Bhoramdeo sugar mill, so that the environment will have least harm.

Key words: Effluent, Bagasse, Molasses, Effluent Treatment Plant (ETP).

I. INTRODUCTION

As we know that water play an important part in the life cycle of living organisms. In earth, fresh water having only 3% in the concentration of total water, so it becomes essential that we must reuse that water, so that the percentage of that fresh water should be in the proper level. Sugar industry is one of the most valuable and significant industries in the world. In all over the world sugar canes and beat both uses for the production for sugar. As we can see from the data of the world sugar production contribution through pie chart, which shows that the India having the position second with 14.68% of overall sugar production. But India, only the sugarcane is used for the production of sugar.



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From the sugar industries, the waste water having so much organic pollutants. Conservation strategies plays an important role, not only to save water but also to save the quality of water too. The quantity of fresh water we use in any industries produces near about the same quantity of waste water with same density because of various pollutants. Due to recent development in the race of urbanization, various problem rises of collection, treatment and disposal of wastewater. Which disposes their industrial waste water without any proper treatment, sometime due to lack of financial condition, lack of knowledge and sometime lack of unwillingness. Which degrades the surface and the ground water. Condition became worst, when this polluted water goes into the ground water.

Once, if we know the concentration of pollutants in the wastewater, then it will become possible to remove it through various technologies. That will help to secure the quality and quantity of fresh water. Pollution generating industries and the pollution control bodies, both of them having the responsibilities to reduce the pollution of water.

II. MATERIAL AND METHODOLOGY:

A. Sugar Industry

1) Manufacturing of Sugar

a) Sugar cane harvested basically in north India.

b) Sugarcanes are cut into small pieces and then crushed into rollers to extract their juice in crushing mills.

c) Lime milk is now added in juice and then heated, all the colloidal and suspended impurities coagulate and then colour also removed in this process.

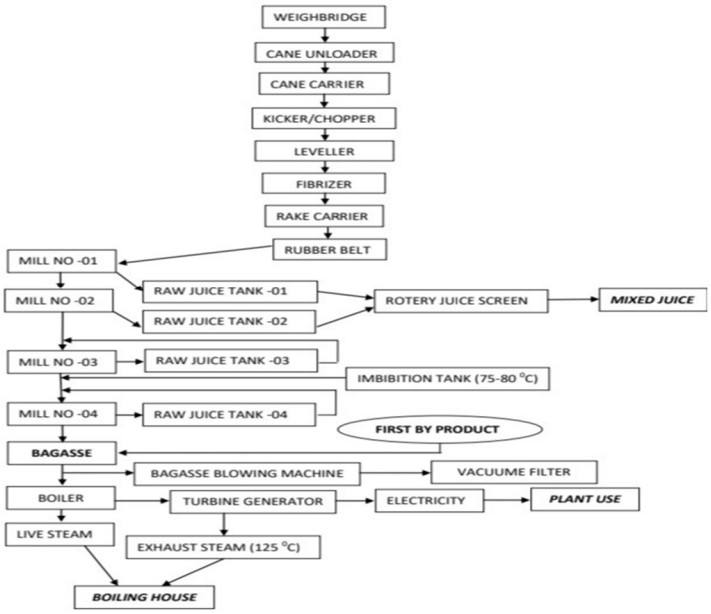
d) Then coagulated juice is clarified to remove sludge and then it filters through filter process and disposed as solid waste.

e) This clarified juice is heated and concentrated in evaporators and vacuum pans. Then this partially crystallised syrup, known as massecuite is transferred to crystallizers, so that the crystallization of sugar occurs.

f) Massecuite is then centrifuged to separate the sugar crystals and spent liquor is discarded as Black strap molasses.

g) Sugar is then dried and bagged for transport.

1. FLOW CHART OF MILLING PROCESS



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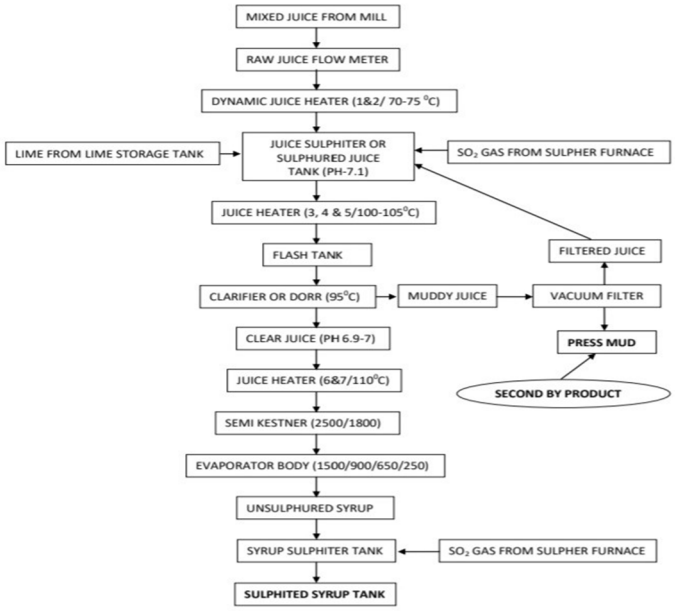
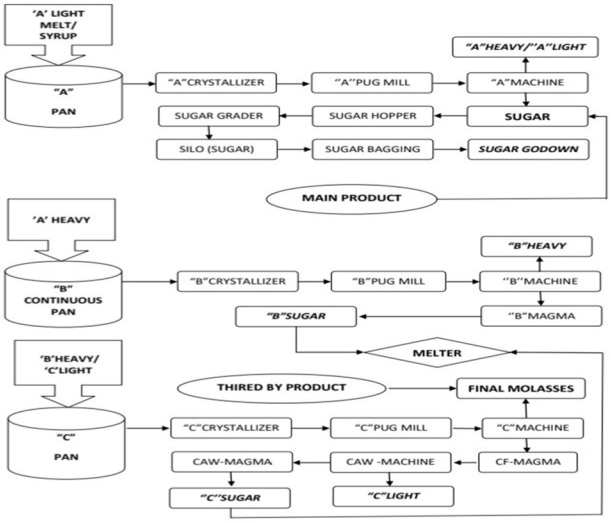
2. FLOW CHART OF PREPARATION OF SYRUP OR DOUBLE SULPHITATION PROCESS



3. FLOW CHART OF COOLING, CURING, BAGGING AND STORING PROCESS



B. Source of Waste Water

1) *Mill House:* In mill house, water is used for mill gland cooling and for washing the floor occasionally, so it has some amount of oil and grease. Cleaning of floor is necessary because, it prevents the growth of bacteria in floor, which spread in floor. This water mix with effluent.
2) *Boiler House:* Waste water from the boiler house comes from pipes, from the leakage of pumps, sometimes from evaporators etc. It has some amount of phosphate and it has high TDS.
3) *Excess Condensate Water:* Cooling of vapor from evaporators and pan boiling are done in condensers. Generally, it not contains pollutant, so it goes to reuse for boiler feed water. Sometimes overflow or loss of sugar occurs in condensates, due to overloading and lack of operation skill.
4) *Occasional Spills & Leakages:* This happens due to disturbances in process.
5) *Cleaning:* Caustic soda and HCL are commonly used for cleaning of Evaporators, juice heaters, pans etc, once in a month. So this acids also added to effluent.

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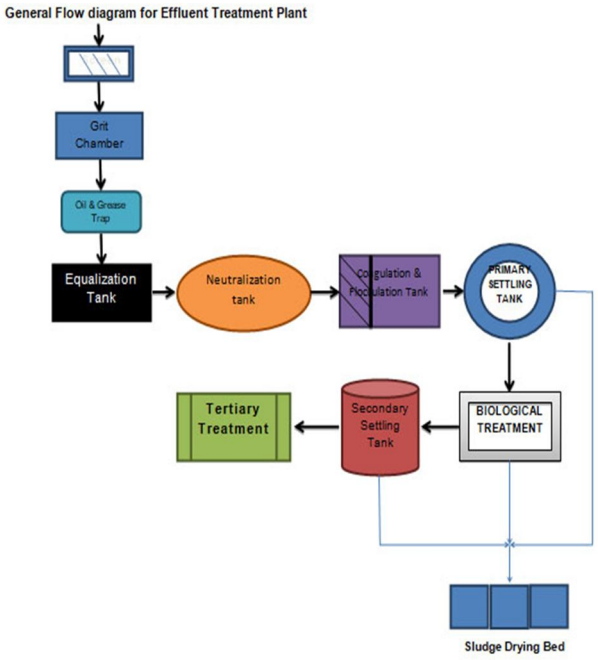
III. FUNCTIONING OF ETP

Effluent Treatment Plants are basically used for the treatment of wastewater, which are generated by anthropogenic or may be by industries, so that this water may be reuse. ETP are used to remove the suspended, colloidal and dissolved in waster. ETP converts the waste material into neutralized molecules so that it becomes at that condition in which this water can be discharged into lake, river or lagoons.



A. Major units in ETP

1) Preliminary Treatment

a) Screens
b) Scrappers
c) Grit Chamber
d) Skimming Tanks
e) Aeration

In Bhoramdeo sugar factory Screens are used

2) Primary Treatment

a) Sedimentation/ Settling Tanks
b) Clarifocculator
c) Equalization Tank
d) Neutralization tank

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In Bhoramdeo sugar factory Sedimentation tank used

3) Secondary Treatment
a) Activated Sludge Process
b) Trickling Filter
c) Aerated Lagoons
d) Multiple Evaporated Plant

In Bhoramdeo Sugar Factory Aerated Lgoons are used:

4) Tertiary Treatment
a) Sand/ Membrane Filter
b) Activated Carbon Filter
c) Ion exchange

In Bhoramdeo Sugar Factory Sand Filter is used

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IV. RESULT AND ANALYSIS

Water sample is collected in such a manner that it would be the composite sample of 24 no. samples (in each hour of one day) , normally 2 liters in each hour. Sample is collected from before the ETP and then after the ETP, and the analysis are as below:

S. NO.	PARAMETER	UNIT	BEFORE ETP	AFTER ETP
1.	B0D	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.	MAGNISIUM	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

V. CONCLUSION

As we can see that proper water treatment is processed, so that major pollutants are reduced. If we will try to clean the floor through dry process, which reduce the waste water and consume the fresh water too. Proper training of workers may also increase the efficiency of factory and reduce the wastes. There must be two separate waste water disposal line, which may reduce the level of treatment, because the less polluted water now mixed with heavy polluted water, which increases the treatment procedure cost. ETP must be efficient and well operated so that the pollution level reduces automatically. We can say from the result that the overall performance of ETP is satisfactory.

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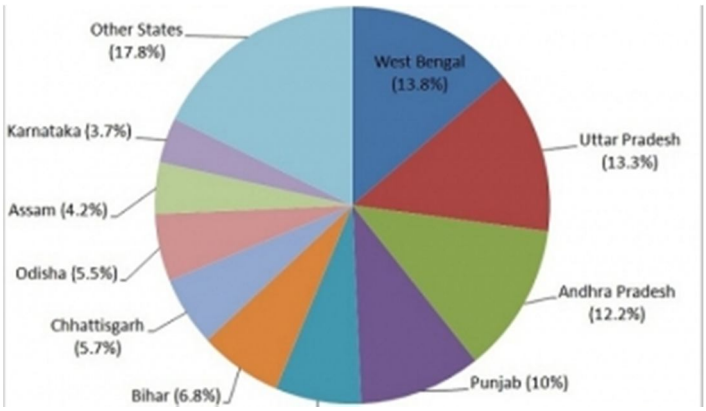

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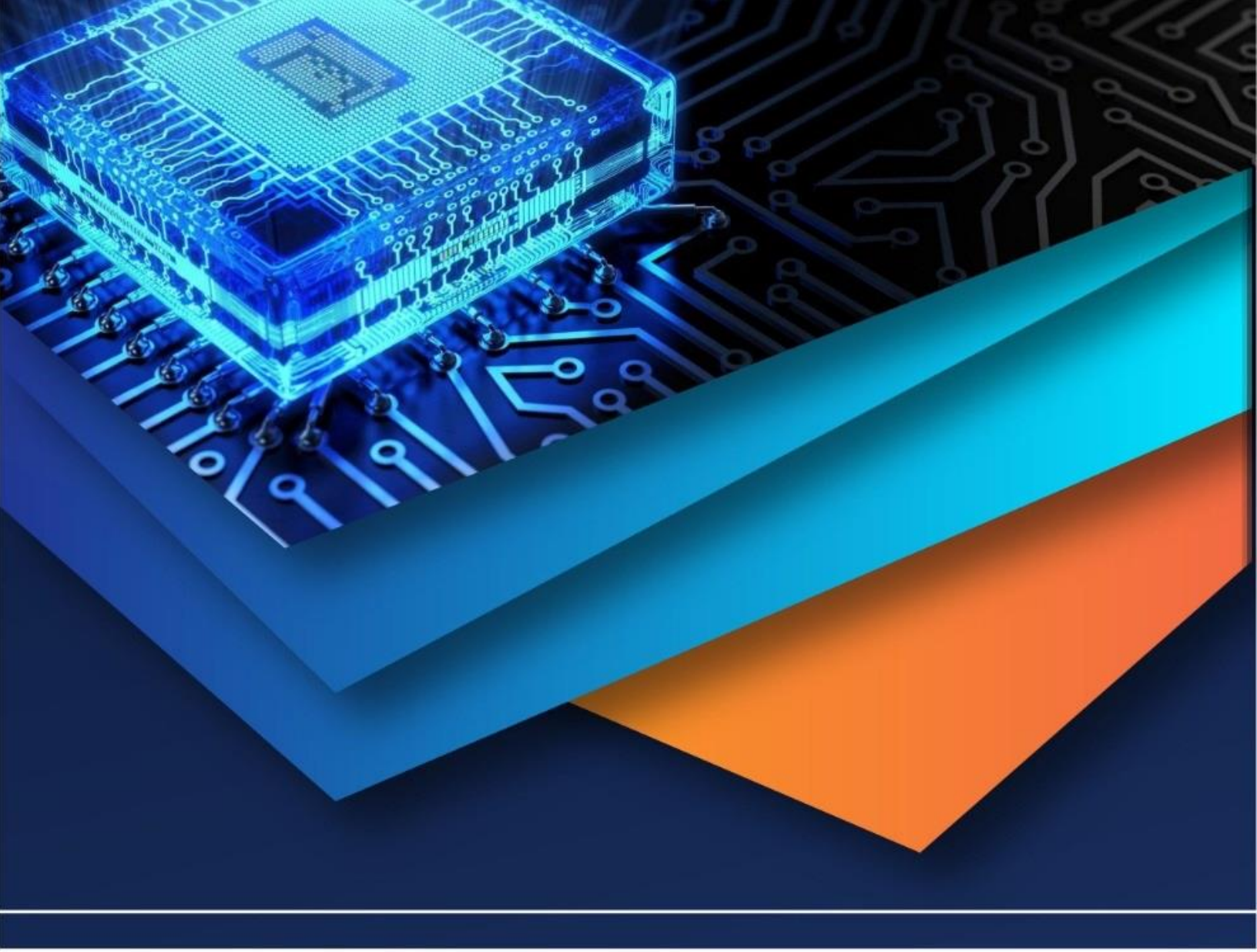

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