WASTEWATER TREATMENT FOR FLEXOGRAPHIC PRINTING FACTORY BY ADSORPTION WITH CORN COB CHARCOAL

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ABSTRACT

The objectives of this research are 1) to study the treatment of wastewater from flexographic printing factory by using corn cob charcoal in adsorption process and 2) to examine the efficiency of corn cob charcoal in color compared with activated carbon. The wastewater from R United Printing (Public) Co., Ltd. was examined and shown that absorbance value was 3.055 at wavelength 214 nm. The wastewater was then pre-treated by precipitation with 20-g alum. The reddish color was remained in water with the absorbance value at 572 nm of 0.037. The residue contaminant was removed by adsorption with corn cob charcoal by stirring with 5 and 10 g, respectively. The treated water after adsorption with 10-g corn cob charcoal was the best which could reduce the absorbance value at 0.025 or 99.18% color removal. It was indicated that the efficiency of 10-g corn cob charcoal was near 5-g activated carbon which could reduce better than corn cob charcoal with the efficiency of 99.41%.

INTRODUCTION

Flexography printing is popular in the printing and packaging industry that used for printing the print media and corrugated box packaging. The printing use water base inks and has wastewater from the washing machine process that impact on amounts of waste water. So, researchers should recognize about waste water treatment from printing and corrugated box packaging industry. In this research, we studied the waste water from R United Printing (Public) Co., Ltd. by passing through the process of sedimentation with alum in the amount of waste water by weight and used dye adsorption process agricultural waste such as corncobs that are burned to charcoal which helps to absorb chemical contaminants and the disposal of waste, including reduce the cost of waste water treatment. So, it used as a way to organize appropriate waste water system and reduce environmental pollution down.

METHODOLOGY

1. Preparation of wastewater

Preparation of wastewater is taken from the washing flexography printing machine within R United Printing (Public) Co., Ltd. by collecting the water samples from the clarifier that use bucket on water surface and must stir water before.

1.1 The study of characteristics of wastewater from flexography printing

Measure the light absorbance or color strength of the waste water using spectrophotometer.

1.2 Treatment by sedimentation

Precipitated by alum 20-g in wastewater 1000 cubic centimeters and stirred solution for 2 minutes, with agitators and leave for precipitation about 30 minutes, then filtered through filter paper to separate water and sediment for analyzing pH and light absorbance.

2. The study of wastewater treatments by color absorption with stirring solution

Taking the water 1000 cubic centimeters when passing precipitation put in beaker and preparing agitators and magnetic stirrer for stirring solution by adjusting the rotation at 8 and put charcoal cob powder 5-g and 10-g, then stir and leave for 2 hours to separate the water after absorbing out from charcoal cob by filtration through filter paper and analyze pH value and light absorbance.

3. The analysis quality of water after color absorption.

3.1 Monitoring pH value

Take the water passing absorption process to measure pH value by pH meter about 3 times and find total average.

3.2 Monitoring the color

Take the treated water to check the color by measuring light absorbance of water. The graph is shown the absorbance in wavelength range 400-700 nm and the absorbance (Abs) at a wavelength of that color.

4. The analysis and data interpretation

4.1 The statistical Analysis of this research is mean as shown:

$$\overline{X} = \frac{\sum_{i=1}^{n} Xi}{n}$$

4.2 Percentage

$$P\% = \frac{f \times 100}{N}$$

RESULTS AND DISCUSSION

1. Properties of wastewater from process of flexography printing

Figure 1 shows the wastewater from the washing flexography printing machine does not precipitate. Found that the turbidity of the water is dirty and has a lot of sediment. The pH value is 6.73. It indicates that the property is a weak acid. And Figure 2 shows the absorbance in the wavelength 400-700 nm with spectrophotometer. It's shown that absorbance value was 3.055 at wavelength 214 nm.

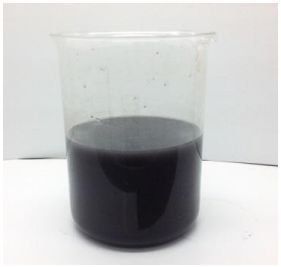

Figure 1. The wastewater from the washing flexography printing machine does not precipitate.

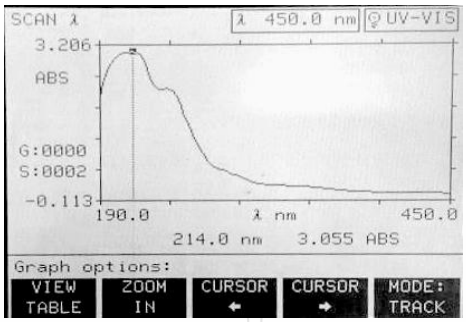

Figure 2. The wavelength and the absorbance value of the wastewater from spectrophotometer.

Precipitated by alum 20-g in wastewater 1000 cubic centimeters and stirred solution for 2 minutes, with agitators and leave for precipitation about 30 minutes, then filtered through filter paper to separate water and sediment. It was found that the water was more clear and sediment were decreased in Figure 3

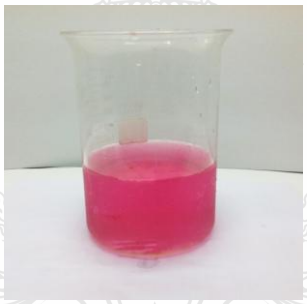

Figure 3. the wastewater was filtered through a filter paper.

2. The adsorption for color removal by stirring

Measure the pH value and absorbance measurements to examine the efficiency of corn cob charcoal in color compared with activated carbon by stirring with 5 and 10-g, respectively. Figure 4 and Figure 5 show pH value and the absorbance value of the treated water after adsorption for color removal by corn cob charcoal and activated carbon. It indicated that the activated carbon and the corn cob charcoal could reduce acidity of the treat water and the absorbance value also decreased. 10-g of activated carbon could reduce better than corn cob charcoal with the absorbance value at 0.003.

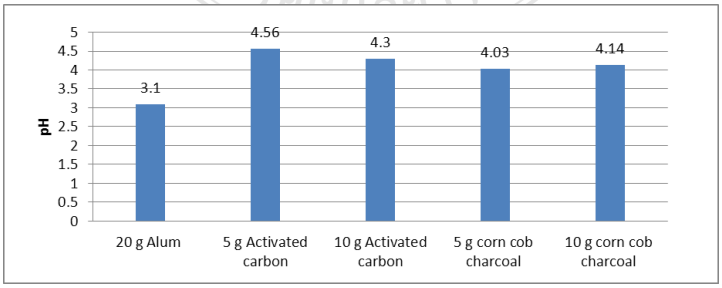

Figure 4. The pH value of the treated water after adsorption for color removal by stirring with activated carbon and corn cob charcoal.

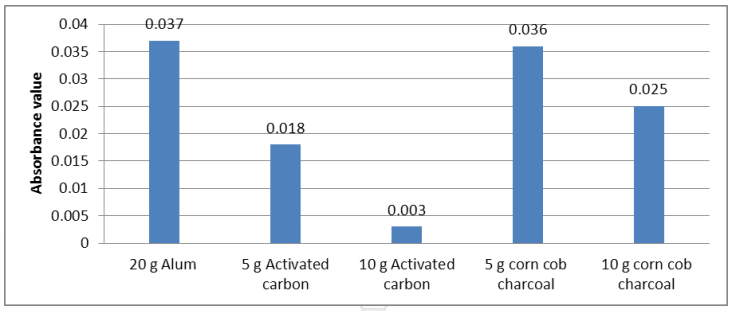

Figure 5. The absorbance value of the treated water after adsorption for color removal by stirring with activated carbon and corn cob charcoal.

The efficiency of corn cob charcoal in color compared with activated carbon was examined and was shown in the table 1. It shows that the efficiency of activated carbon in color removal is better than the corn cob charcoal. However, 10-g corn cob charcoal could reduce the absorbance value with the efficiency of 99.18% color removal. It was near 5-g activated carbon which could reduce better than corn cob charcoal the efficiency of 99.41% color removal. However, both activated carbon and corn cob charcoal could reduce the acidity of the treated water as well.

Table 1: The efficiency of color removal

Quality	Corn cob charcoal		Activated carbon		Difference	
	5-g	10-g	5-g	10-g	5-g	10-g
pH value	4.03	4.14	4.56	4.30	0.53	0.16
Color removal (%)	98.82	99.18	99.41	99.89	5.73	0.71

CONCLUSION

Agricultural waste is an option that can reduce the cost of wastewater treatment. The treated water after adsorption with 10-g corn cob charcoal was the best which could reduce the absorbance value at 0.025 or 99.18% color removal. It was indicated that the efficiency of 10-g corn cob charcoal was near 5-g activated carbon which could reduce better than corn cob charcoal with the absorbance value at 0.003 or the efficiency of 99.41%. However, both activated carbon and corn cob charcoal could reduce the acidity of the treated water as well.

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