iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** III **Month of publication:** March 2021

DOI: https://doi.org/10.22214/ijraset.2021.33147

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue III Mar 2021- Available at www.ijraset.com

Color Removal of Waste Water Treatment Plant in the Vicinity of Gwalior (M.P.) and some Suggestions to Improve Performance

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Abstract: ***Harshit textile industry produced a large amount of coloured wastewater containing variety of dyes in different concentrations. The colour is due to high concentration and stability of synthetic dyes in the effluent. Colour in wastewater. These harmful dyes present in textile effluents react with many disinfectants, chlorine and forms carcinogenic bi products. Colloidal matter presents along with color increases the turbidity, gives bad appearance, foul smell and prevents the penetration of sunlight into water bodies required for the photosynthesis hence badly affects marine life. If textile dyes effluents are allowed to flow in drains and rivers it affects the quality of drinking water making unfit for human consumption the conventional biological treatment method are ineffective for the complete colour removal and degradation of orange peel and dyes also takes place and these methods are expensive too. This research paper deals with the determination of colour in waste water effluent then its removal at different pH and temperature using orange peels as adsorbent. It was concluded that as by following standard procedure, as per permissible limit, the efficiency of removal of colour is obtained nearly 86%.***
Keywords: Bio adsorption, Total colour, Orange peel powder, Synthetic dyes.

I. INTRODUCTION

Wastewater has the majority significant and ecological impact for the growth of Textile industries and other major or small issues. Textile industries use various types of synthetic color dyes which produces much amount of highly colored waste water. It is highly impact on aquatic life because low light penetration and oxygen consumption. It may be lethal to certain forms of aquatic life due to the presence of chloride and heavy metals present in the synthetic dyes which is carcinogenic. So we must treat textile water before discharge. Main characteristics of wastewater involves physical, chemical and biological characteristics.
Various treatment processes for the color removal of textile waste water:

A. Adsorption Process Physisorption Chemisorption.
B. Aerobic wastewater treatment process
C. Anaerobic Wastewater Treatment Process

II. MATERIALS AND METHODS

A total of 12 samples are prepared of volume **500ml each**. Then, Color test is performed along with other affecting parameters on untreated samples and Treated samples. Then, by calculating percentage removal of colour we can find the optimum value of all the three factor namely Amount of adsorbent, pH value and Contact time. Each of the sample is analyzed for Total colour using Tintometer method and also for various water quality parameters such as pH, Temperature, Chloride content, Total hardness, and T.S.S. as per standard procedures recommended by CPHEO, Table02. The experimental values are then compared with standard values recommended by Bureau of Indian Standards (BIS) for drinking water (Table01).

Table-01, 02

S.No.	Parameters	Indian Standards for drinking water (IS 10500: 2012)	Permissible limit in the absence of alternate source (IS 10500: 2012)
01	pH	6-8.5	6-8.5
02	Colour	5	15
03	Chloride Content	250	1000
04	T.S.S.	500	2000
05	Total Hardness	200	600
06	Temperature	30^{o}C	-

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S. No.	PARAMETERS	INTRUMENTS USED	METHOD ADOPTED
01	pH	Digital pH Meter	-
02	Colour	Tintometer	-
03	Chloride Content	-	Argentometric Method
04	T.S.S.	-	Gravimetric Method
05	Total Hardness	-	Volumetric Method
06	Temperature	-	-

Rest of the parameters are in ppm except pH

A. Bio Adsorbent

For the removal of Colour, an adsorbent is prepared by using orange peels. It is a herbaceous annual/ephemeral member of the family Asteraceae. Literature study shows that this plant can be successfully and economically used as biological alternative for chloride removal.

Fig 1 Orange peel

Fig 2 Adsorbent powder

III. METHODOLOGY

A. Objective

The objective of this work is to determine colour and governing water parameters in wastewater effluent from Harshit textile industry. Then attempts are made to remove the colour by using orange peel powder as adsorbent. Then to compare the obtained values with Standard values.

B. Work Plan – An Overview

A total of 12 samples are prepared of volume **500ml each**. Then, Color test is performed along with other affecting parameters on untreated samples and Treated samples. At the same time, orange peel is collected and adsorbent is prepared via standard procedures at standard temperatures. Then samples are subjected to adsorption and removal efficiency is analysed. Results obtained are compared and discussed.

C. Study Area – An overview

Harshit Textile Industry is located at Birla Nagar in Gwalior (M.P.). The processing of the industry includes receiving completely manufactured dry cotton-polyester mix cloth from Bhiwadi and then undergoing it through wet processing. Beginning with Bleaching then washing, Sounding then washing, mercerizing then washing, dyeing or printing then drying. Developing and Padding, Counter cuffing washing then drying and Finally Folding and Standing. Al1 the washing as mentioned earlier results is the generation of Wastewater which is discharged to a common leading to the ETP of the Harshit Textile Industry.

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IV. OBSERVATIONS

Table 3 Observation for Colour and Total Suspended Solids

S.No.	Sample	Colour, mg/L	Total Suspended Solids, mg/L
01	Untreated ETP effluent	218	280
02	Treated ETP effluent	110	68

Table 4 Observation for Other water parameters

S.No.	Water parameter	Concentation
01	pH	8.3
02	Chloride content	380 mg/L
03	Total hardness	280 mg/L
04	Temperature	$45^{o}C$

V. RESULTS AND DISCUSSIONS

Table 5 Effects of amount of adsorbent

S.No.	Amount of adsorbent, mg	Colour in untreated water	Colour in treated water	Percentage colour removal
01	200	218	185	15.13
02	400	218	150	31.19
03	600	218	110	49.54
04	800	218	135	38.07

Table 6 Effects of dye-adsorbent contact time

S.No.	Contact time, minutes	Colour in untreated water	Colour in treated water	Percentage colour removal
01	45	218	130	40.36
02	60	218	115	47.24
03	75	218	110	49.54
04	90	218	120	44.95

Table 7 Effect of Temperature

S.No.	Temperature, K	Colour in untreated water	Colour in treated water	Percentage colour removal
01	310	218	125	42.66
02	320	218	116	46.78
03	330	218	110	49.54
04	340	218	118	45.87

Table 8 Effect of Agitator Speed

S.No.	Agitator speed, Rpm	Colour in untreated water	Colour in treated water	Percentage colour removal
01	400	218	135	38.07
02	600	218	110	49.54
03	800	218	128	41.28
04	1000	218	142	34.86

A. Other Parameters

pH -

T.S.S. –

Total Hardness –

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VI. CONCLUSIONS

A. We have seen the maximum removal of colour from textile wastewater at 330 K Temperature and at 600 rpm agitator speed rotator at adsorbent dose of 600 mg and contact time 75 minutes with pH 7.

B. The removal efficiency of colour from textile wastewater may be improved with more change in pH, contact time, rotation speed of agitator and dose of adsorbent.

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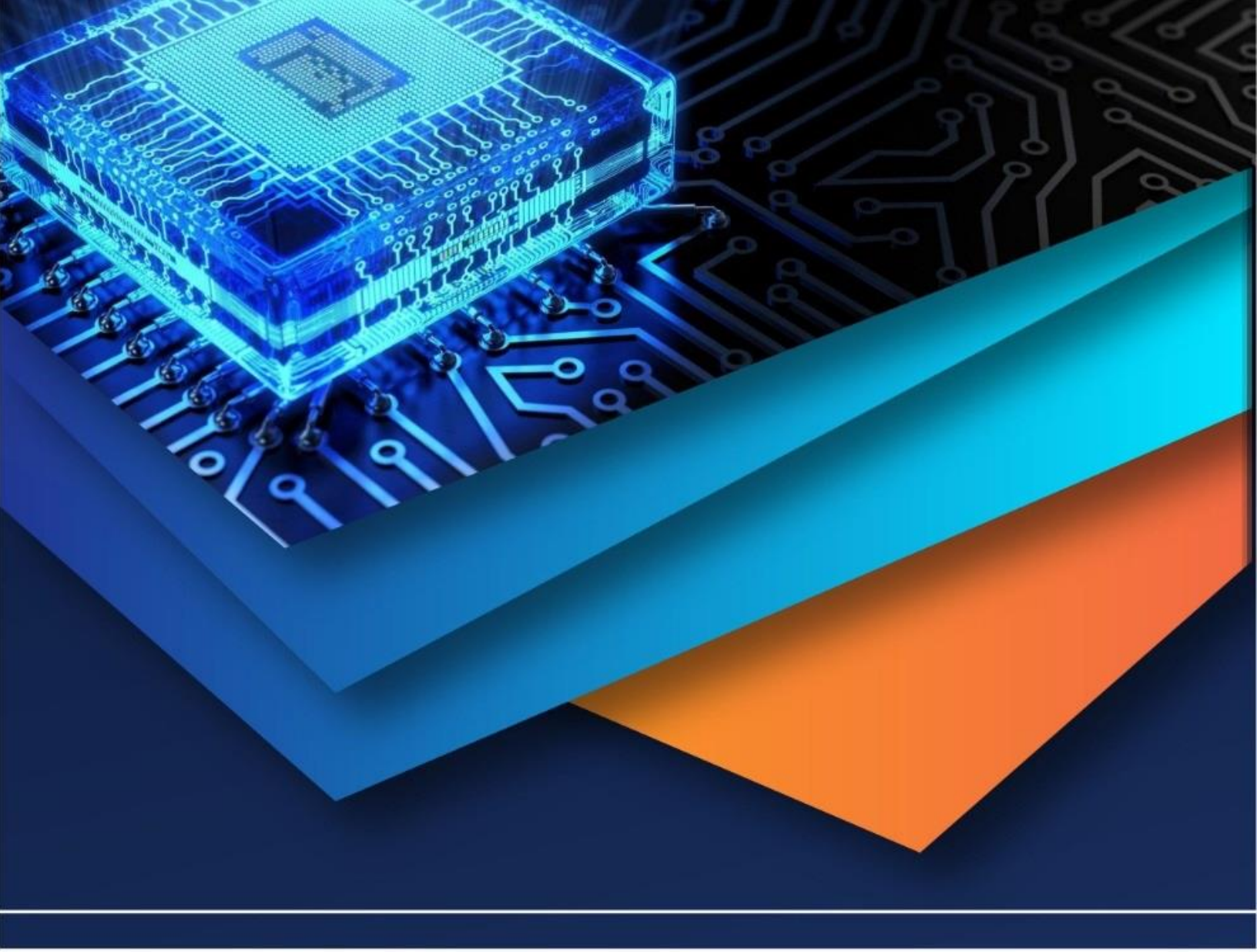

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