

DEVELOPMENTS IN EFFLUENT TREATMENT – CONCLUDING PART

REF: TT/ NOV 2021/ WK 2

Electrocoagulation

The conventional coagulation technique of textile effluent/wastewater treatments has the issue of low removal rate of pollutants and generation of a large quantity of sludge. An advanced technology based method called **Electrocoagulation** has been developed to treat the waste water with high COD, TDS, and color efficiency before it is treated further or discharged in to water bodies. This method is considered as effective method for the removal of dyes from colored waste water.

Electrocoagulation is a treatment technology that removes total suspended solids (TSS), heavy metals, emulsified oils, bacteria and other contaminants from waste water.

ELECTROCOAGULATION

Electrocoagulation is a process of destabilizing suspended, emulsified or dissolved contaminants in an aqueous medium by introducing electrical current into the medium. The electrical current provides the electromotive force causing the chemical reactions. Electrocoagulation is based on the formation of metal hydroxide flocs in the wastewater by dissolving anodes with the applied current.

Electrocoagulation technique has achieved importance due to its efficiency. In an advanced approach, the process has also been integrated with Ultrasound and Hydrogen Peroxide for better efficiency. The technique involves dissolution of the sacrificial anodes to provide an active metal hydroxide as a strong coagulant that destabilizes and then removes them by precipitation or adsorption. Electrocoagulation process is affected or influenced by various operating parameters such as applied current, electrodes material and configuration, type of electrical connection, pH and conductivity of the solution, and mixing state.

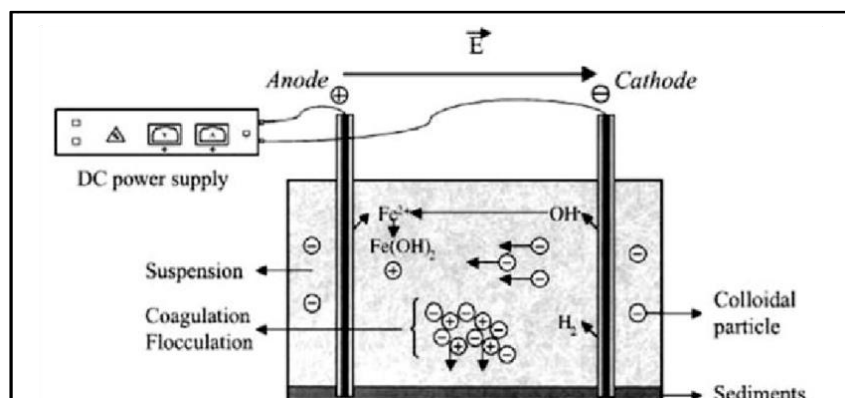


Fig 1.1 Principle of Electrocoagulation Process

Ref: researchgate.net



Adsorption

Adsorption is the process by which ions, atoms or molecules adhere to the surface of a solid material without undergoing any reaction. It is one of the most commonly used methods for the removal of textile dyes from the effluents. Besides conventional materials like activated carbon other materials are also being considered as adsorbents such as polyelectrolytes, chemically modified polyelectrolytes derived from chitosan containing amino and sulfonate groups in the adsorption of treatment of wastewater from the textile industry.

Other than chemically modified alternatives, biological origin adsorbents are also used. Those are chitosan, chitin, saw dust, cotton waste etc.

Biomass is also used to decolorize the textile wastewater by adsorption process. However, the disadvantage of biomass is its low adsorption property.

BIOMASS

Biomass is renewable organic material that comes from plants and animals. It contains stored chemical energy from the sun. Plants produce biomass through photosynthesis. Biomass can be burnt directly for heat or converted to renewable liquid and gaseous fuels through various processes.

Summary

The different new techniques such as coagulation-flocculation, advanced oxidation processes like electrochemical oxidation, cavitation, Fenton, ozonation and photocatalysis are also introduced in the textile effluent treatment plants. Improvements in the biological treatment methods have also been taking place like phytoremediation, microbial fuel cells, use of fungi and algae. Membrane technologies and physicochemical treatments combining with biological oxidation have also being considered.

In case of Common Effluent Treatment Plants (CETP) also new techniques are being applied for their performance enhancement.

References:

1. <https://www.sciencedirect.com/>
2. <https://www.tandfonline.com/>
3. <http://nopr.niscair.res.in/>
4. <https://www.ionindia.com/>
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UNSCRAMBLE THE JUMBLE WORDS

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ANONITOOZ

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Last week's Answers: 1) MEMBRANE 2) CLOGGING 3) SUSPENDED 4) FIRST

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