ISSN No:-2456 –2165

Study on Dye Industry Wastewater Treatment Process by Alum and Natural Charcoal

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Abstract:-In the present research coagulation & adsorption process was applied for removal of dye with the use of three coagulants viz. Alum, Activated Carbon and Natural Charcoal (prepared by random wood). This paper investigate the effect of alum and Natural Charcoal in the treatment of dyeing wastewater, removal of parameters such as pH, SS, TDS, TS, DO, COD, BOD, Sio_2, Alkalinity, Total Hardness, Chloride, Turbidity, and about total removal in color of dyes is been analyzed. Finally it's been concluded that Natural charcoal is equally efficient and less costly than the commercial Activated Carbon.

Keywords:-Alum, Dye, Activated Carbon, Natural Charcoal, DO, COD, BOD, Sio_2, Alkalinity, Total Hardness, Chloride, and Turbidity,

I. INTRODUCTION

We know that dyes are hazardous substances and the Wastewater from printing and dye industry process unit is often rich in color, containing effluent of reactive dyes and chemicals, and requires proper treatment before being released into the environment. The dyes and the pigment both are colored because they absorb some wavelength of light more than others. Textile dyeing industry is one of the most water consuming industries after thermal, pulp and paper industries. In India water consumed by textile industries in the year of 2016 was around 3000 million cubic meters and effluent water generated was around 75 per cent of its intake. As the textile industry is one of the most water consuming industries in many countries, water treatment plays an important role here. Coagulation/flocculation process is widely used and recommended due to its positive result, lower sludge generation and high running cost. Activated carbon filtration based on the adsorption of contaminants onto the surface of a filter it is commonly used technology of this. This adsorption technology is effective in elimination of certain organics, radon from drinking water chlorine or fluorine or wastewater. With the help of Alum, Activated carbon and Natural Charcoal this wastewater can easily convert into useful water and can easily use in process of dyeing by ignore the disposal of this wastewater.

II. MATERIAL AND METHOD

The main purpose of the coagulation process is the removal of finely divided suspended solid and colloidal is. The process of Coagulation has been defined as the addition of a positively charged ion such as Al3+, Fe3+ or catalytic polyelectrolyte that results in particle un-stabilization and charges neutralization, the waste liquid materials. Aluminum is an active metal that dissolves in strong acids and in strong bases. It doesn't seem like an active metal in everyday use because it forms a tightly bound oxide coat on its surface which protects it from further oxidation. For industrial wastewater treatment alum is useful for this. Alum quickly soluble in water, sweetish in taste, react acid to litmus, and crystallize in regular octahedral. In alums every metal ion is surrounded by six water molecules. When water is heated, substance liquefies fast, and if the heating is continued, the water of crystallization is driven off, the salt froths and swells, and at last an amorphous powder remains. Charcoal is the lightweight black carbon and ash residue produced by eliminate water and other volatile constituents from animal and vegetation substances. The procedure to produce natural charcoal is pyrolysis and heating of wood or other substances in the absence of oxygen. Natural Charcoal made up of Wood

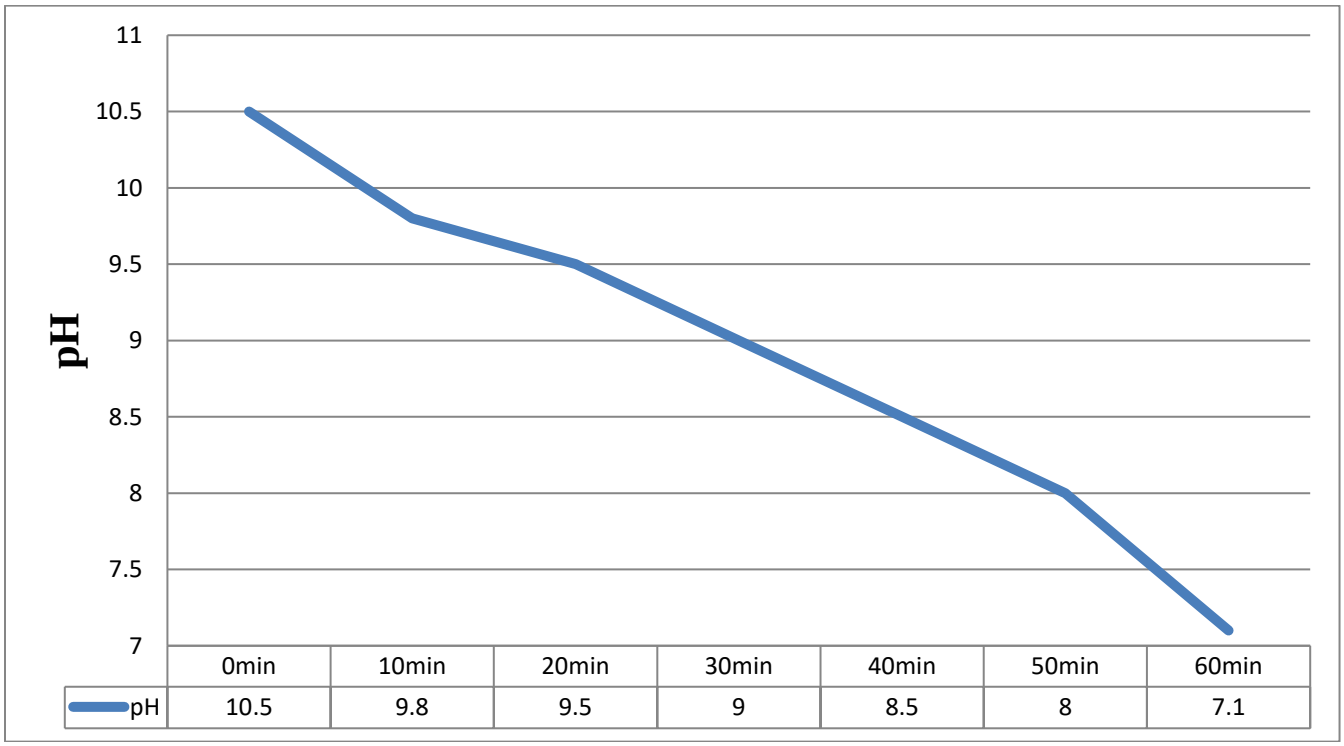
III. RESULT AND DISCUSSION

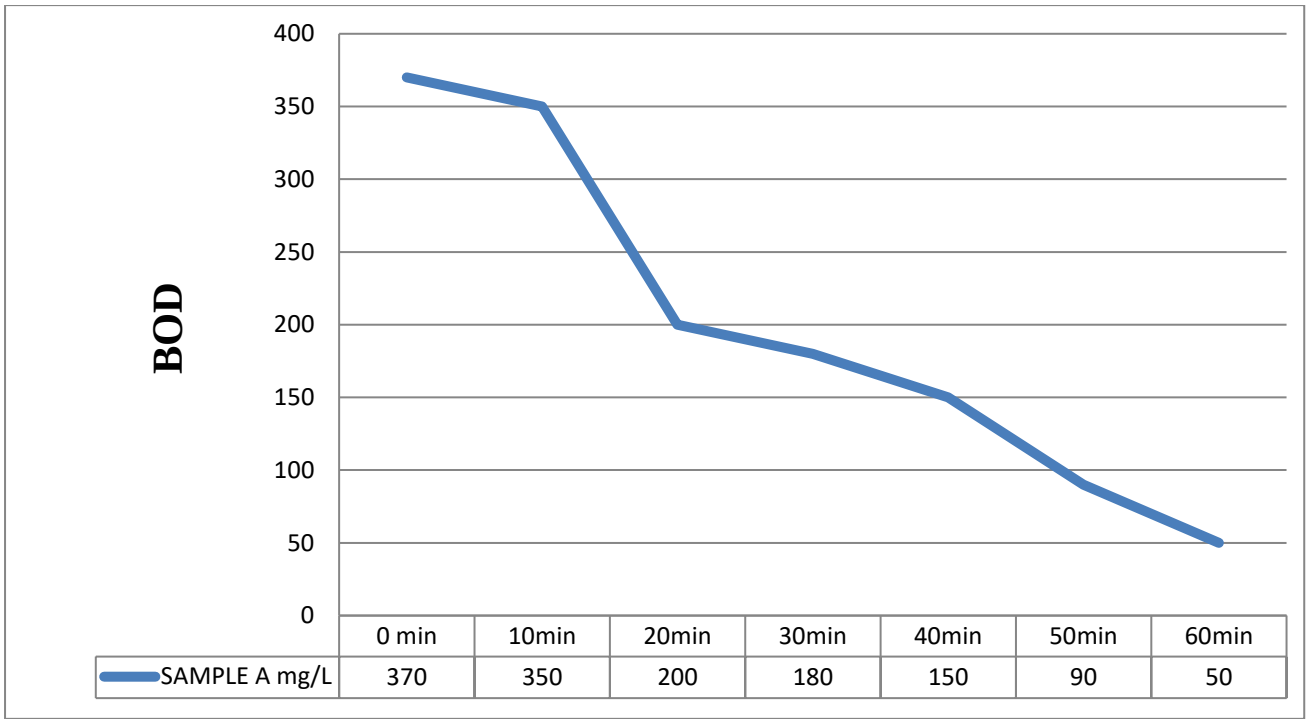
This study depicts the ultimate solution for dyeing wastewater containing psycho chemicals. As we know several pollution problem created from this wastewater which is directly disposes in rivers. As we collected dye wastewater from Bhairavgarh, Ujjain (M.P.) on that place wastewater is directly disposed in open domestic wastewater seawares and this seawares drained in river Kshipra. To reuse this dye wastewater this coagulation process by alum and Natural Charcoal is very convenient process and there should be no energy uses and loses by using of this process. it is efficient and most economy than the other treatment processes. The main motive of this study is to design a economic and easy treatment process. Use of two coagulants with alum is to identify the best of them by comparing them and it was observed that the Natural Charcoal is more efficient in

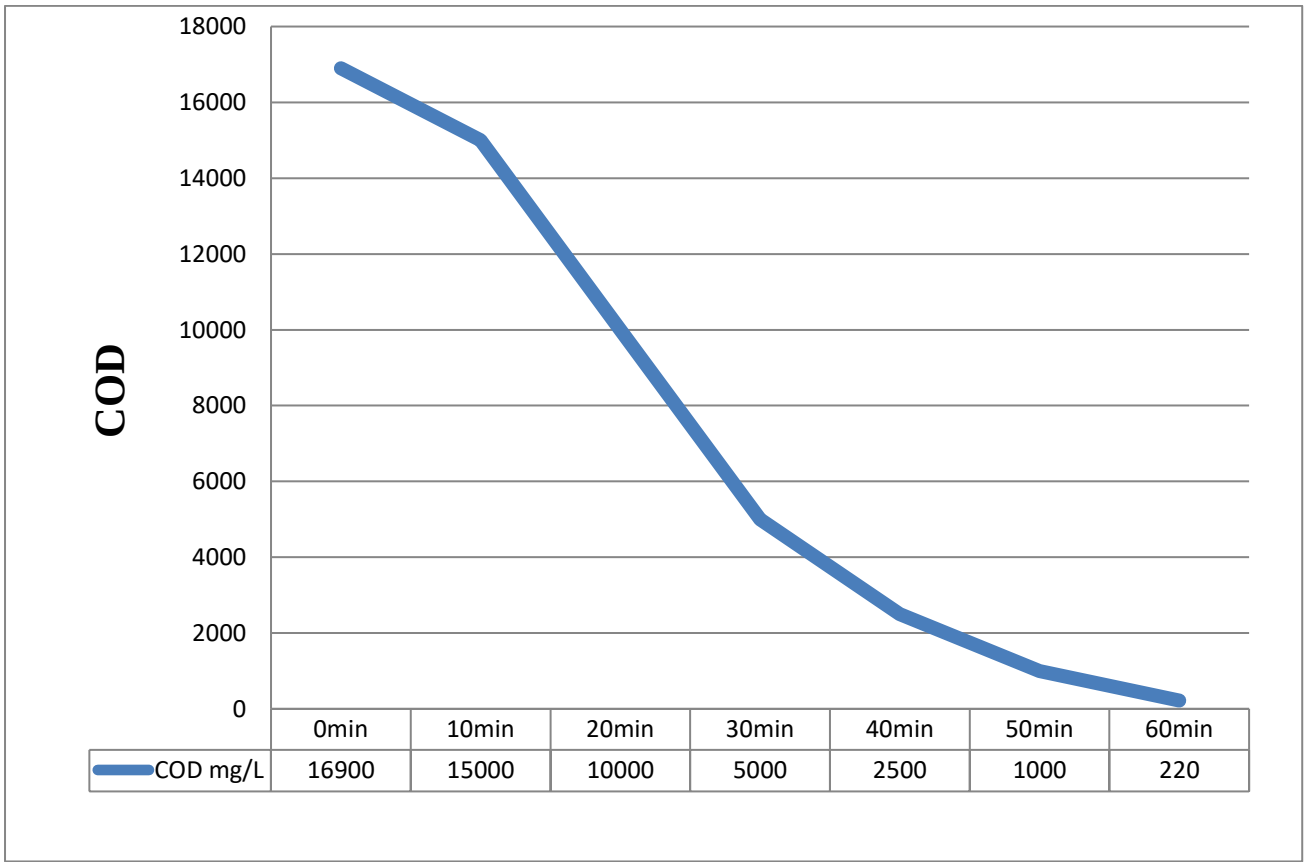
removal of TDS, SS, TS, and TSS than the Activated Carbon. There is about 80-90% of removal in pH, SS, TDS, TS, DO, COD, BOD, Sio2, Alkalinity, Total Hardness, Chloride, Turbidity, and about total removal in color of dyes.

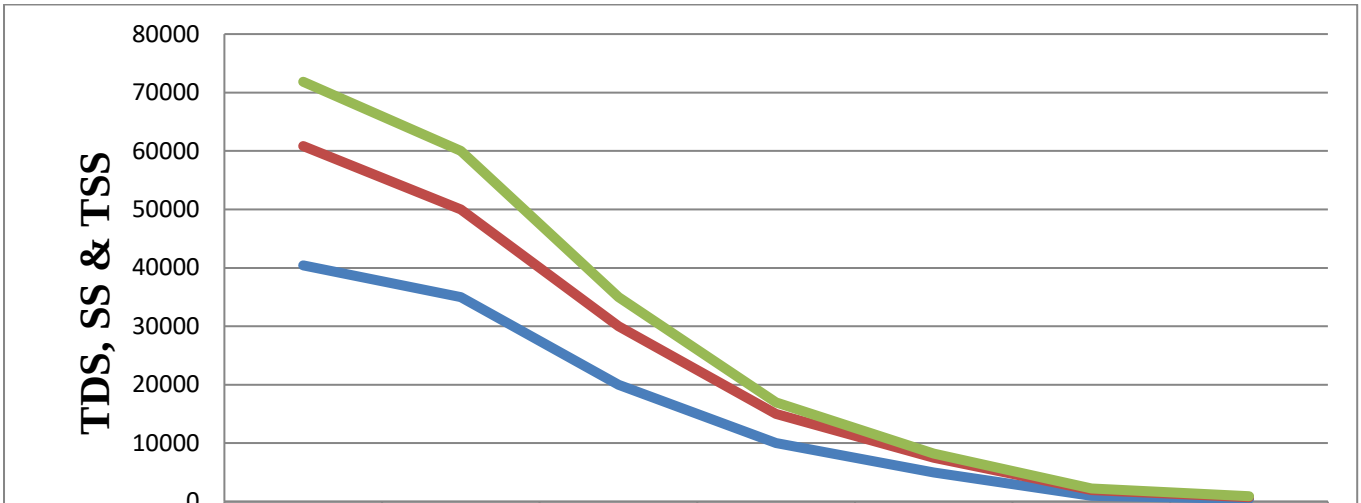
Parameters	Standards as per CPCB Norms.	Characteristics before treatment	Our analysis after treatment
pH	6.5-9.0	10.5	6.9-7.1
Total Suspended solids (mg/L)	100	29420	290
Total Dissolve Solids (mg/L)	100	11000	172
Total Solids (mg/L)	200	40420	462
Dissolve Oxygen (mg/L)	4-6	1.5	4.2
COD (mg/L)	250	16900	220
BOD (mg/L)	30	370-420	50
Color (Hz)	<25	320	25
Turbidity	<5	700	10
Alkalinity	<25	610	120
SiO2	<5	46	5
Total Hardness	<100	970	300
Chloride (mg/L)	5	692	250

IV. GRAPHYCIAL REPRESENTATION




BOD
400
350
300
250
200
150
100
50
0
0 min
10min
20min
30min
40min
50min
60min
SAMPLE A mg/L
370
350
200
180
150
90
50


COD
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0min
10min
20min
30min
40min
50min
60min
COD mg/L
16900
15000
10000
5000
2500
1000
220



	0min	10min	20min	30min	40min	50min	60min
TDS mg/L	11000	10000	5000	2000	700	250	172
SS mg/L	20420	15000	10000	5000	2500	1000	290
TSS mg/L	40420	35000	20000	10000	5000	1000	462

As shown in graph below pH, BOD, COD has 80-90% of changed. If we compare with parameters which are shown in observation table as per CPCB norms than it can be understand that the graph of reduction in pH is all about 90-100%, BOD is about 70-80% and COD is about 80-90%, the graph in the end which shows reduction in TDS,SS and TSS which was all about 80-90% reduced with the help of Natural Charcoal so we can conclude by saying that this study is effective with both coagulants Activated Carbon and charcoal but with Natural Charcoal get maximum results of reduction in impurities and color of the dyeing wastewater. And if we compare on the basis of economic point of view Natural charcoal is less costly than the Activated Carbon. Preparing method is very easy and effective results given as activated carbon.

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