CHARACTERISTICS OF PAPER MILL EFFLUENT

Soumyashree B T[1], Dr MC Sampath Kumar[2]

[1]Student,Civil Engineering ,BMS college of engineering, Karnataka,India
[2]Professor,Civil Engineering ,BMS college of engineering, Karnataka,India

ABSTRACT

The aim of this study is to remove the dye from the paper and pulp industry waste water and to use the bio adsorbent kitchen waste powder in dye removal. The dark color in paper mill effluent is caused due to the presence of organic ligands such as wood extractives, resins, synthetic dyes, tannins, lignin and its degradation products. Using kitchen waste powder as an adsorbent for the removal of color, the effect of adsorbent dosage, contact time, agitation speed, pH are studied.

Keywords – *kitchen waste powder and Removal of color.*

I. INTRODUCTION

Water is basic requirement and core essential for living being in day to day life. To develop healthy and hygienic environment water quality should be maintained within given standards.

Above seventy percentage earth surface is covered with water. 97% rain water, 2% in ice cap, and 1% ground and surface fresh water. Water management in India depends on rainfall distribution leading to insufficiently usage of water, poor waste management system, unrequired ground water extraction, floods and droughts.

Water pollution is at peak frightening people to be aware. Industry is major reason for water pollution. Every year quarter children born in under developed and developing countries die due to contaminated water. Overall 35000 people die from contaminated water every day. This water pollution becoming serious issue day by day. As population increasing industrialization increasing this phenomenon associated with problem such as water pollution, poor use of natural resources and shortage of fresh water.

Paper and pulp industry being categorized under red list of polluting industry. It consumes high quantity fresh water results in equal volume of wastewater generation. It's among 17 highly polluting industries in India. It is 6th largest water polluter after oil, cement, textile and leather, food processing and chemical etc. About 80% to85% of water consumed by industry is discharged as waste water containing inorganic and organic pollutant and coloring materials. The volume and character of waste water changes from mill to mill depending on raw material, manufacturing process, pulping process, recovery of chemicals etc.

This industry release large amount of color waste water, this color is mainly due to colloidal or suspended material. This color is unaesthetic, not fit for drinking and cannot be used without proper treatment.

Figure 1. Paper and pulp industries in Bijapur.

II. MATERIAL AND METHODS

Preparation of kitchen waste powder

Kitchen waste (like vegetable peel, onion peel, fruits peel etc) collected from houses and hotels were washed repeatedly with water to remove dust and soluble impurities and were allowed to dry first at room temperature in a shade till the peels were dried. These were crushed into a fine powder in a mechanical grinder to obtain the kitchen waste powder (KWP). The powder was mixed with orthophosphoric acid kept in muffle furnace at 450 degree Celsius for one hour. The KWP was sieved using 600 micron sieve. KWP was preserved in glass bottles for use as an adsorbent

Batch Experiments

The batch adsorption experiments were conducted to study optimum removal of color from paper mill wastewater. Required quantity of different doses of kitchen Waste powder added to conicalflask with 50 ml paper and pulp mill waste water. The conical flask were kept in rotatory shaker at room temperature at 150 r.p.m. The contents were filtered using filter paper. The equilibrium time, pH, speed and optimum dose of adsorbent were optimized by repeating the same experiment at different conditions.

To determine the percentage of color removal. The following equation used

Removal Percentage of color

$$= \frac{Co - Ce}{Co} \times 100$$

Where,

Co= initial concentration of color solution (mg/l)Ce= finial concentration of color solution (mg/l)

III LABORATORY WORK & ANALYSIS

Preliminary Analysis of Wastewater Sample.

Collected water sample, tested initially to know its concentration, was found to be highly turbid and alkaline, also showing the presence of Sodium,Potassium etc in it. Preliminary water sample testing helps in determining the type and extent of treatment to be given to the wastewater. The below table shows results of wastewater collected from paper and pulp industry.

Table: 1 Characteristics of the paper mill effluent (mg/l), conductivity (micro S/m)

Parameter	**Initial value**
pH	7.57
Totalhardness	286
Calciumhardness	152
Magnesiumhardness	134
Chlorides	141
sulphates	113
Totaldissolved solids	932
Totaldissolvedsolids-inorganic	750
Totalsuspended solids	1104
COD	1500
COD-Soluble	620
BOD_5	1054
BOD_{5-} soluble	560
Conductivity	2.95
Sodium	224
Potassium	6
Ashcontent	1288

Effect of contact time

50ml of wastewater sample was taken in conical flask and treated with the KWP and kept in a orbital shaker at room temperature and 150 r.p.m. The sample was withdrawn from flask attime interval of 10 min each and results are compared with original color concentration of wastewater to know the color removal efficiency of absorbents. The percentage removal of dye concentration is measured u0sing colorimeter and graph is plotted between the percentage removals of dye VS contact time. The optimum time duration required for color removal is 55min**.**

Effect of adsorbent dosage

The effect of dosage on the absorption is studied by varing the amount of adsorbent from 0.01g to 0.08g with 50ml wastewater in conical flask in rotatory shaker at room temperature and 150rpm.It was found that maximum color removal efficiency was 88.88% at 0.06g dose when shaking time was 55min.

Effect of agitation speed

The rotatory shaker is used to agitate the sample and agitation speed varied from 50,100,150,200 rpm. The percentage removal efficiency is calculated .The graph is drawn between percentage removal of dye VS rpm. The equilibrium rate required for absorption is 150rpm.

Effect of pH

Color removal capacity was studied at pH ranging between 2 to 12 by maintaining pH of wastewater with HCL and NaOH solution. The graph is drawn between percentage removals ofdye VS pH. The maximum removal of color from wastewater is at 7 pH.

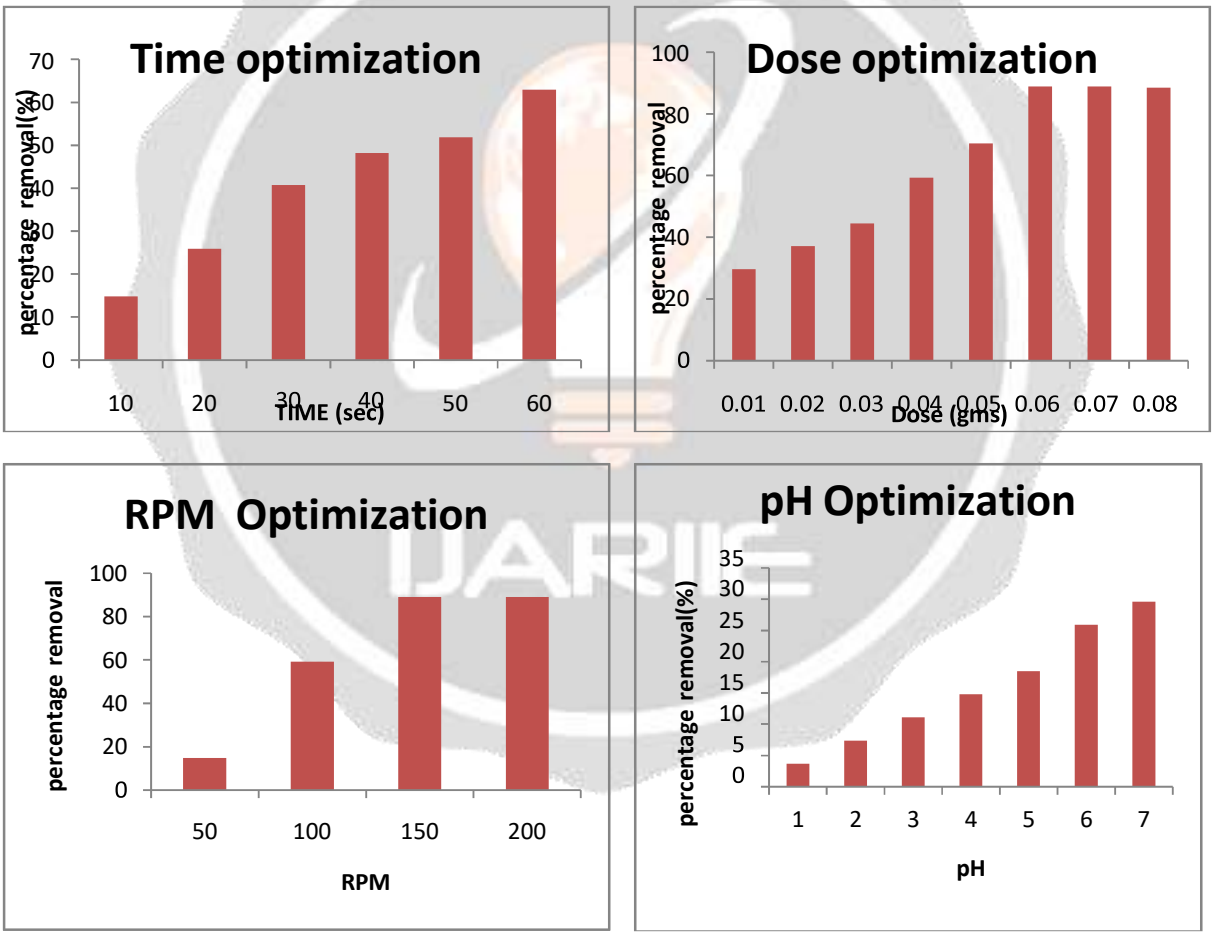

Figure: 2 shows the graphical representation of Characteristics of paper mill waste water.

CONCLUSION

Maximum color removal in the waste water is obtained at 150rpm. About 88.88% removals are obtained 0.06gram kitchen waste is used as absorbent and with a contact time of 55 minutes. From the pH study. At pH 67maximum dye removal of 25.7% is obtained. The absorbent selected for this study proved to be good adsorbent for the Removal of dyes which present inthe paper mill wastewater.

REFERENCES

[1]. Fahim Bin et al (2013) "Dyes Removal From Textile Wastewater Using Orange Peels".International journal of scientific & technology research volume 2,
issue 9, september 2013

[2]. Ranjanayadav et al (2012) "Colour removal from paper mill effluent using activatedcarbon".
Received 13 December 2011; accepted 10 January 2012

[3]. KashifMehmood et al (2019) "Treatment of Pulp and Paper Industrial Effluent UsingPhysicochemical Process for Recycling Physicochemical treatment".
Received: 8 October 2019; Accepted: 11 November 2019; Published: 14 November 2019

[4]R S.Mane, V.N.Bhusari(2012) "Removal of Colour (dyes) from textile effluent by adsorptionusing Orange and Banana peel".
International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622www.ijera.com Vol. 2, Issue 3, May-Jun 2012