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Performance Evaluation of 750 KLD ETP at Bhimashankar Co-operative Sugar Factory

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Abstract: Agriculture is one of the major contributor in India's economy. Sugarcane is largely cultivated in Maharashtra. Hence there are large number of sugar industries in Maharashtra. They generate large amount of wastewater. This wastewater needs to be treated before it is discharged into the environment. It is treated in Effluent Treatment Plant (ETP). This paper throws light on the performance of ETP
Keywords: ETP, effluents, influent, anaerobic, masticate, aerobic.

I. INTRODUCTION

Sugar industries use huge amount of water . After the process the water is transferred to ETP for treatment .The plant crushing capacity is 480 TCD . The capacity of ETP at Bhimashankar Co- operative sugar factory is 750 KLD. Anaerobic treatment is used for biological treatment of the wastewater. Oil and Grease are present in the wastewater . They are removed along with other harmful parameters. Various other factors are present in the wastewater. Different methods are implemented to remove different parameters . The manufacturing process of the sugar and the working of ETP are discussed further in the paper.

II. SUGAR MANUFACTURING PROCESS

A. The Steps Involved In Sugar Manufacturing Process Are As Follows

1) *Milling*- Sugar juice is needed to be extracted from the cane . In order to extract maximum juice from the cane it has to be cut in longitude shred. the preparatory devices used for it are kicker, leveler and fiberizer. Further there are four set of mills to extract the juice. Each mill consists of three rollers where all the cane are crushed fully.
2) *Clarification*- The dark green juice from the mills is acidic (Ph-4.5) and turbid called raw juice or mix juice. The clarification process designed to remove both soluble and insoluble impurities , universally employs lime and heat as the deriving agents. The mixed juice after being heated to 650 to 750 degree celsius is treated with phosphoric acid, sulphur dioxide and milk of lime for removal of impurities in suspension in a continuously working apparatus.
3) *Evaporation*- The clarified juice having much the same composition as the mixed juice, except for the precipitated impurities removed from the clarification process contains ells arranged in series so that the succeeding body has higher temperature therefore boils at lower temperature. the vapours from one body can thus boil the juice in the next one. The syrup levels the last body continuously with about 60% solids and 40% water.
4) *Crystallization*- The syrup is again treated with sulphur dioxide before being sent to the pan station for crystallization of sugar. Crystallization takes place in single effect vacuum pan where, the syrup is evaporated until saturated with sugar . At this point "Seed Grain" is added to serve as a nucleus for the sugar crystal. Here a dense mass of crystals and syrup is formed called "masticate".
5) *Centrifugation*- The masticate from crystallizer is drawn into revolving machines called centrifuges ,having perforated sides and revolve with speed of 1000 to 1800 rpm. The perforated lining retain the sugar crystals, and molasses passes outside, and is sent to pan for boiling and re-crystallization . The retained sugar may be washed with water ,if desired.

III.EFFLUENT TREATMENT PROCESS

The waste water from factory i.e. effluent is passed to ETP for proper treatment. The capacity of the ETP is 750 KLD.

A. This process involves-

1) *Oil ,grease and suspended matter removing chamber*- Grit chamber is provided to remove grit. For removing oil and grease oil skimmers are used. The floating material is removed by bar screening.
2) *Neutralisation and Equalisation tank*- After primary treatment ,the effluent is neutralized by giving lime dose. In this tank, pH is adjusted in between 7.00 to 8.00.Effluenet may be stored in equalisation tank for equalisation.

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3) *Primary Clarifier*- In this tank, the sludge is settled down and clear water is passed further. The sludge is settled at bottom and is removed using pumps.
4) *Anaerobic treatment*- In this biological treatment ,the anaerobic bacteria purifies the water by eating the sludge. The grow in number and continue their task in absence of oxygen. The water is passed further to aeration tank.
5) *Aeration tank*- The water from anaerobic tank is aerated here using blower type air diffuser. The air is blown using pumps. In this tank aerobic treatment takes place in which aerobic bacteria purifies water by eating sludge. The water is further passed to secondary clarifier
6) *Secondary Clarifier*- After aeration, in this tank ,the suspended particles are removed. The sludge is settled down and clear water is passed further. The sludge is settled at bottom and is removed using pumps. Here the suspended matter is almost removed and water is having the dissolved solids.
7) *Sand Filter*- For efficient removing of colloidal particles ,sand filter is installed. Layers of stones, gravels, sand are formed which traps the particles. The water is further passed to activated carbon filter.
8) *Activated Carbon Filter*- There still remains particles in water which are removed in this filter. Activated Carbon helps to remove the particles by adsorbing them. The treated water is stored in treated water tank and may be used for agriculture or discharged into river.

TABLE I EFFLUENT PARAMETERS AT INLET

Sr. No	Parameter	Unit	Result
1.	pH	---------	6.54
2.	Total Suspended Solids	mg/lit	1152
3.	Total Dissolved Solids	mg/lit	1875
4.	COD	mg/lit	4126
5..	BOD	mg/lit	1320
6.	Chlorides	mg/lit	542
7.	Sulphate	mg/lit	149
8.	Oil & Grease	mg/lit	<1.0

TABLE II EFFLUENT PARAMETERS AT OUTLET

Sr. No	Parameter	Unit	Result	Limits as per MPCB norms
1.	pH	---------	6.54	5.5 to 9.0
2.	Total Suspended Solids	mg/lit	75.0	100 max
3.	Total Dissolved Solids	mg/lit	1809	2100max
4.	COD	mg/lit	121	250max
5..	BOD	mg/lit	26.0	30max
6.	Chlorides	mg/lit	98.5	600 max
7.	Sulphate	mg/lit	44.0	1000 max
8.	Oil & Grease	mg/lit	<1	10 max

IV. CONCLUSIONS

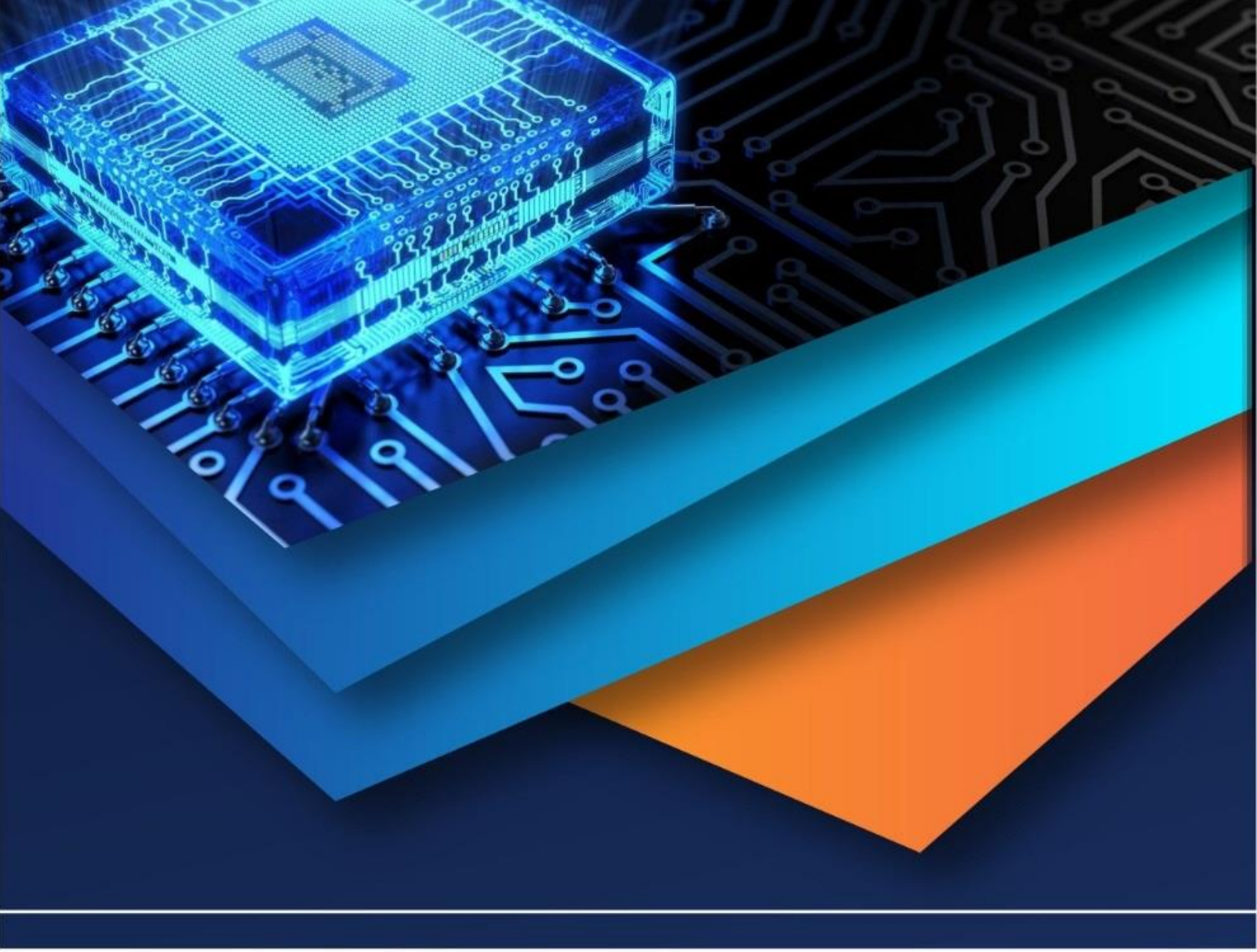
After analysing the manufacturing process of this sugar industry , we found out that the effluents from the factory contains harmful and hazardous parameters. If this wastewater is not treated and harmful parameters are not removed from it, this wastewater may cause severe harm to the environment. The effluent treatment process adopted at BSSK is efficient in removing these parameters to desired limits. After the ETP process this wastewater can be discharged into the environment without causing any harm to the environment.

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