

Treatment of Distillery Wastewater By Electro-Flotation

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Abstract – Distillery Wastewater (DWW) has been effluent aspect leading many diseases in human. It requires treatment and minimization. For this, the efficient method named electro-flotation would represent the categorical representation of the information. The primary objective is to study the characteristics of wastewater through which COD, SS and pH level has been influenced. It has somehow focused on the five parameters i.e., BOD, COD, color and suspended solids and pH. Based on the DWW quality component, it has been found that Light brown color at pH 5.6 and SS to be minimum and COD and BOD ratio is 1:2 presents the removal of wastes in the water as per CPCB Board.

Key Words: Electrocoagulation, Distillery wastewater, Electroflotation

1. INTRODUCTION

Water has been a limited source which is generally affected to shortage of facilities. It hampers the home and commercial usage level if there is inefficiency in it. This can be profound that numerous contaminants have been hazardous and leading to negligence in the environment and unavoidable trash affecting the human health. With the rising cost of water treatment, the new regulations are set to mitigate the adopted programs within the environment. It proposes new and innovative techniques for optimization of the water bodies. This can also help in setting out the treatment of water which contains organic and inorganic compounds by coagulation and flotation. The colloidal and destabilized substances are remarkably managed through promising technique which has been included in the current study i.e., Electroflotation.

Electroflotation has been a separating method which has electrically generated a tiny bubble of hydrogen and oxygen. It requires the pollutant free measures to coagulate the process. It usually separates the wastes present in the water with the help of D.C. supply. It can somehow form a layers which generates flakes that usually driven in the liquid body.

1.1 Review of Literature

Juarez et al (2014) provide electroflotation as the process of pH dependent and maximizing the effectiveness through current density around 200 or more. While on

other hand, the electro-coagulation and reverse osmosis method have rejected the effluent treatment of distillery with use of Al-Al and Fe-Fe electrodes. It has been segmented that 98% of COD removal and efficiency rates were obtained through electrolysis time of 3 h using Al-Al electrode.

Yi-Ming Kuo et al (2008) have provided the treatment of simulated laundry wastewater through flotation technique. It has removed waste coagulants to around 63%. Henceforth, it has set out the ultrasound to the cell which has addressed on pH approach for neutrality in all experimental running. It has added on optimal results to energy concentration of less than 2500 ppm. It has also addressed on the positive effect on removal of efficiency.

Jiang et al (2020) have worked on the electrolytic reactors where separation in flotation tank and coagulants being positively drawing on the hydrogen gas bubbles generation with the cathode surfaces and Al dissolution in aqueous species at pH 6.5 are attained. It has specified that drinking water treatment has been low and added on current density of 10-20 A/m².

Belkacemi et al (2000) has reportedly might wet oxidation to add on timothy grass-based alcohol distillery wastewater and sharpen on organic carbon and went down and catalyst deactivated by carbonaceous deposition on the catalyst inhibition to managed on the kinetic models with non-catalytic process within reaction inhibition.

Kyaz et al (2016) has gravity separation process originated for mineral processing and adding the dissolved air-flotation or electroflotation. It has applied on the biological wastes, heavy metals and waters among the ions and magnesite and pyrite. Cd (II) and Cr (VI) and it presents electric field gradients and fine gas bubbles with the certain design aspects. It has also contributed on the by-products and waste materials inclusion in water.

2. EXPERIMENTAL METHOD

The Wastewater of distillery industry, used in this study was taken a local distillery. This wastewater used for treatment has an initial COD =35650. The entire chemicals used in the study were analytical reagent/ grade (AR). The stainless steel are used as electrode material. These sheets were procured from the local suppliers. A flat-bottomed flask made of acrylic glass was used as a reactor.

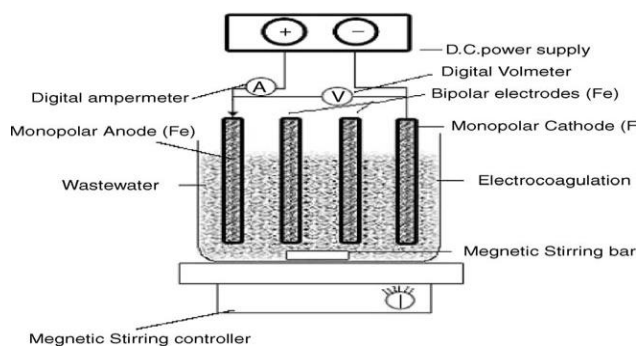


FIG.-1. Schematic diagram of electro- flotation process

Batch experiments were conducted for treatment of DWW by EF. 1.4 dm³ DE was taken in 1.5 dm³ EF reactor. Four plate configurations at varying current intensities (1, 2, 3 and 4) and voltage in the range of 0-30 V were used during experiments. All test runs were performed at the temperature 22-27°C for 60 min. Since pH has tremendous effect on EC, the experiments were first performed at different initial pH. When the optimized pH evaluated, treatments were performed at different intensities. To determine the COD, the samples were analyzed at regular time interval of 1 hr.

3. RESULT AND DISCUSSION

The influence of pH on the wastewater has somehow strongly presented that treatment at pH 4, 6, 8 have not presented the desired results.

Parameters	Effluent	EF-after optimum conditions
COD	35650	8913
TDS	46245	3456
TSS	36000	3659
TS	94525	7887
Total Hardness	9000	1100
pH	3.5	5.6
Color	Dark Brown	Light Brown

Table-1: Typical composition after and before treatment of wastewater

It has been analyzed that the efficient and theoretical amount of the supplied information would set out the current density rate at 0.05 A/m². It has certainly formed the bubbles which would help in sweeping the coagulation and flotation mechanisms.

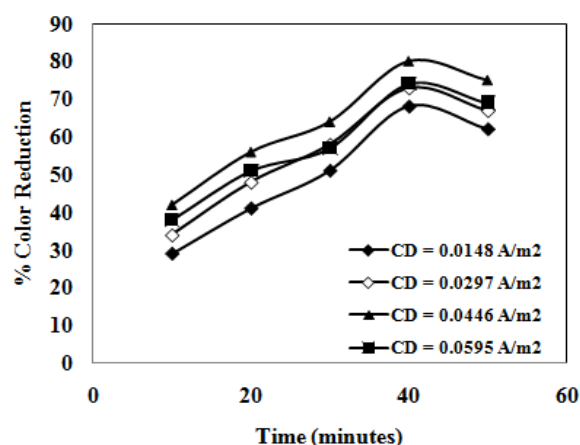


Fig-2: pH 5.6 and values of current density and its effect

It raises the bubbles rates which causes the flux to move upward and enhance the pollutants degradation in the water. It has also helpful in generating the relevant tendency to reduce the waste in water using SS-304 electrode at COD = 8913 mg/dm³ and pH=5.6.

4. CONCLUSIONS

With the current process of electroflotation, it has been withdrawn that pH 5. Provides the best characteristic and removal ratio of the waste organics and inorganics from the water. It also reduces the color tendency from dark to light with COD of 75.6%. It has certainly presented that 85% of the reduction was achieved. It has somehow represented that the discharge of wastewater was achieved and method was helpful in treatment of it at feasible duration.

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