STUDY OF VARIOUS PARAMETER AND ITS EFFECTS ON WASTE WATER USING ELECTRO- LYSIS PROCESS

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Abstract: **Chemical industries such as pharmaceutical, petroleum, petrochemical, textile, paint and pigment, inorganic chemical industries, cement, dyes & dyes intermediates are responsible to generating huge amount of wastewater containing significant amount of suspended solid, color, BOD, COD which are highly toxic and hazardous for environment. Conventional treatment techniques are used for wastewater treatment process. But these have many limitations so it has to find alternative method. Electrolysis is the simple and efficient method for water and wastewater treatment. The purpose of this study was to investigate effect of parameter such as current, pH, electrolytes concentration, inter-electrode distance on removal of organic matter.**
Index Terms **- Electrolysis, iron, copper, Zinc.**

I. INTRODUCTION

Water is one of the basic need for human being. The chemical process industries have been a part of human development since past many decades. As major contributor to development of industrial growth in India industries like petroleum, petrochemical, pharmaceutical, textile, paint and pigment, inorganic chemical industries, cement, dyes & dyes intermediates are responsible. It is very obvious that these industries needs raw water for their product manufacturing, cooling, boiler, washing etc. Therefore they not only consume large quantity of fresh water but also generate waste water of various concentrations based on the operations involved. The wastewater once generate need to be treated before final disposal into environment for sustainable growth. Many wastewater treatment technologies are available for treatment of variety of industrial effluent for removal of toxic parameters. Final disposal mode of effluent is one of the selection criteria for treatment technique. The raw effluent characteristic and their treatment to reduce them at the level as prescribed by the regulatory authority are also necessary criteria for selection of proper treatment technology.

II. OBJECTIVE

- To study the existing secondary wastewater treatment and propose/new electrolysis technique for wastewater treatment.
- To study the electrolysis method for reduction of organic matter and color in industrial wastewater.
- To study the various factors affecting the operation like types of electrodes, inter electrode distance, Effect of supporting electrolytes, current density, effect of pH, Effect of initial dyes concentration.

III. METHOD

- **Electrolysis Process (Electrocoagulation):**

Electrolysis Process an electrochemical technique in which variety of unwanted dissolve solid can be effectively removed from an aqueous solution. Electrolysis is the process of destabilizing suspended emulsified or dissolved contaminants in an aqueous medium by introducing an electric current in to the medium.

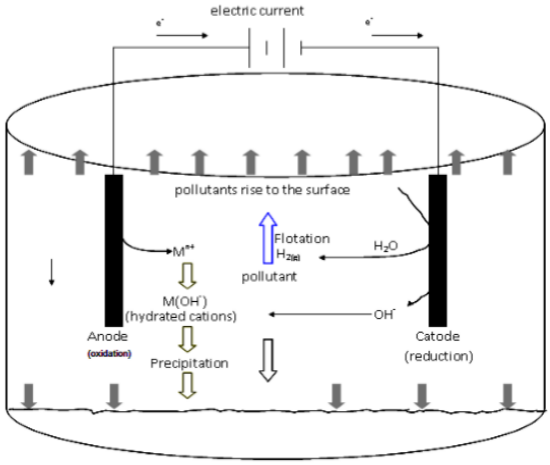

Figure.1 Schematic diagram of electrolysis cell

Electrolysis cell/reactor contains two electrode anode and cathode, in the process direct current applied to the reactor containing water or waste water. This current breaks the water molecule into hydrogen gas. If the anode having a lower oxidation potential than water, it will produce a metal ion which will react with hydroxyl ion and produce metal hydroxide and polymeric hydroxide.

IV. EXPERIMENTAL WORK

- **Lab Scale Electrolysis Setup**

Electrolysis reactor with mono-polar electrode connected in parallel was used in the experiments. The reactor having a volume of 200ml. Copper and Zinc were used as the electrode for the experiments. A regulated direct current supply (Jaytron, 0-5 A and 0-24 V) was used for the experiments.

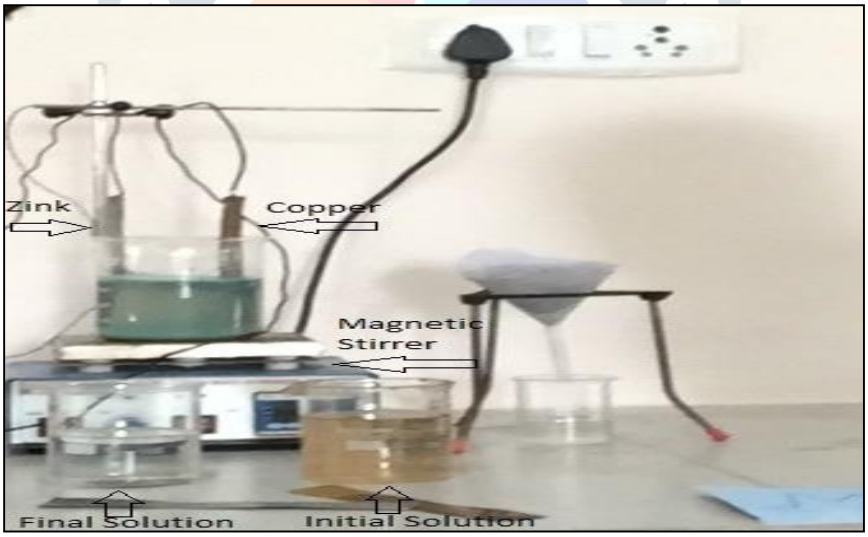

Figure.2 Electrolysis lab scale set

- **Experimental Procedure**

Sample solution was prepared as required quantity. Before every experiment electrodes were clean with sand paper to remove scale and then cleaned with water. The electrodes were weighed before and after each run. The inter electrode spacing was adjust as per our requirement. D.C power supply was used to pass the current. Proper agitation was done by magnetic stirrer. The sample was taken for color removal analysis.

- **Dyes used in Experiment**

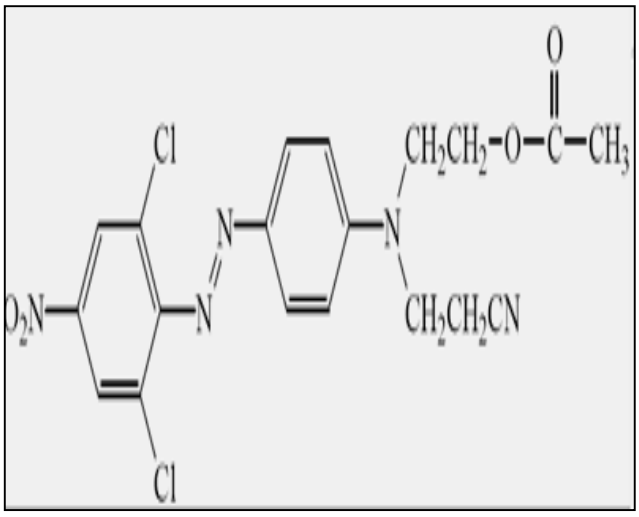

Figure 3. CORALENE ORANGE 2B

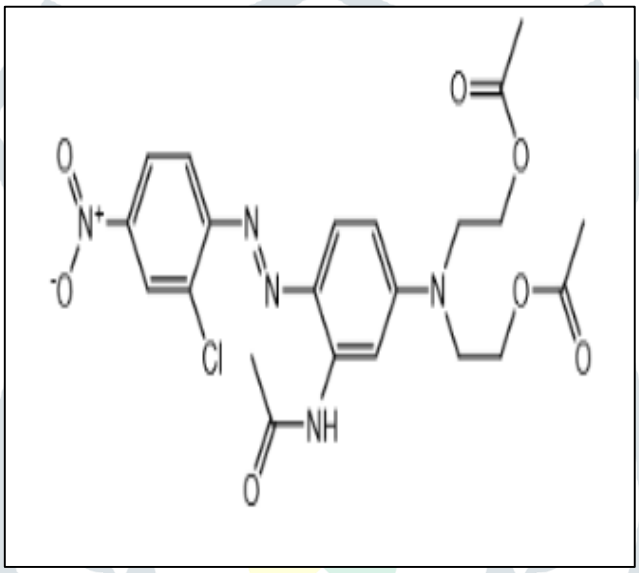

Figure 4.CORALENE DARK RED 2B

V. RESULTS

- **Coralene Dark Red 2B**

Effect of Parameter on Coralene Dark Red 2B
Effect of Initial Concentration

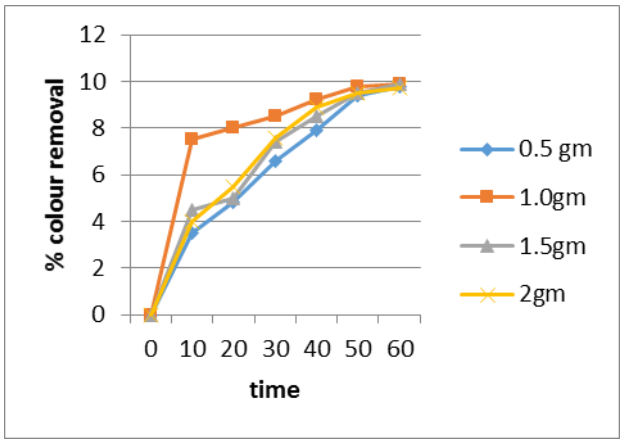

Figure 5. Effect of initial concentration

Effect of electrode distance

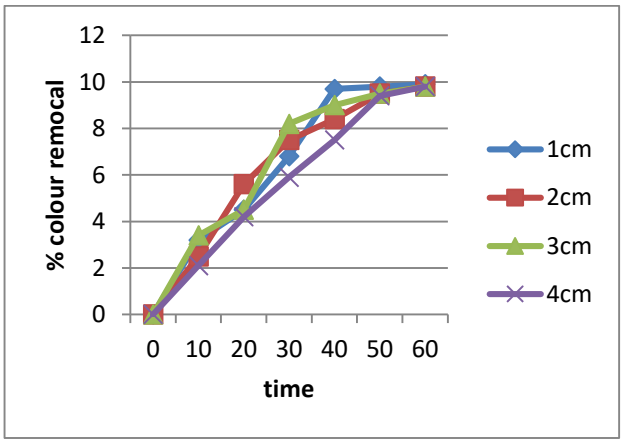

Figure 6. Effect of electrode distance

Effect of operating current

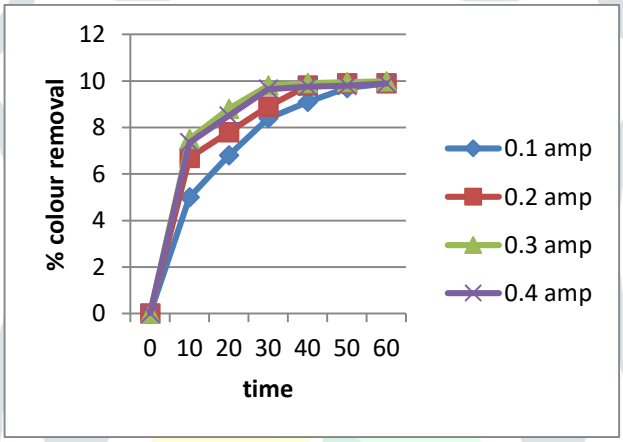

Figure 7. Effect of operating current

Effect of electrode on % color removal

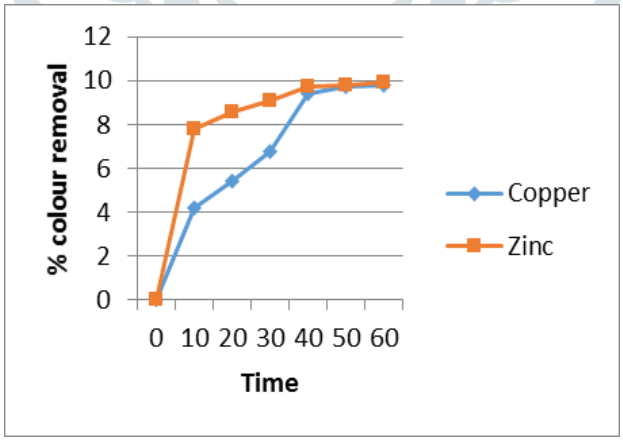

Figure 8. Effect of electrode on % color removal

- **Coralene Dark Orange 2B**

Effect of Parameter on Coralene Dark Orange2B
Effect of initial concentration

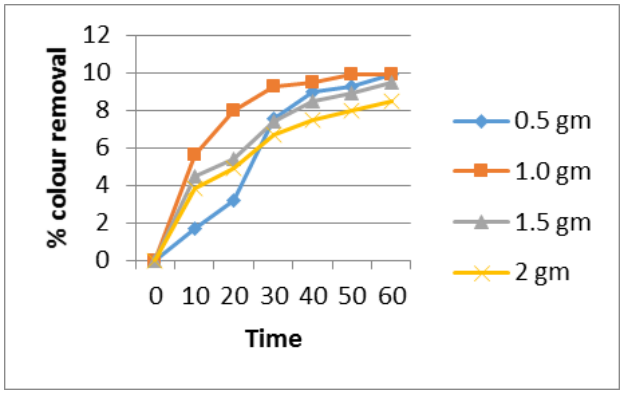

Figure 9. Effect of initial concentration

Effect of electrode distance

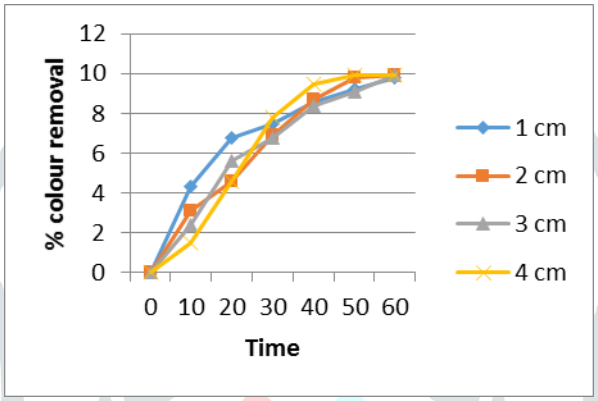

Figure 10. Effect of electrode distance

Effect of electrode on % color removal

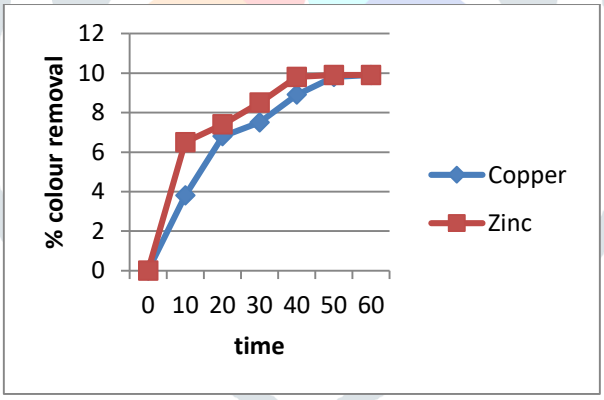

Figure 11. Effect of electrode on % color removal

Effect of operating current

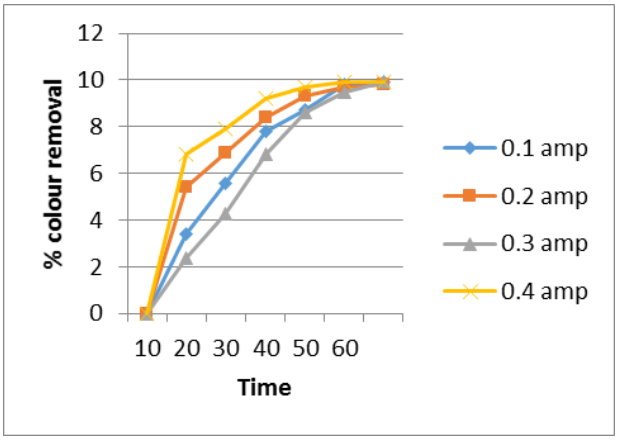

Figure 12. Effect of operating current

VI. CONCLUSION AND FUTURE WORK

➢ **Future Work**

- Study the effect of various parameters like effect of pH, and types of electrodes (like Platinum, Carbon etc.) Study the metal recovery process from treated water.

➢ **Conclusion**

- In the present research/study we have reviewed the existing secondary treatment methods which have some limitations so it is necessary to upgrade existing facility.
- Both dyes shows best color removal (%) with 50 mins time and 0.4 amp. After 60 minute there is no color removal in both the dyes.

VII. ACKNOWLEDGMENT

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