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ANAYSIS OF SOME PHYSICO-CHEMICAL CHARACHARACTERISTICS OF EFFLUENT WATER IN SCIENCE LABORATERY IN S.S.G.M. COLLEGE KOPARGAON BY USING EFFLUENT TREATMENT PLANT TAL-KOPERGAON, DIST – AHMEDNAGAR (M.S.), INDIA.

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ABSTRACT
In the recent past several studies have reported the water bodies becoming increasingly contaminated due to domestic and industrial wastes. The Sanjivani Sahakari Sakhar Karkhana Limited, Sahajanand Nagar, Tal – Kopargaon Maharashtra State (India) having important factor in rural economy of Ahmednagar district & is situated at Sahajanandnagar of Kopargaon Taluka. It is useful in development of many other industries such as Distillery, Biogas plant, Acetaldehyde plant, Acetic acid plant andSpirit production. The area of Kopargaon has been developed by this sugar mill because of the income gained by the farmers and the rural people of the surrounding area. But its liquid effluent containing heavy as well as toxic metals and having bad odour which have posed the threat to the ecological balance of rural area around. To minimize this problem industry havestarted plants such as biogas plant, distillery plant etc. to make use of the polluted liquid effluent for production of biogas and alcohol beverages. This treated liquid effluent can be used as a fertilizer. The present study deals with the physico-chemical parameters and metals such as Ca, Mg, etc. determined by different analysis methods & compare the limits with standards available for us.

KEYWORDS: Physico-chemical parameters, heavy as well as toxic metals, contaminated due to domestic and industrial wastes Biogas Plant, Distillery plant.

INTRODUCTION

The Study area Sanjivani Chemical distillation effluent water from Sanjivani Sahakari Sakhar Karkhana Limited, Maharashtra State (India) is situated at Sahajanandnagar of Kopargaon Taluka which we have selected for our analysis purpose is situated to east at 1.5 km away from our educational institute. In recent time our country" The great India" changing its image as a developed country by strong and firm economy and consistency within development in various fields such as "Industrialization, urbanization. Agriculture, defense, nuclear power etc.

SAMPLING SITES AND COLLECTION

The sampling site which we have selected is Biogas plant. At the site we have collected inlet spent wash which is disposal of distillery plant after production of alcohol. Other sample collectedis disposal of biogas plant which is treated spent wash with DAP for production of biogas. Randomselection method is used for collection of samples. We have collected samples at three different sessions in morning, noon and evening. From these a representative composite sample of two litre volume is made for analysis purpose. Polythene bottles are used for sample collection which were thoroughly washed with distilled water. At the time of collection, the bottles were rinsed with sample 3-4 times and then sample was collected. The distance between the inlet spent wash and outlet effluent is near about meters.

ANALYSIS OF EFFLUENT WATER

For the analysis of inlet and outlet wastewater the methods used for estimation of particular parameters are as follows.

METHODOLOGY

WASTEWATER TREATMENT (CURRENT STATUS)

Methods of treatment in which the application of physical forces predominate are known as unit operations. Methods of treatment in which the removal of contaminants in brought about by chemical or biological reactions are known as unit processes. At the

present time, unit operations and processes are grouped together to provide what is known as primary, secondary and tertiary or advanced treatment. In primary treatment physical operations such as screening and sedimentation, are used to remove the floating and settle able solids found in wastewater. In secondary treatment, biological and chemical processes are used to remove most of the organic matter. In tertiary treatment, additional combinations of unit operation and processes are used to remove other constituents, such as nitrogen and phosphorus, which are not removed by secondary treatment. Land treatment processes combine physical, chemical and biological treatment mechanisms and produce water with quality similar to that from advanced wastewater treatment.

At the present time, most of the unit operations and processes used for wastewater treatment are undergoing continual and intensive investigation from the standpoint of the implementation and application. As a result, many modifications and new operations and processes have been developed and implemented; more need to be made to meet the increasingly stringent requirement for environmental enhancements of watercourses.

In addition to treatment system and technologies are also under study, land treatment systems and those involving the use of aquatic species are examples. In addition to treatment, aquatic systems can be used for the capture of solar energy and for the utilization of the nutrients in wastewater, The potential for producing usable plant and animal protein is another possible advantage of such system.

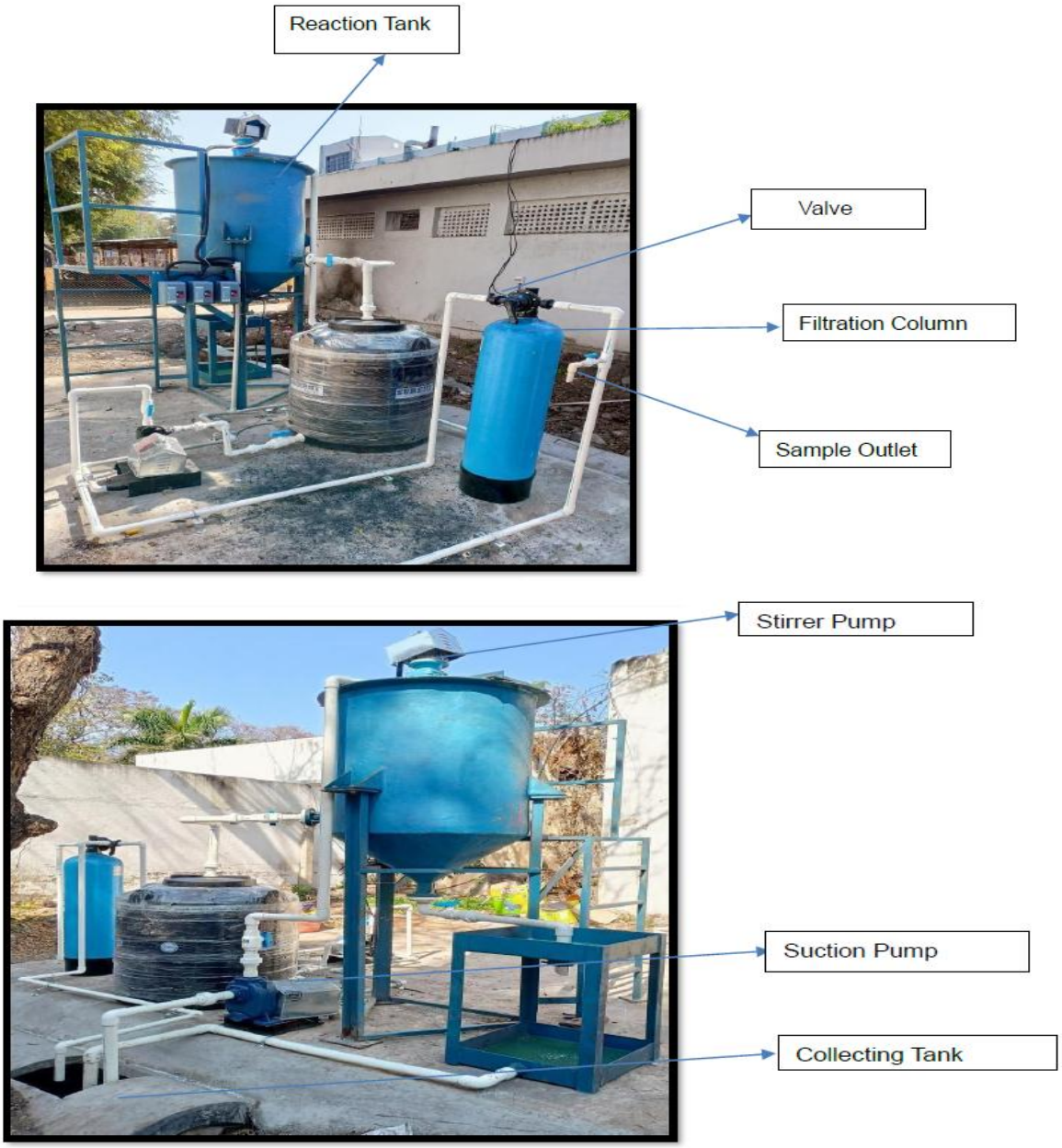
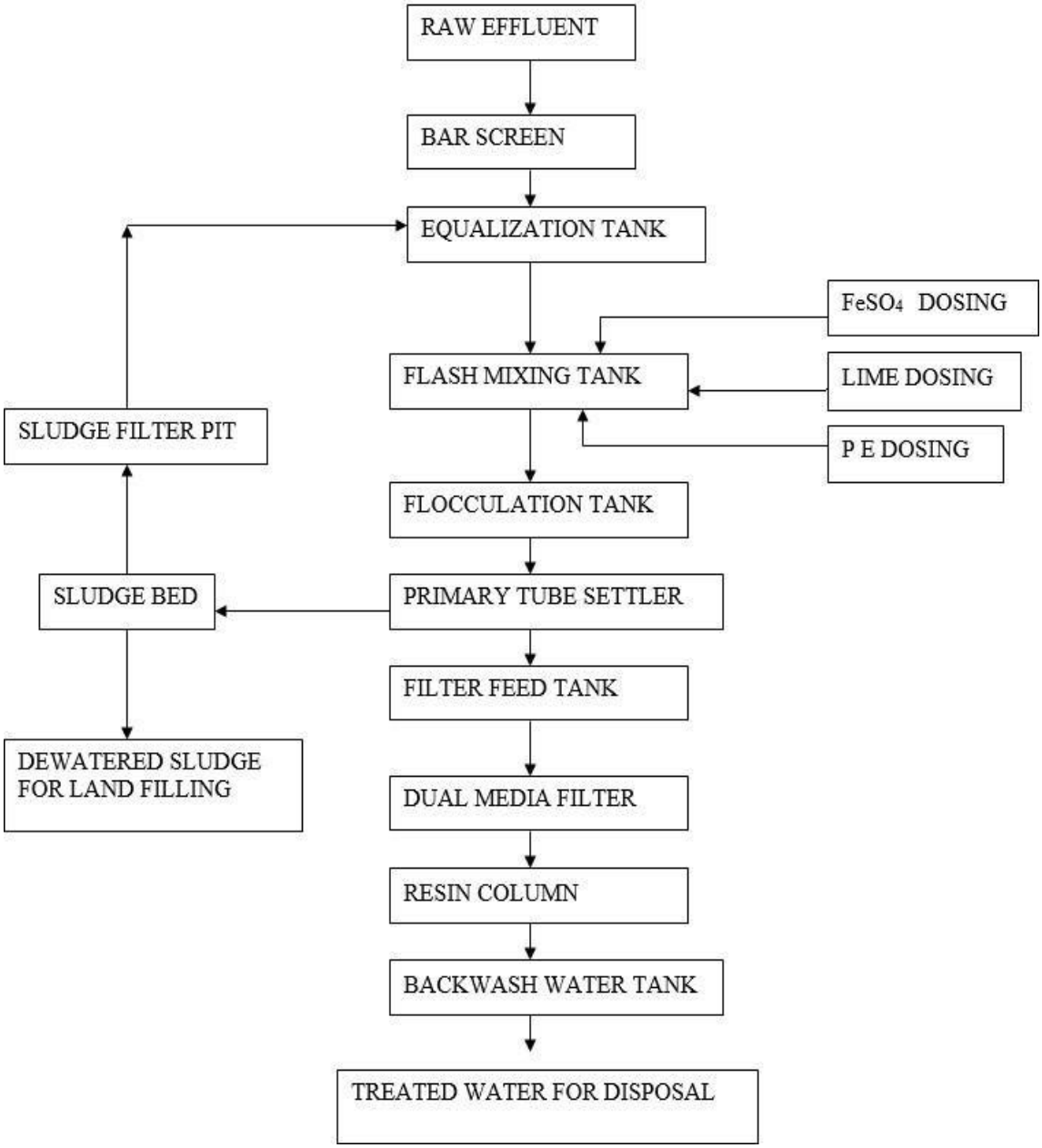


Figure: Effluent Treatment Plant

PROCESS FLOW DIAGRAM OF EFFLUENT TREATMENT PLANT



Physio-Chemical characteristics of effluent water analysis.

Sr. No.	parameters	Method
1	Temperature	Thermometer
2	pH	pH Meter
3	Dissolved Oxygen (DO)	Winkler's iodometric Method
4	Chemical Oxygen Demand (COD)	Titrimetry
5	Conductivity	Conductometry
6	Total Solid (TS)	Gravimetry
7	Total Dissolved Solids (TDS)	Gravimetry
8	Acidity	Titrimetry
9	Sulphate	Gravimetry
10	Chloride	Titrimetry
11	Oil and Greese	Gravimetry
12	Redox Potential	PH- Metry

PARAMETERS

Temperature result table

The determination of temperature of both the samples is done by similar way. The sample was collected in beaker and soon the temperature was recorded by inserting the thermometer.

Sr No	Parameter	S1		S2		S3		S4	
		INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET
1	pH	9.3	6.8	12.2	7.5	4.3	6.9	4.4	7
2	Temperature	240C	230C	240C	240C	270C	280C	300C	300C
3	Total Solid	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
4	Conductance	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
5	TDS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
6	COD	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	3820mg/l
7	DO	3ppm	0.5ppm	3.1ppm	0.7ppm	3.9ppm	ppm	3.7ppm	0.9 ppm
8	Chloride	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
9	Sulphate	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
10	Oil andGrease	4mg/l	mg/l	mg/l	mg/l	5mg/l	mg/l	3mg/l	mg/l
11	RedoxPotential	-131mV	-348mV	-131mV	-320mV	-152mV	-384mV	-142mV	-377mV

SAMPEL FOR ANALYSIS

Chemical Oxygen Demand (COD) Reactions

Cr_2O-2+ 14H++6e- → 6Fe2+ → 6Fe3+ + 6e-

$Mn2+ + 2OH- \rightarrow Mn(OH)_2$ white ppt. (O_2 absent)

$Mn2+ + 2OH- + ½\ O_2 \rightarrow MnO_2 + H_2O$ (O_2 present)

$MnO_2 + 4H+ + 2I- \rightarrow I_2 + Mn2+ + 2H_2O \rightarrow BaSO_4$

$I_2 + 2Na_2S_2O_3 \rightarrow Na_2\ S_4O_6 + NaI$

2Cr3++7H2O MnSO4 → Mn2+ + SO4 2-

Alkaline KI → K+ + I- + O

$H_2CO_3 \rightarrow H_2O + CO_2$

Sulphate result table Gravimetric method reaction

Ba2+ + SO42-

Total Alkalinity – carbonates & bicarbonates Reactions	Chloride resulttable Reactions
Ag+ + Cl- → AgCl (White ppt.).	CaCO3 + 2HCl → CaCl2 + H+ + HCO-3 2Ag+ + CrO42- → CrO4 (Reddish brown ppt.).
M2+ + EBT → M-EBT complex (Wine red).	M-EBT + EDTA M-EDTA + EBT (where M-

Physico-chemical characteristics of effluent water analysis

SR. NO	Parameter	Sample first (rowspent wash)	Sample second (treated effiuent)
1	pH	12.2	7.5
2	Tempreture	240C	240C
3	Total Solide	88 mg/l	980 mg/l
4	Conductance	2184 mg/l	2220 mg/l
5	TDS	1893 mg/l	2030 mg/l
6	COD	195mg/l	3580mg/l
7	DO	3.1ppm	0.7ppm
8	Chloride	430 mg/l	280 mg/l
9	Sulphate	928 mg/l	340 mg/l
10	Oil and Greese	8mg/l	25mg/l
11	Redox Potential	-131 mV	-320 mV

RESULTS AND DISCUSSIONS

Physico - chemical parameters

- The results related to the physico-chemical characteristic of the sugar mill distillery effluent collected at biogas plant. The inlet & outlet composite effluent samples have been listed in the given result table.
- The results reveal that the pH value have increased after treatment. The acidic pH (3.05) of inlet spent wash changes, to alkaline pH (7.43) after treatment. The pH values are not in standard range (4.3- 5.3) recommended by ISI & WHO.
- The concentration of dissolved oxygen in water depends on temperature, pressure, and concentration of various ions. The DO level was recorded in the range of 2 to 4 ppm.
- The TDS values ranges between 26000 to 4000 ppm which are in the recommended standard range.

- The term total hardness indicates the concentration of Ca & Mg only. It is express in terms ofcalcium carbonates. Total hardness varies from 6500 to 8500 ppm.
- Carbon dioxide, inorganic phosphorous, oil and grease these parameters have been decreased from untreated to treated effluent.
- The electrical conductivity is very low & is 0.01285 mhos for untreated effluent which decrease to 0.01168 mhos for treated effluent after biogas formation.

CONCLUSION

- The pH values of effluents are higher than standard limits probably due to the presence of chemicals formed by degradation of sugar itself.
- High DO concentration is undesirable as it accelerates the corrosion at high temperature and pressure. The lower range of conductivity value indicates that effluent water has less content
- of inorganic acids, bases and salts which are good conductor.
- Sudden rise in conductivity in water indicates addition of some Pollutants.
- Water having conductivity more than 20 mmhos have not been suitable for irrigation as the samples which we have analysed have the conductivity between 11-13 mmhos is therefore suitable for irrigation purpose.
- Lower values of redox potential indicate more & more reduction processes while rise in it will denote more oxidation processes. Redox potential related to pH –when there is decrease in 1 unit of pH, there is decrease in 0.058 V of redox potential.
- Langelier calcium carbonate saturation index results include that both the effluents cause significant corrosion.

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